

XAG Agricultural Drone

Service Manual

Version 2.9.1 7-12-2023

Contributed by XAG Technical Team

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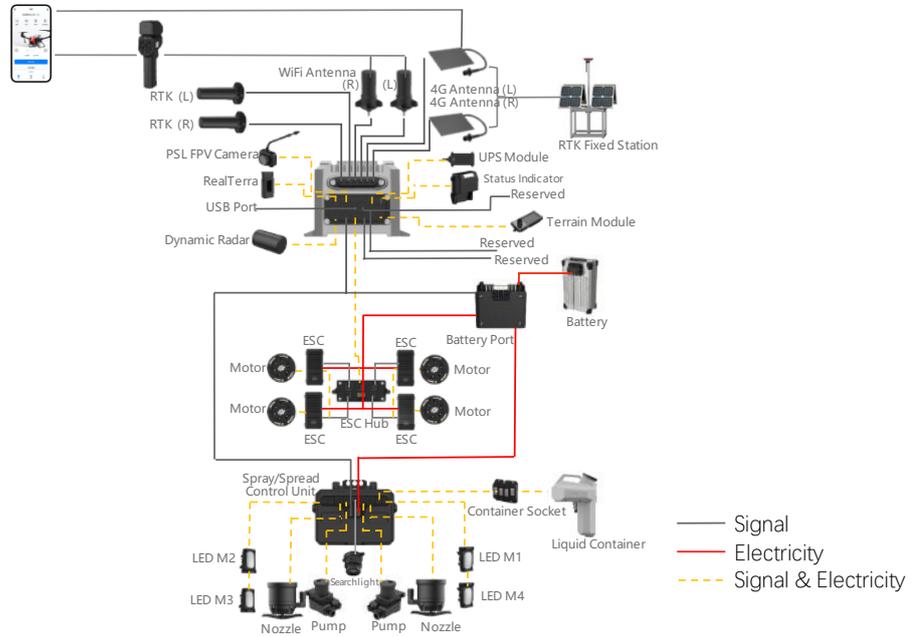
Chapter 1

UAV Components, Sections, and Systems

UAV Configuration Schematic

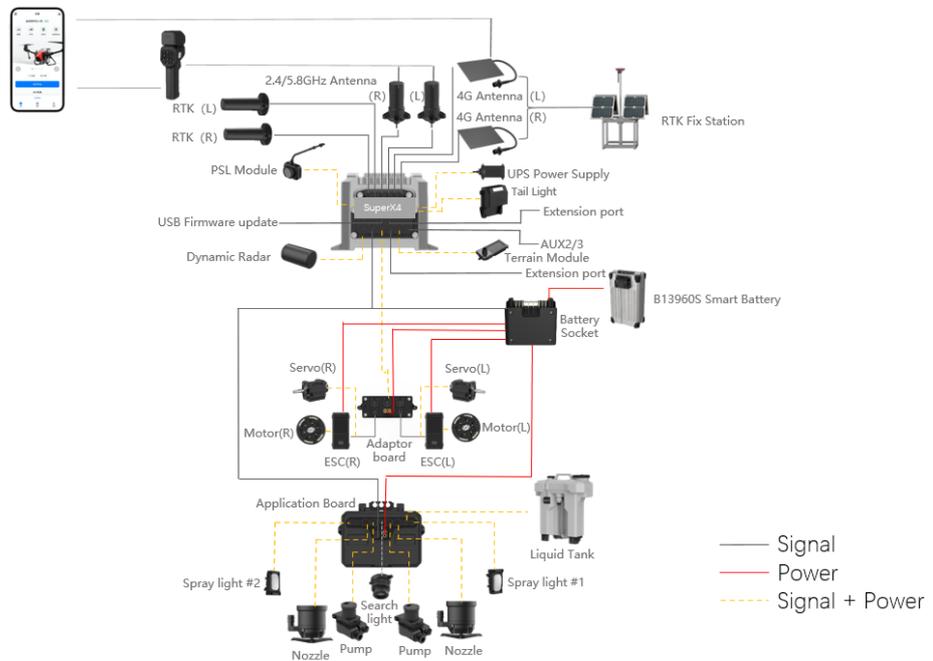
P40 Schematic

P40 Configuration Schematics



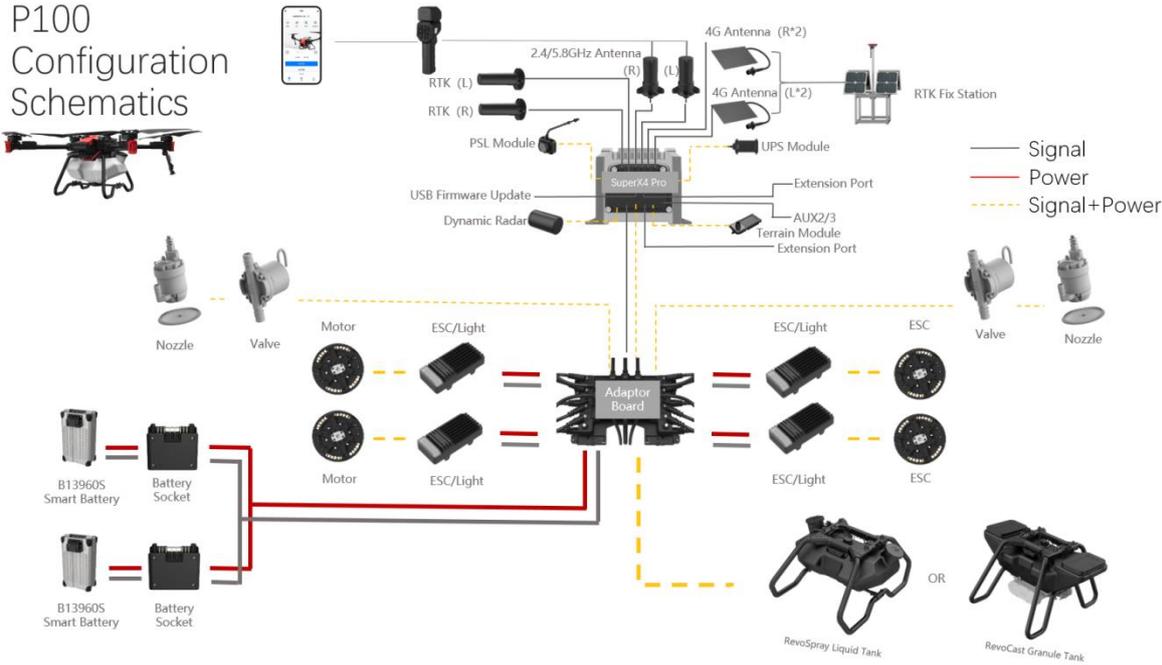
V40 Schematic

V40 Configuration Schematics



P100 Schematic

P100 Configuration Schematics



Propulsion System

Overview

UAV propulsion system is the machine that produces force to run the aircraft. The force of flight consists of altitude, roll, pitch, and yaw. Air fluid is accelerated by the rapidly spinning propellers, and the reaction to this acceleration produces a force on the aircraft.

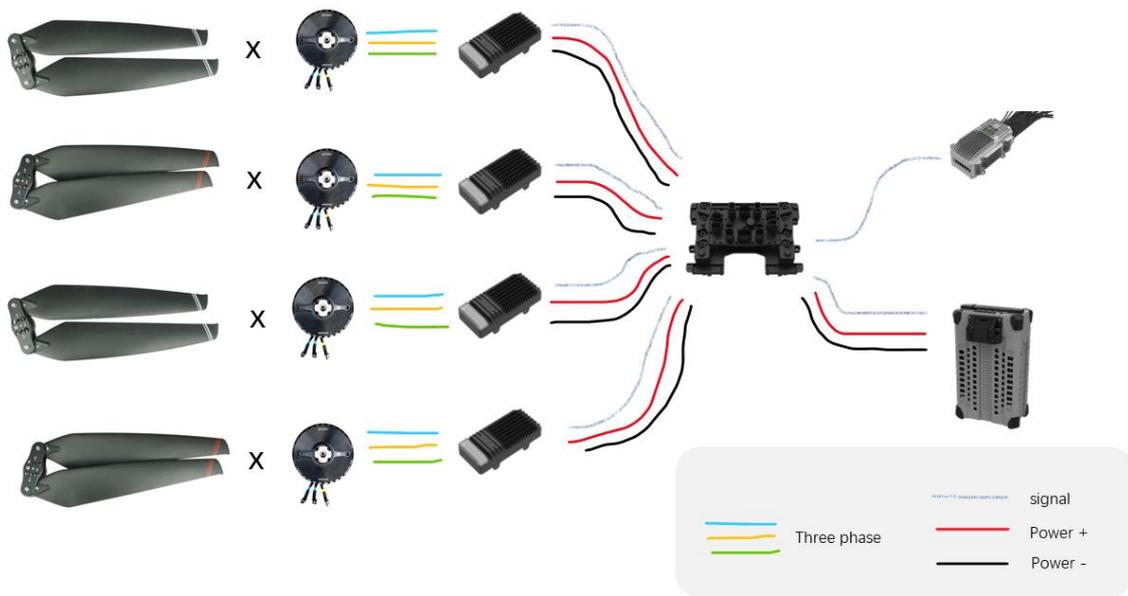


	P40	V40	P100
Maximum Takeoff Weight	49.1 kg	45.8 kg	88 kg
Rated Takeoff Weight	49.1 kg (Spraying)	45.8 kg (Spraying)	88 kg (Spraying)
	49.1 kg (Spreading)	45.8 kg (Spreading)	51.5 kg (Spreading)
Maximum Operating Flight Speed (Dynamic radar On/Off)	10m/s	8m/s	13.8m/s

**No matter that dynamic radar is on or off, their maximum operating flight speed are the same.*

Model	Hovering Duration
	<i>* Tested in an environment near sea level with a wind speed of less than 3 m/s. For reference only</i>
P40	15 min (with no-load @20,000 mAh & takeoff weight: 29.1 kg) 6.5 min (with full-load @20,000 mAh & takeoff weight: 49.1 kg)
V40	13.5 min (with no-load @20,000 mAh & takeoff weight: 29.8 kg) 6.8 min (with full-load @20,000 mAh & takeoff weight: 45.8 kg)
P100	17min (no-load @20000mAh x2 & takeoff weight 48kg) 7min (full-load @20000mAh x2 & takeoff weight 88kg)

P100 propulsion system schematics



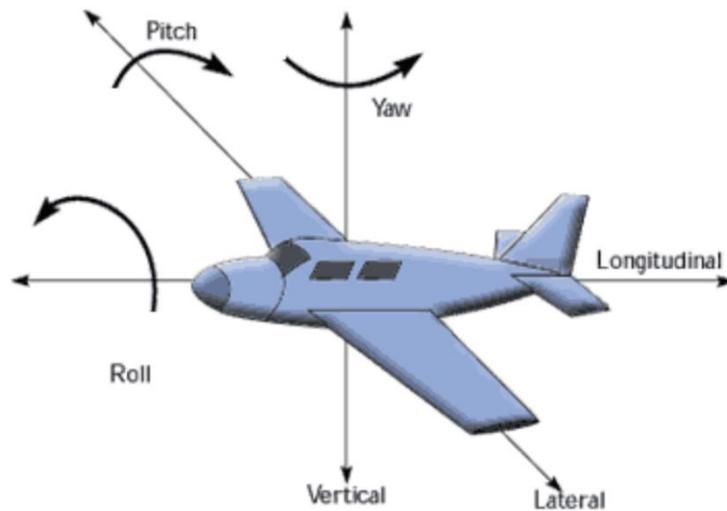
Attitude Flying: Establishing Control of the Aircraft's Flight Path

Attitude provides information about an object's orientation with respect to the local level frame (horizontal plane) and true north. GNSS attitude solutions typically consist of three components: roll, pitch and yaw.



The easiest way to understand what we mean by attitude is to consider a plane with three linear axis running through it:

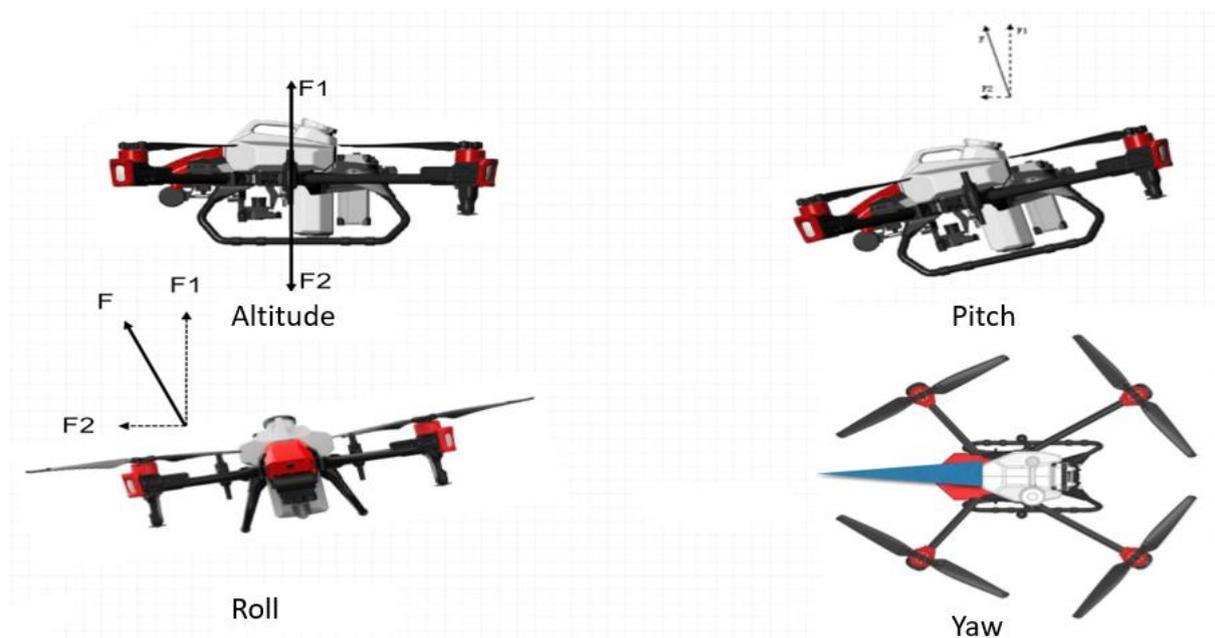
- Wing up/down = Roll
- Nose up/down = Pitch
- Nose left/right = heading/yaw/azimuth



Angular measurement on the horizontal plane, with respect to true north, is referred to as yaw. Yaw is also known as azimuth or heading. The angular measurement on the vertical plane, with respect to the local level frame, is computed as pitch or roll.

Attitude measurements are important for precise positioning in UAV. For XAG UAV, the attitude flying will look like:

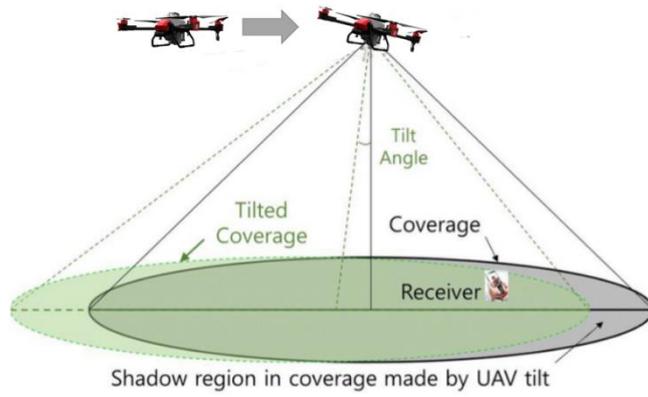
P40/P100:



If the tilt angle reaches its limit, the UAV may lost balance and possibly crash immediately. To avoid this accident, please do not fly your drone when,

- Poor propulsion system
- Strong wind
- Heave rain

- container is too full

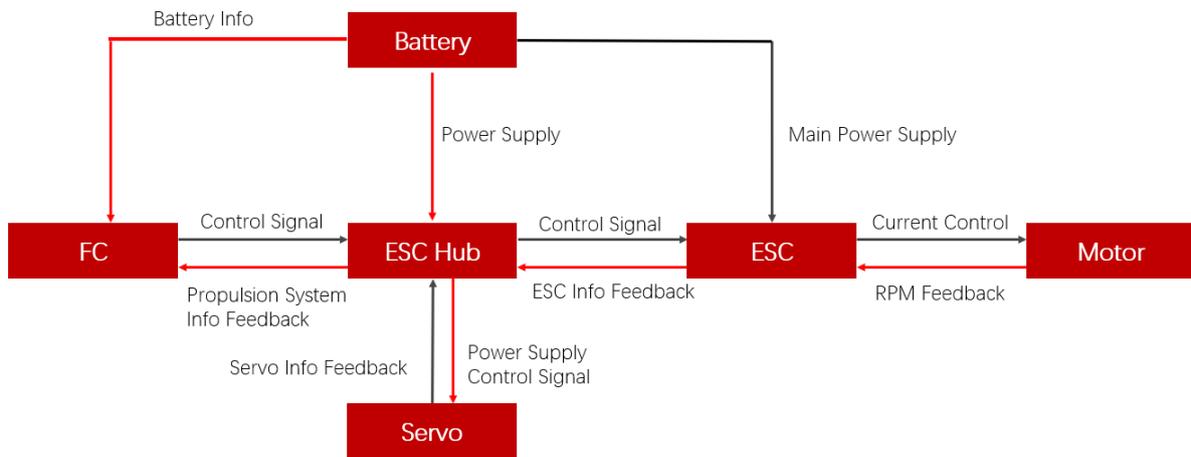


Regarding to P100 RevoCast, its propulsion system requires at least two batteries to take off.

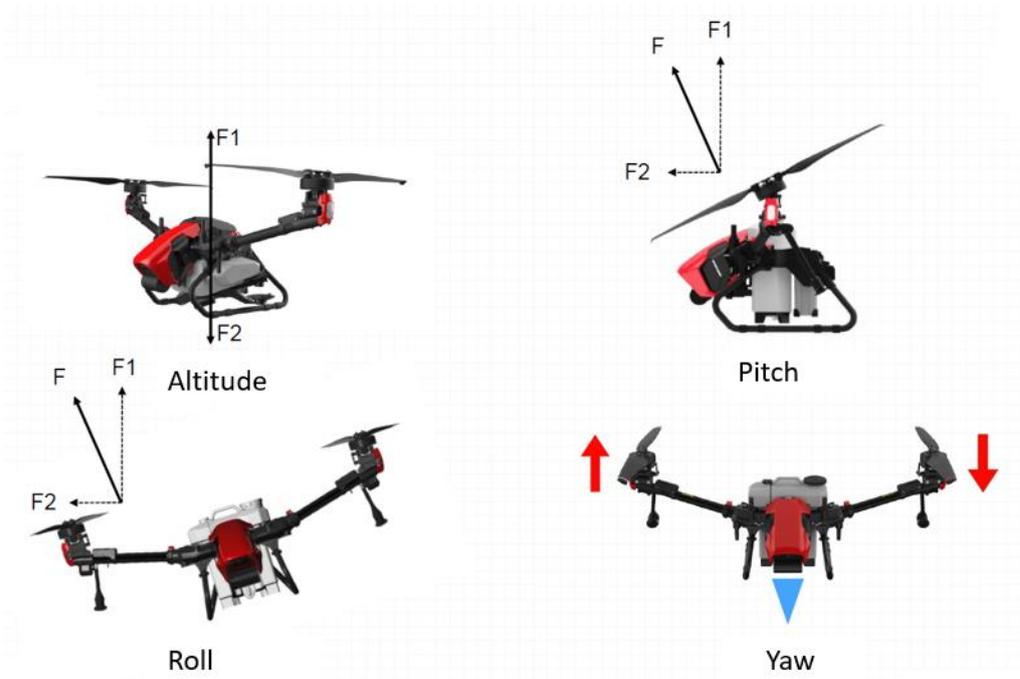
Regarding to P100 RevoSpray, its propulsion system requires at least one battery to take off.



V40 Duo Propellers Drone Data flow

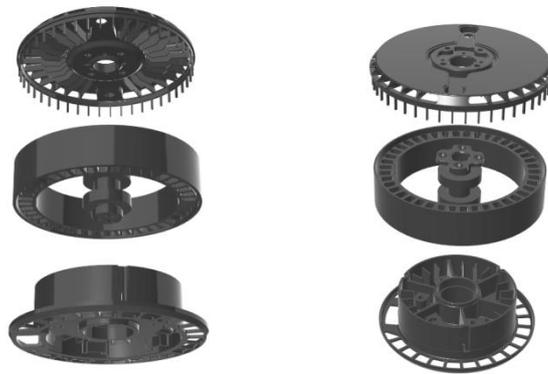


V40 attitude:



Motor (three-Phase Induction Motor)

The motor is used to convert an electrical form of energy into mechanical form. XAG uses three phase induction motor that operates on three phase supply. The construction is very simple and robust. It has mainly two parts. They are stator and rotor. The three-phase supply current produces an electromagnetic field in the stator winding which leads to generate the torque in the rotor winding of three phase induction motor having magnetic field.



UAV Model	Diagram
P100 EN/CN P40 EN/CN	
V40 CN	
V40 EN	

Electronic Speed Controller

The electronic speed controller (ESC) is an essential part of an UAV propulsion system's hardware. It acts like the brain of the system by telling the motor how fast to go based on data signals it receives from the flight control. The role of the ESC is to act as the regulating middleman between the battery and the electric motor. It controls the rotation of the motor by delivering timed electric signals that are translated into changes in speed. It uses the direct current from the battery coupled with a switch system to achieve an alternating three-phase current that is sent to the motor.

Comparison Table of P40/V40/P100

	P40 ESC	V40 ESC	P100 ESC
photo			
LED indicator	×	×	✓

Foldable Propeller

Drone propellers are a replaceable part of a drone that generate airflow by rapidly spinning which acts as a propulsion system that creates lift and enables a drone to fly. Changing the speed of specific propellers enables it to ascend, descend, hover in place and it also affects the drone's yaw, pitch, and roll.

P100 Propeller

47" CW



47" CCW



Propeller tip up/down can weaken the vortex.



XAG propellers tips. Some tip up while others tip down. But both are proven to weaken vortex.



If you are not sure what vortex is. The below picture is the propellers vortex in fluid.

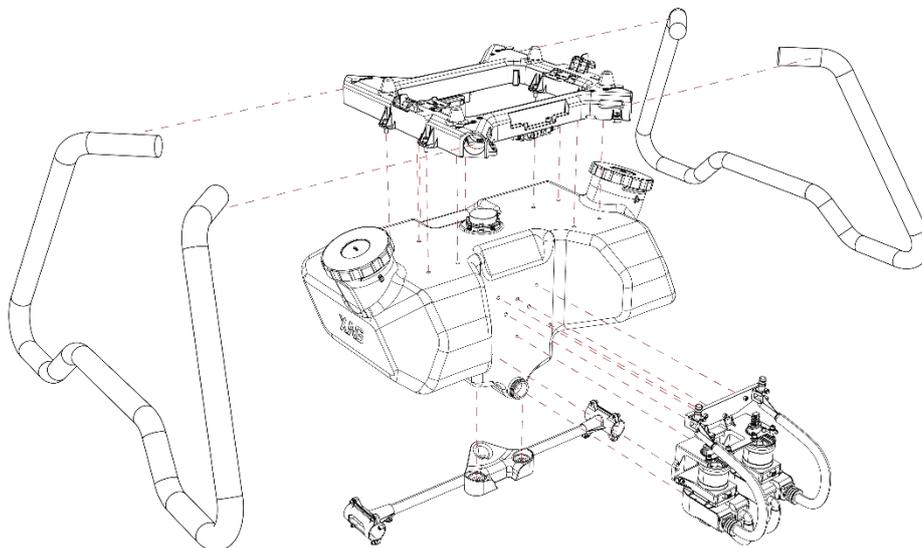


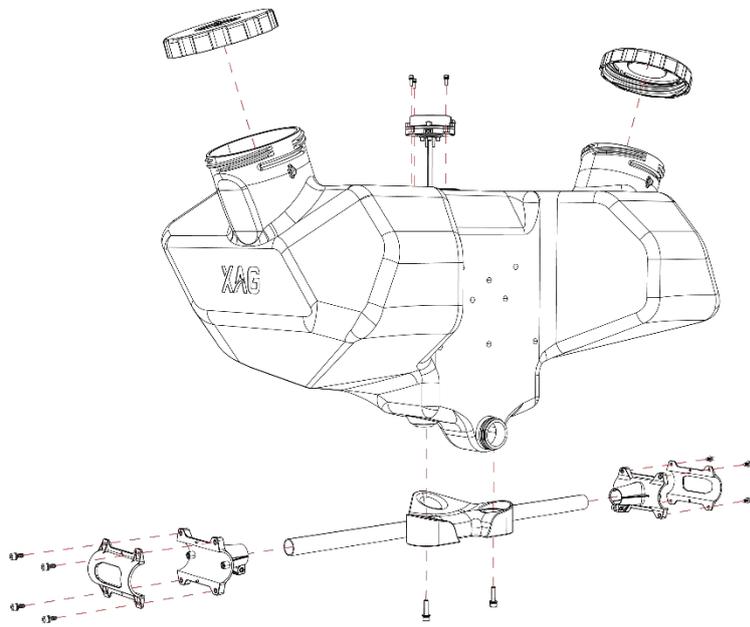
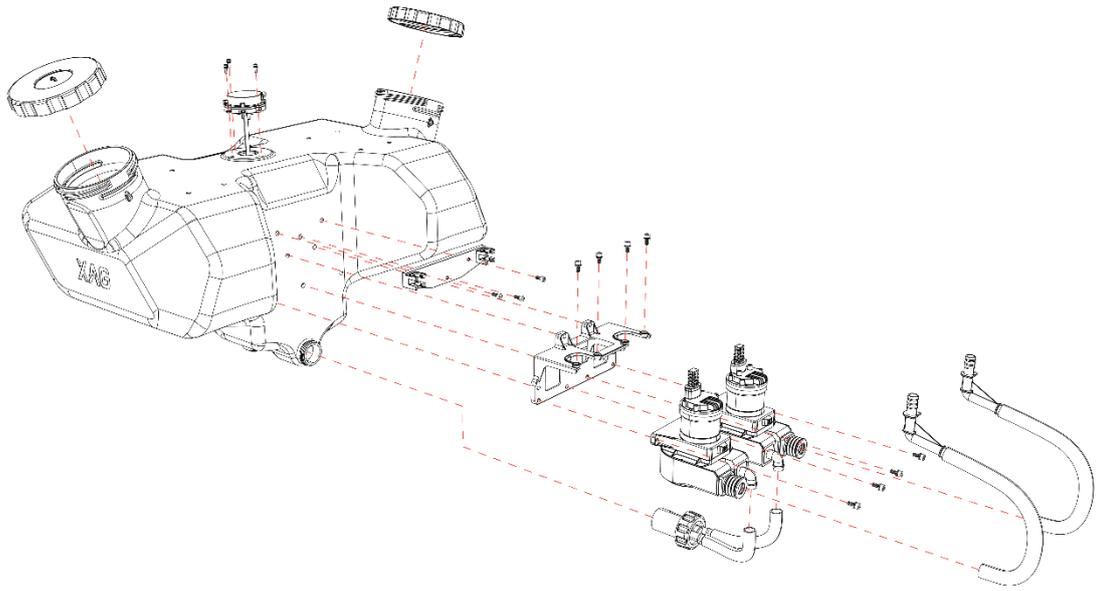
RevoSpray

Variants

	P40	V40	P100
Tank photo			
Tank size	20	16	40L
Max. flow rate	10L/min	10L/min	12L/min
number of Peristaltic Pump	2	2	2
Atomized droplet size	60-400 μm	60-400 μm	60-400 μm
Max. spraying width	10m	10m	10m
Adjustable spray bar	×	×	✓
magnetic float level transmitter	✓	✓	✓

P100 RevoSpray Structure

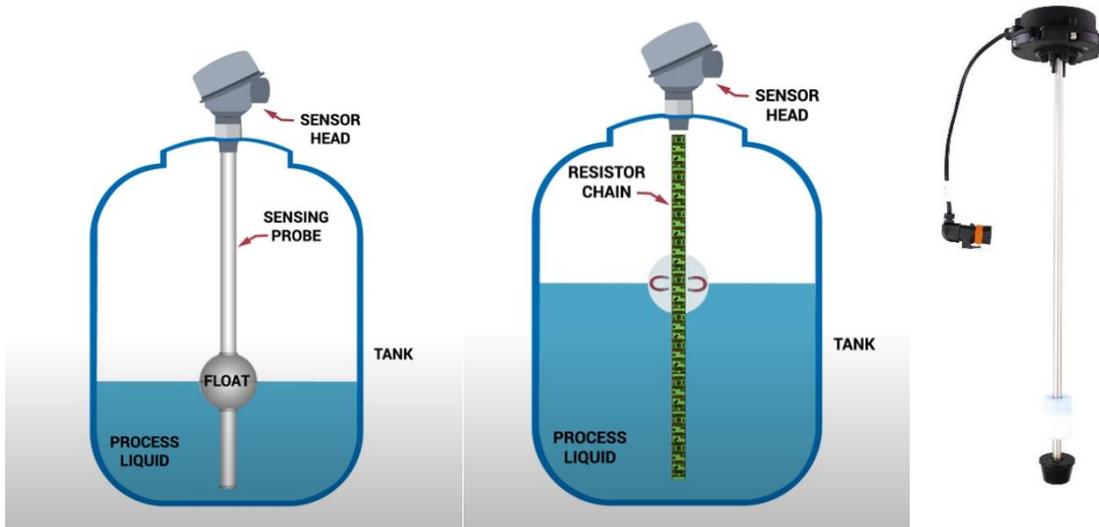




Basic Concept of Smart Liquid Tank

magnetic float level transmitter

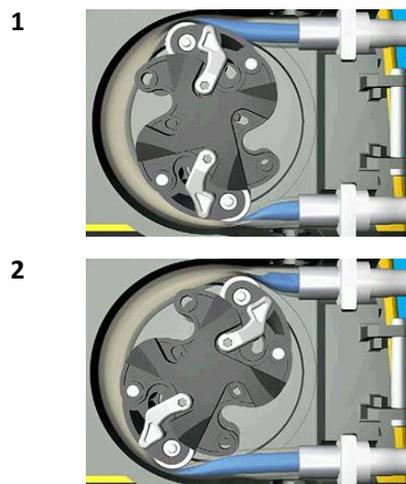
A float moves with the liquid surface. Magnets within the float cause a change in resistance along a resistor chain built into the sensing probe. The change in resistance is used to calculate the level of the liquid. This design of float level transmitter is non-invasive and protected the electronics components from chemical erosion.

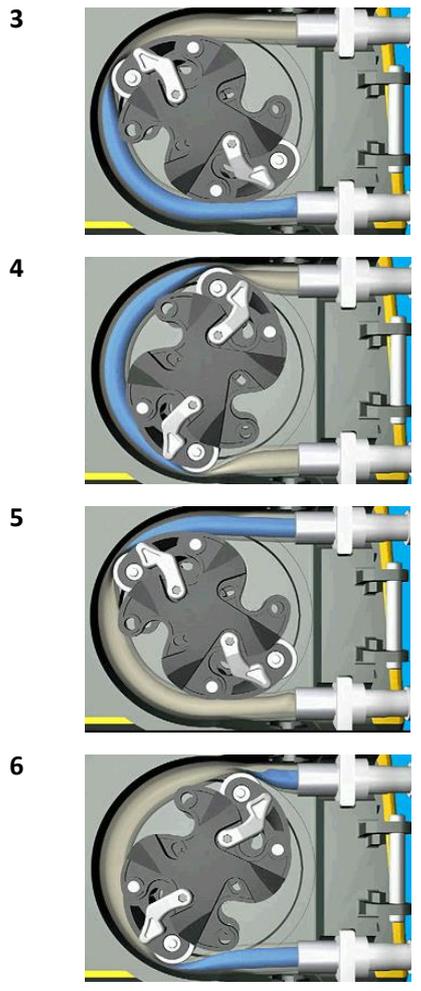


Peristaltic pump

A peristaltic pump, also commonly known as a roller pump, is a type of positive displacement pump used for pumping a variety of fluids. The fluid is contained in a flexible tube fitted inside a circular pump casing. The peristaltic pumps work through rotary motion. The rotor has 2 wipers attached to its external circumference, which compress the flexible tube as they rotate by. The part of the tube under compression is closed, forcing the fluid to move through the tube. Additionally, as the tube opens to its natural state after the rollers pass, more fluid is drawn into the tube. This process is called peristalsis and is used in XAG spray system.

No. Peristaltic pump motion in one cycle





Peristaltic Pump	V40, P40	P100
Photo (pump A, pump B)		
Quantity	2	2
Voltage	50V	50V
Maximum System Flow Rate	10L/min	12L/min
Maximum Flow Rate (Single Pump)	5L/min	6L/min
Installation	Under fuselage	Detachable Liquid tank

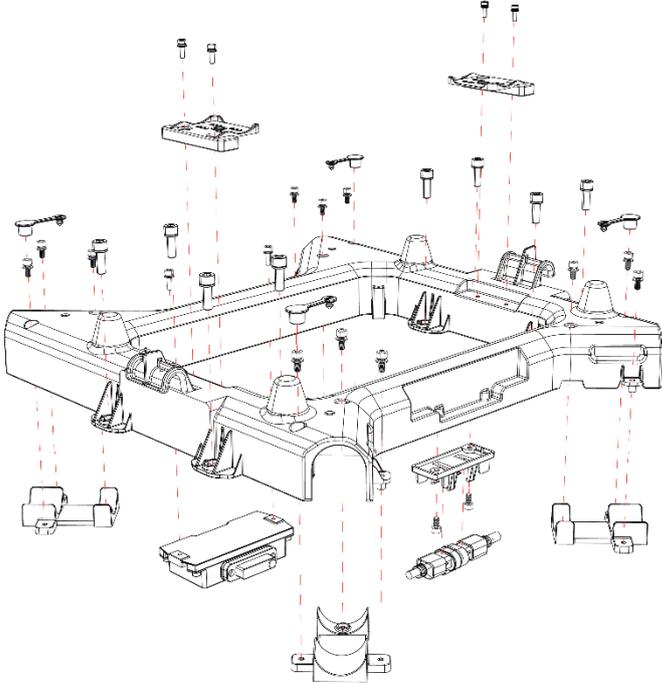
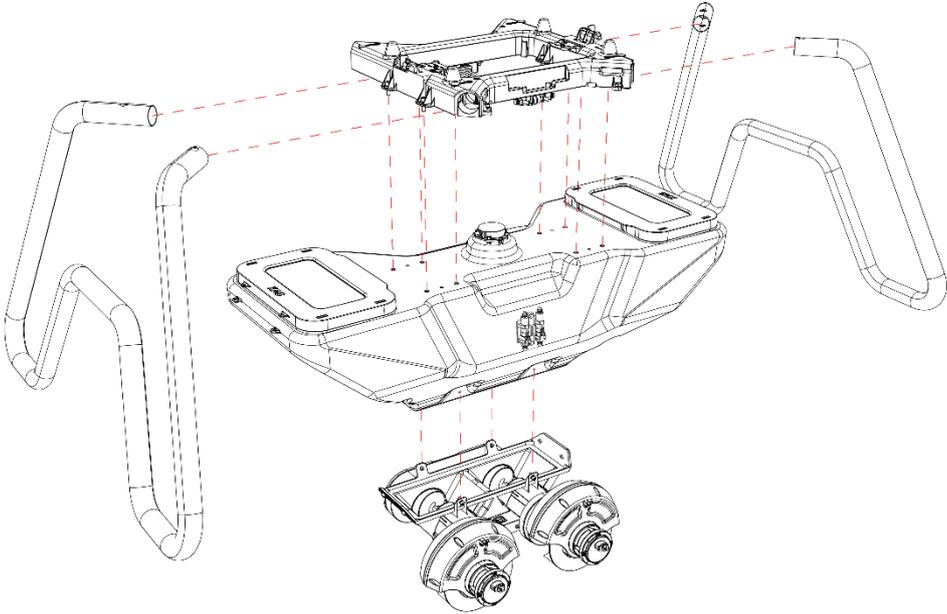
RevoCast 2 for P100

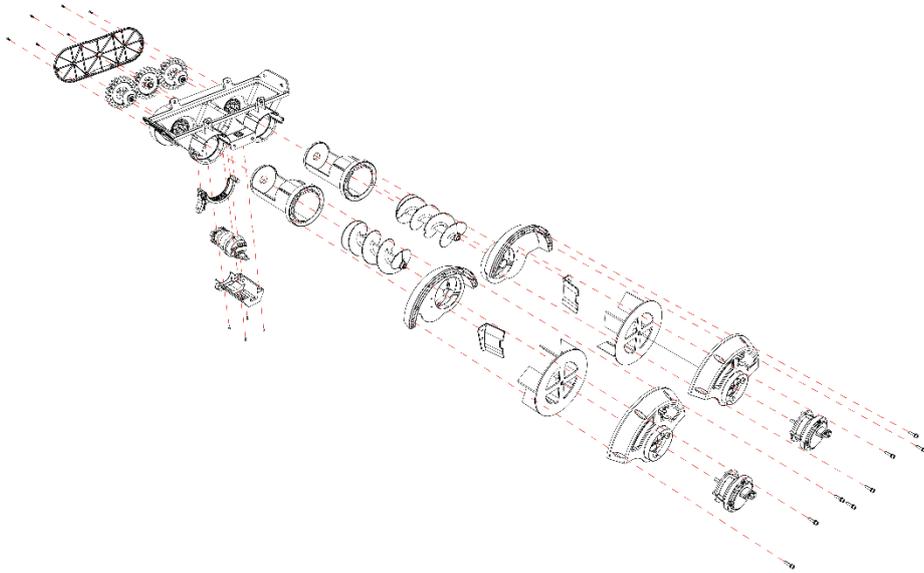
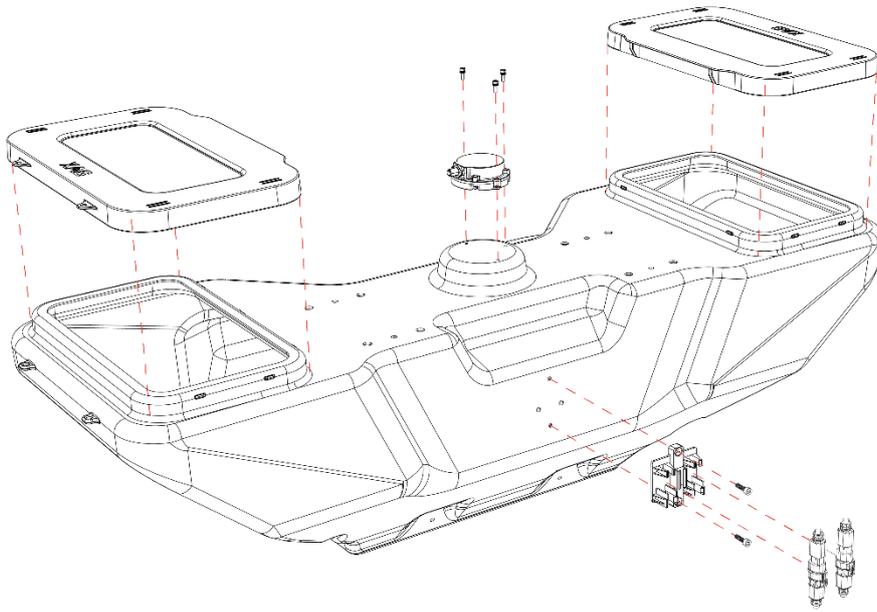
Introduction

RevoCast 2 is a spreading system designed for P100. It adopts a brand-new design for spreading disc and screw feeder, reshape the spread methodology of agricultural drones that greatly enhance the efficiency and accuracy of spreading granules.

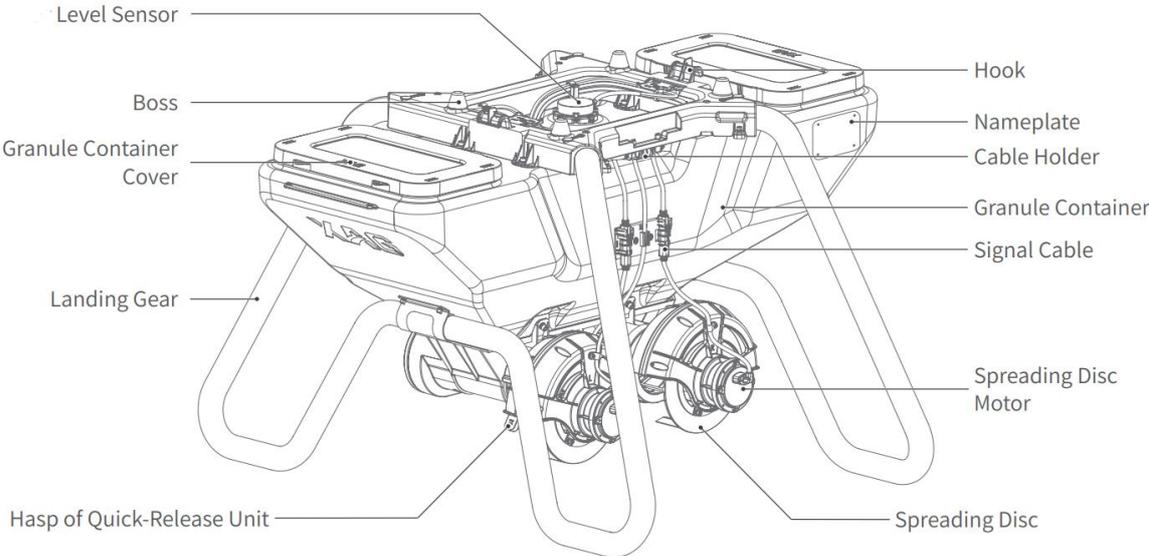


Structure

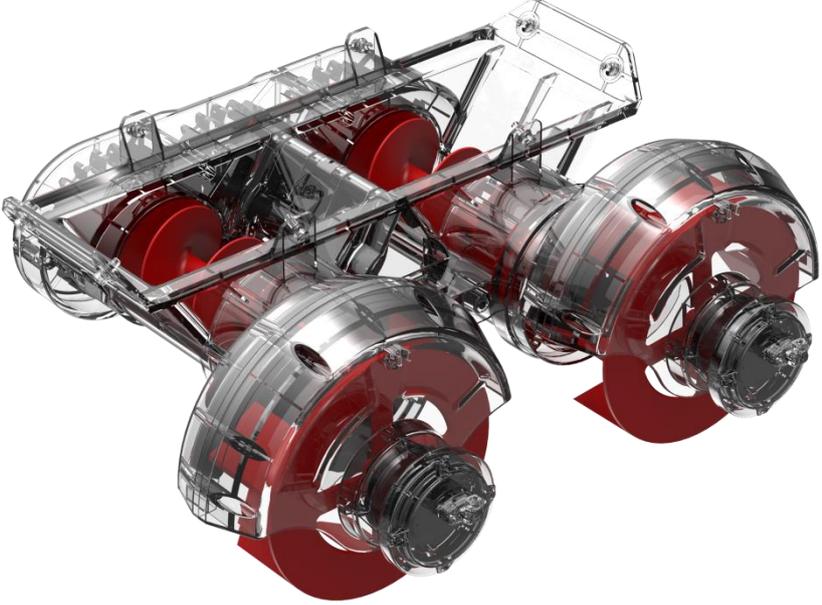




Main Component

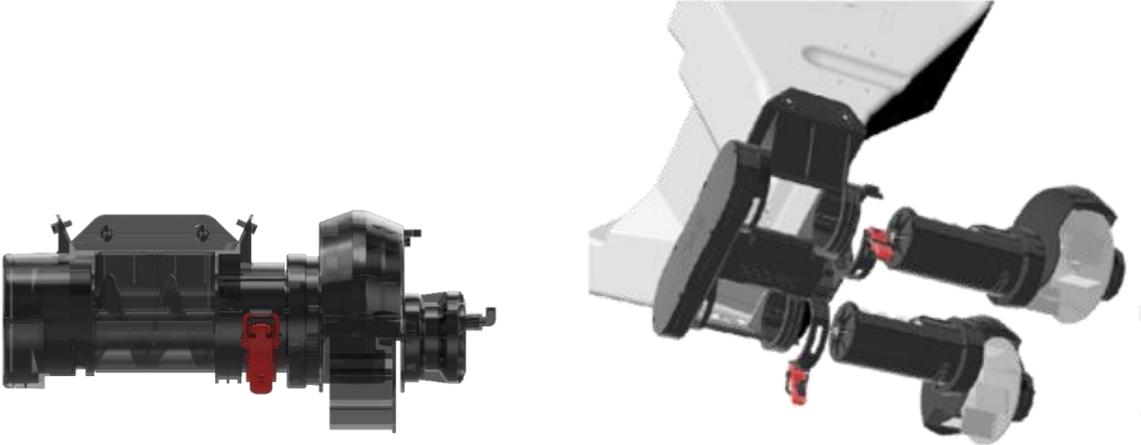


The two key mechanical parts of RevoCast system is the spiral feeder and spreading disc. The spiral feeder is used to control the flow of granules. The spread disc is used to control the spread width.



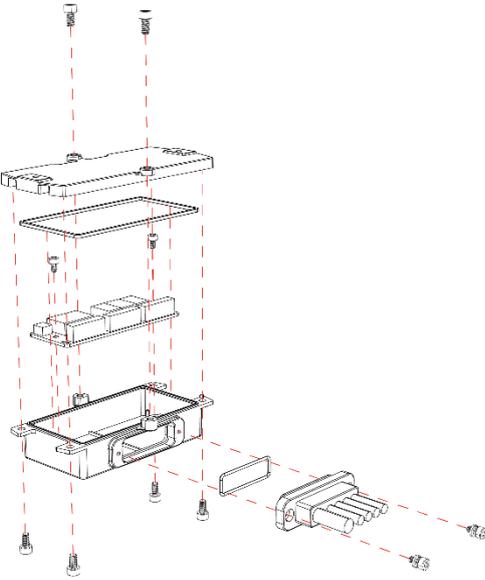
Fast release

Fast release allows user quickly clean or change spiral feeder.



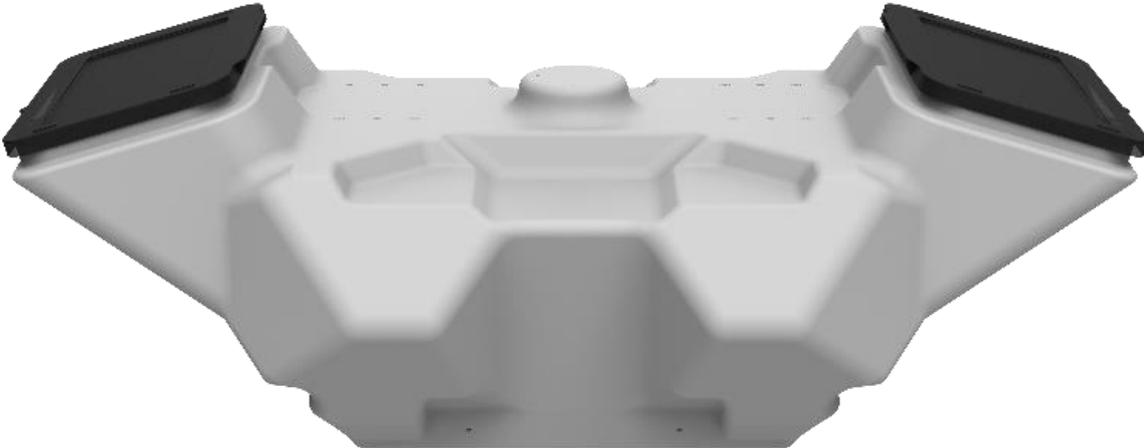
Application system cable hub

Application system cable hub contains the high voltage circuitry that controls RevoCast operation.

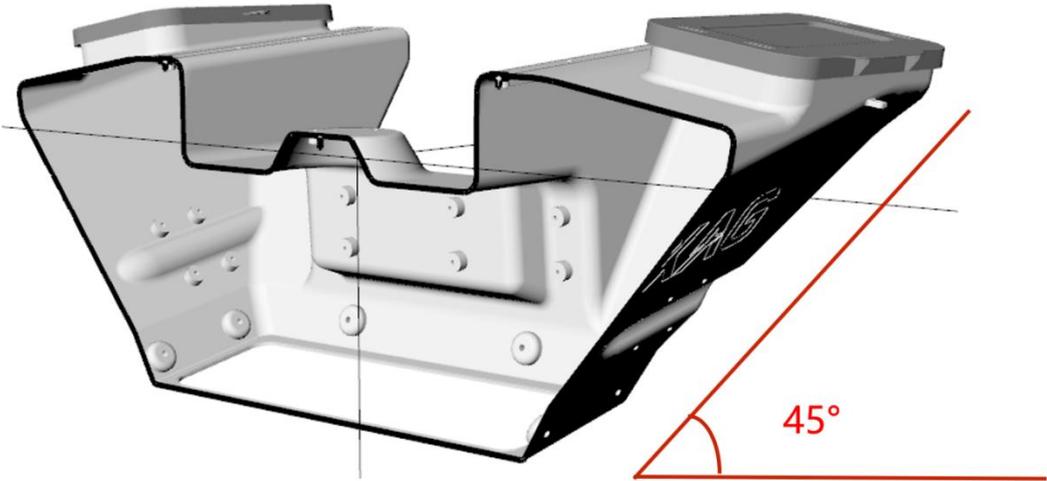


Granule Container

Granule container has the funnel shape that allows the granule naturally moves to the bottom.



The trapezoid shape allows granules flow downward smoothly, and minimize granules trapped inside the container.

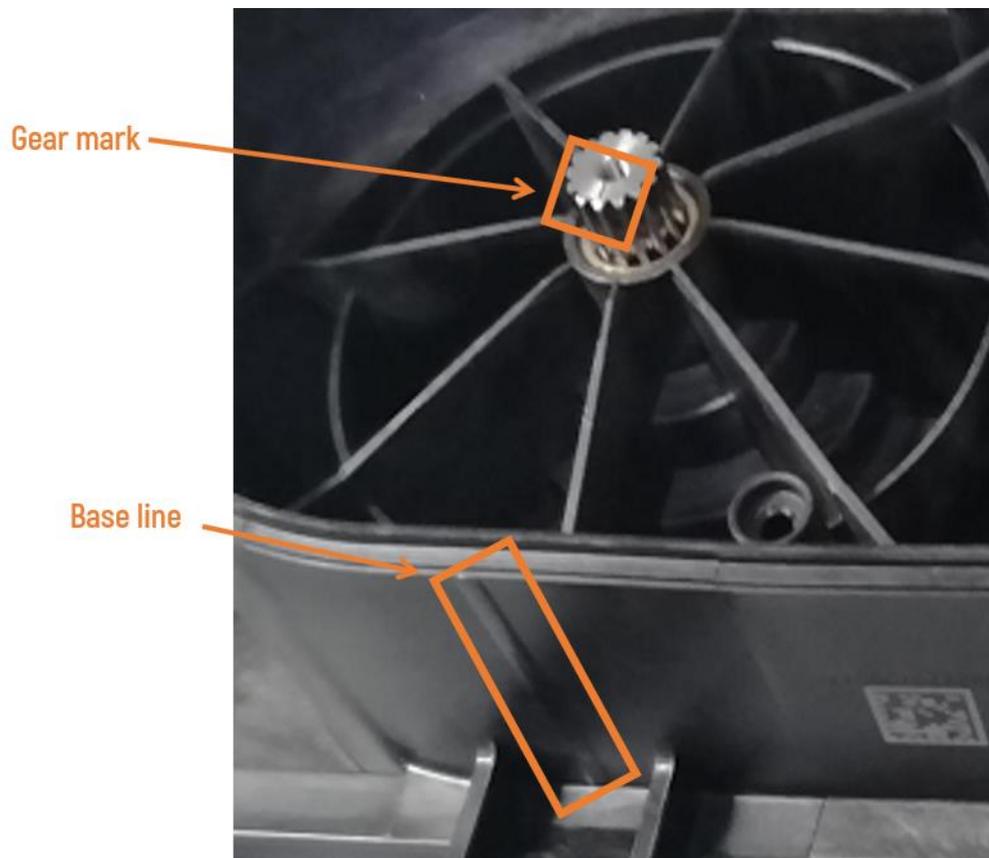


Spiral Feeder Motor

Spiral feeder motor allows the rotation of spiral feeder.
The spiral feeder motor and ESC are sealed inside the

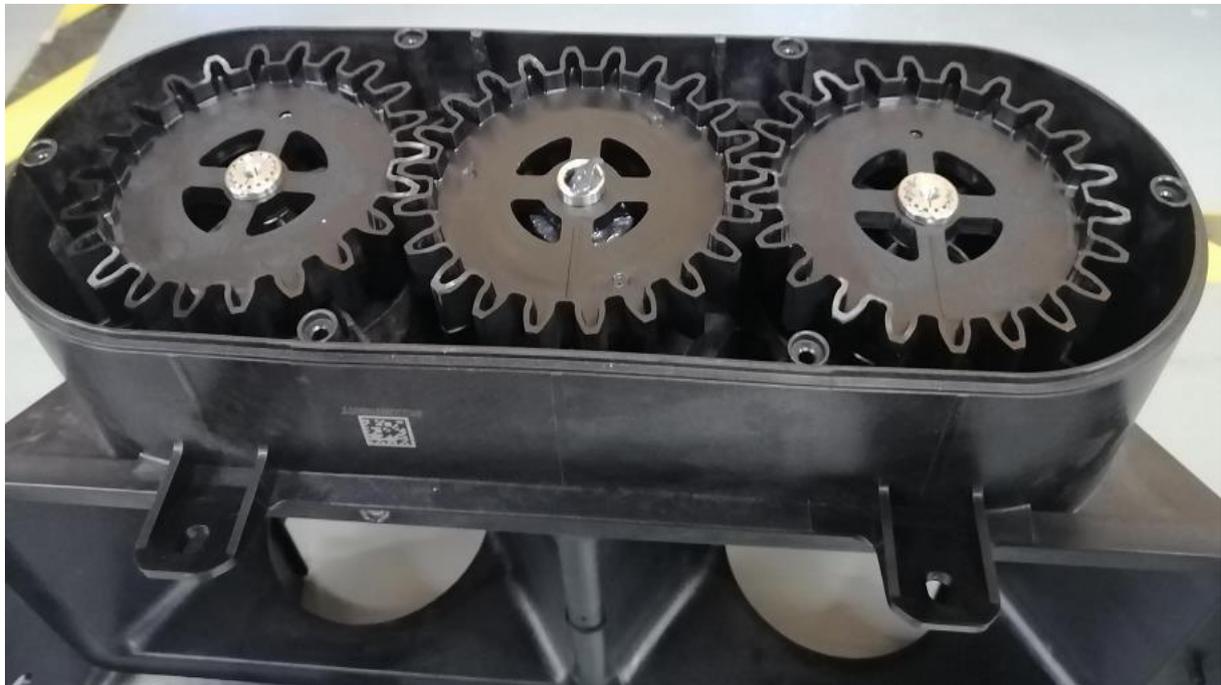


The gear mark should be align with base line.



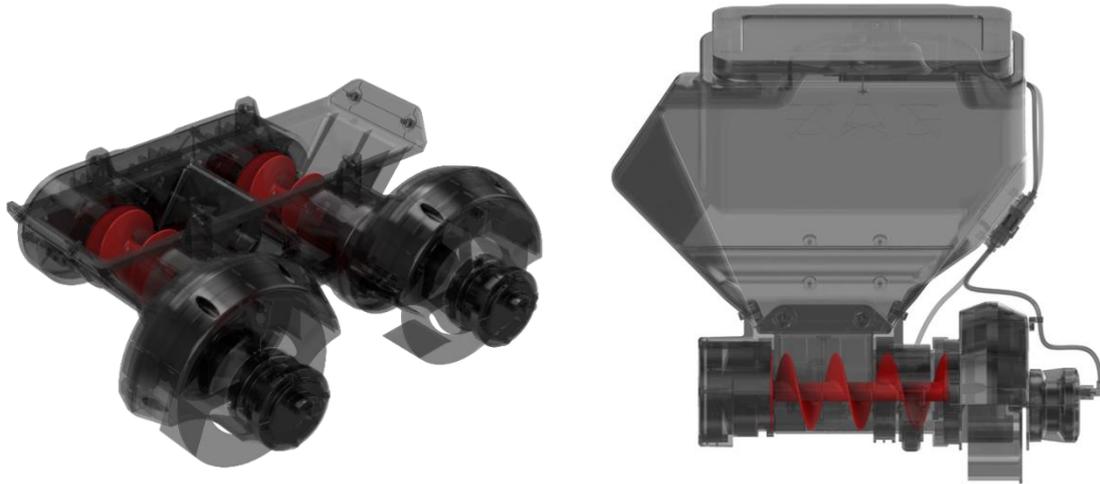
The pictures of synchronized gear:

synchronized gear of spiral feeder	Synchronized gear of spiral feeder motor
	



Spiral Feeder

Spiral feeder is used to deliver granules to spreader disc in certain rate. During the flight mission, the UAV will generally speed up or slow down. To ensure the dosage per hectare, the spiral feeder rotation rate will adjust accordingly.

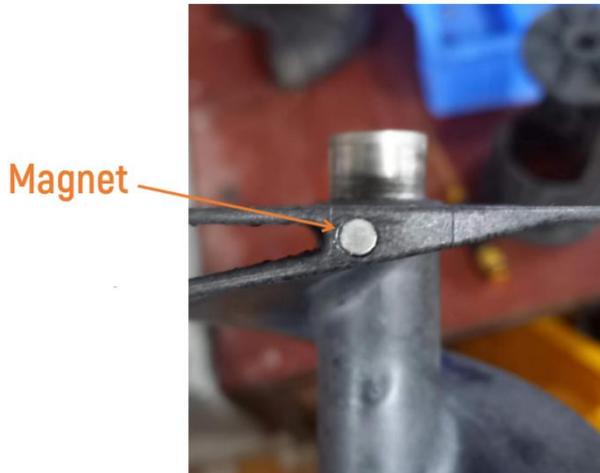


It's important to know that there are three sizes of spiral feeder. They are large, medium, small respectively

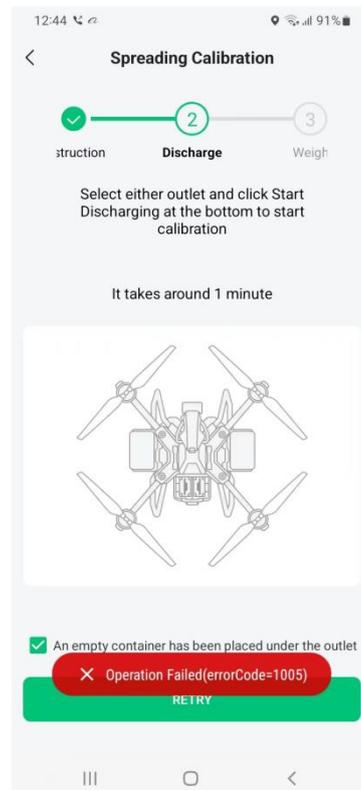




Please be aware of that A magnet on spiral feeder is used for measuring the spiral feeder stop position.

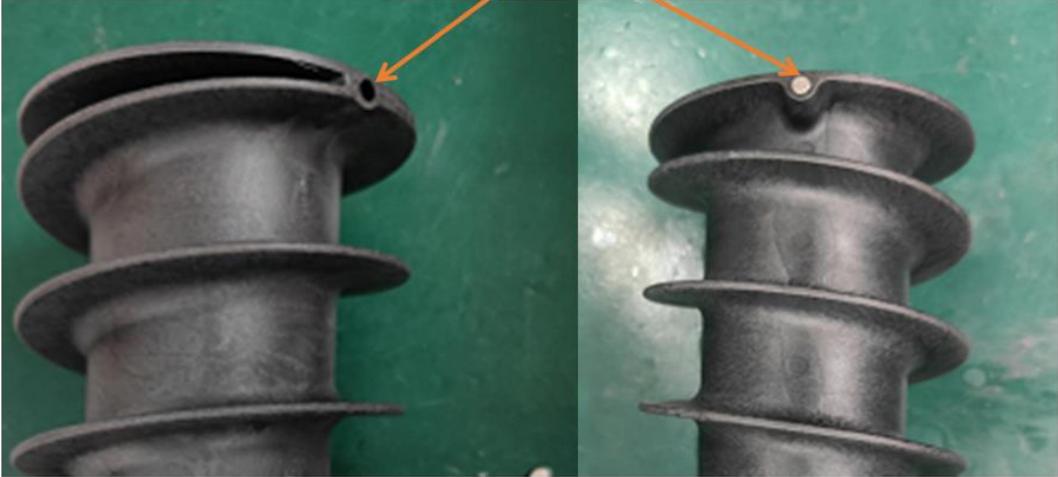


If magnet is loss, the spiral feeder will no longer work and need to be replaced.



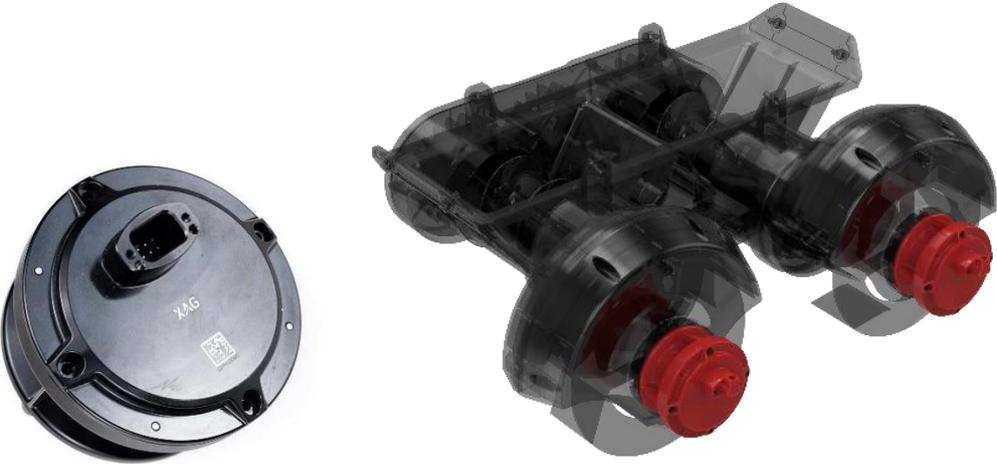
There are two holds on one spiral feeder but only one magnet needs to be installed.

Two holes per spiral feeder but only one Magnet is need to installed.



Spreader Motor

Spreader motor is used to rotate spreader disk.

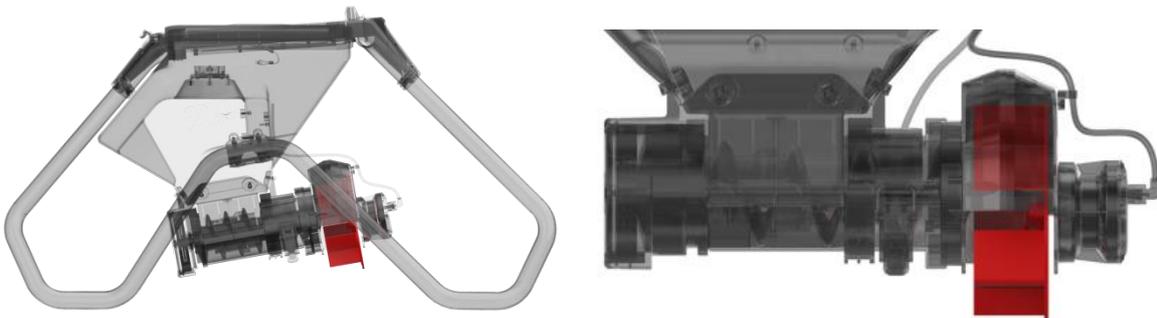


Spreader Disc

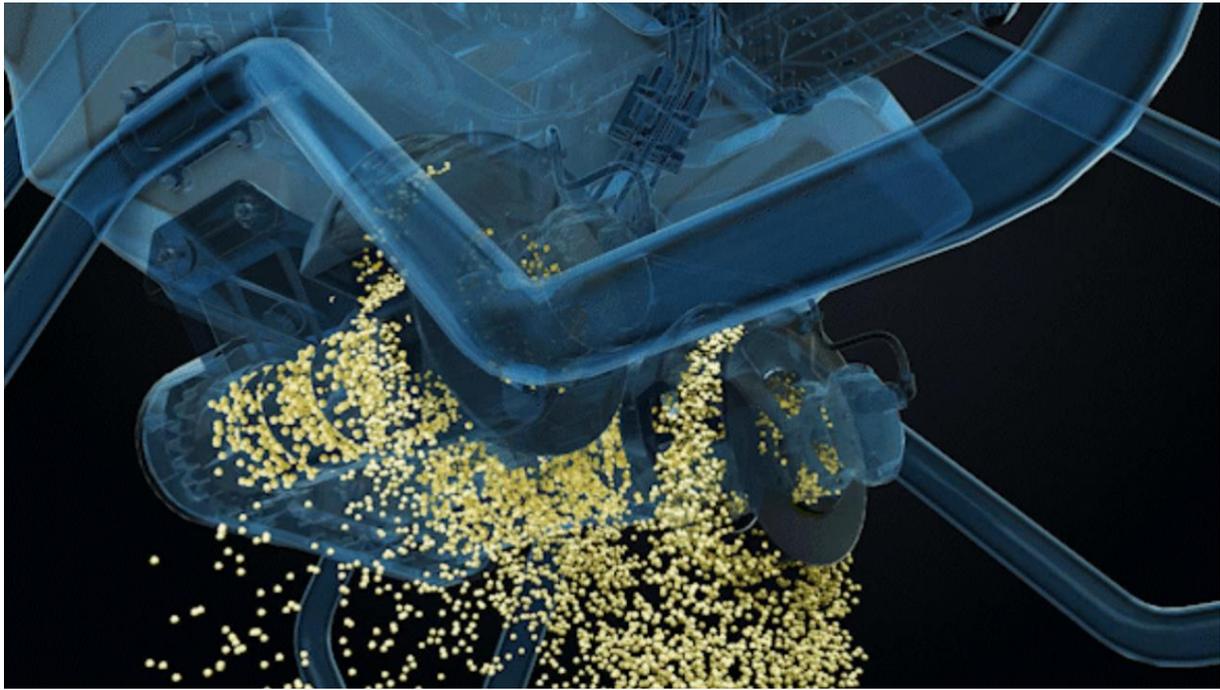
Spreader Disc is used to uniformly distribute granules.



Two spreader disc is installed vertically. Spreader disc can apply force on granules, so that granules can reach the speed above 20m/s. Assumed the flight height is 6 meters, the spreader disc can shoot the granules onto the ground surface within 0.3 second. Benefit from this short of time, RevoCast spreading can eliminate the granules misplacement due to wind.



Additionally, the spreader disc is designed like a wheel with teeth, which will avoid the physical harms on seed.



Granule Level Sensor

Level sensor can detect if the granule container is empty. This sensor is not capable of estimating the remaining quantity of granules inside container. Thus, the XAG One App will NOT display the remaining quantity of granule. Instead, it will display three unique status. They are offline, unoccupied, and spreading respectively.

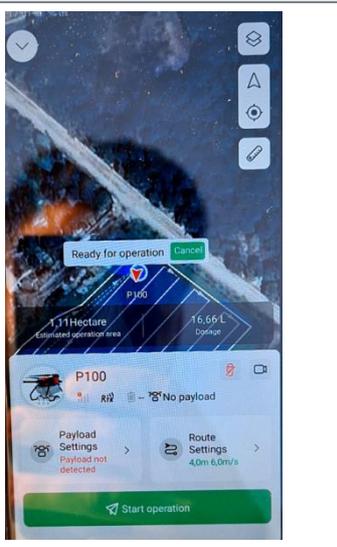
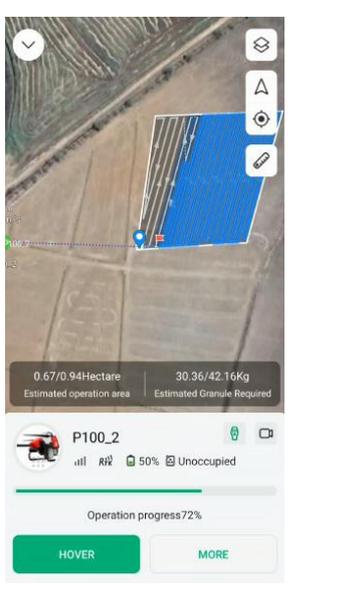
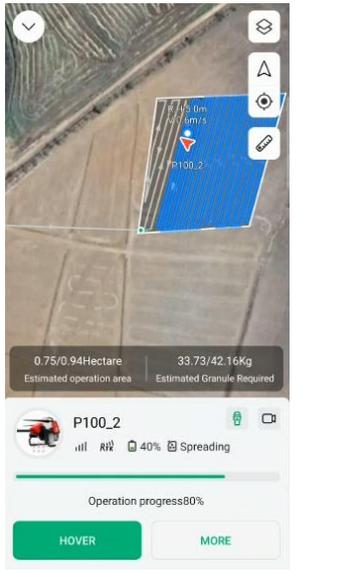


The image of level sensor



The position of level sensor

To better understand the status, please refer to the below table

No.	Status	Description	Photo
1	No payload	Disconnected/ system malfunctioned.	
2	Unoccupied	Idle/ inactive	
3	Spreading	Spreading in process	

Spreading Performance on Dosage

Spreading granules distribution test results (only for reference)

RevoCast 2 Uniformity Testing Result

- Flight parameters**
13.8/9/5 m/s flight speed @ 6 m flight height
- Dosage**
8 kg/mu (120 kg/ha)
- Sow object**
Rice seeds
- Test methods and purposes**
One-way flight, not shuttle. Calculate seeds in 3 rows of granule container to test the uniformity. (The smaller CV, the more evenly it spreads.)

The test has shown that if dosage and flight height are not changed, RevoCast 2, combined with vertically downward feeding, can dynamically adjust discharge amount at different flight speeds by precise variable control and ensure a stable spread width and dosage.

The data above is for reference only. The data of practical operations may vary with field situation, wind speed, firmware update, etc.

13.8 m/s

Valid Spread Width **7 m**
CV **11.8%**

9 m/s

Valid Spread Width **6.5 m**
CV **13.8%**

5 m/s

Valid Spread Width **6.5 m**
CV **14.0%**

RevoCast 2 Uniformity Testing Result

Row	Number of Seeds in The Granule Container per 0.5 m Interval																	Spread Width (m)	Mean	Standard Deviation within this spread width	Mean within this spread width	CV		
	-4.5	-4.0	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5						4.0	4.5
#1	1	2	7	8	9	4	5	7	12	5	11	6	10	8	8	11	12	9	1	7	7.16	2.58	8.33	31.0%
#2	3	4	8	9	7	8	9	8	6	10	8	10	7	8	9	9	6	5	4	6	7.26	1.14	8.29	13.7%
#3	1	1	8	7	9	9	7	7	7	14	10	8	12	7	9	9	5	6	0	6	7.16	2.08	8.79	23.7%
Total	5	7	23	24	25	21	21	22	25	29	29	24	29	23	26	29	23	20	5	7	21.58	2.92	24.87	11.8%

Row	Number of Seeds in The Granule Container per 0.5 m Interval																	Spread Width (m)	Mean	Standard Deviation within this spread width	Mean within this spread width	CV		
	-4.5	-4.0	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5						4.0	4.5
#1	1	1	3	8	11	4	8	6	14	10	8	9	8	6	8	11	14	6	2	6.5	7.26	2.87	8.93	32.1%
#2	0	5	3	9	7	13	9	9	10	6	9	12	8	11	8	8	6	8	5	7	7.68	2.00	8.87	22.5%
#3	3	4	3	8	9	10	8	10	13	6	5	8	9	11	10	10	9	6	0	6.5	7.47	2.00	9.00	22.2%
Total	4	10	9	25	27	27	25	25	37	22	22	29	25	28	26	29	29	20	7	6.5	22.42	3.72	26.86	13.8%

Row	Number of Seeds in The Granule Container per 0.5 m Interval																	Spread Width (m)	Mean	Standard Deviation within this spread width	Mean within this spread width	CV		
	-4.5	-4.0	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5						4.0	4.5
#1	1	5	5	9	11	7	8	7	12	7	10	11	6	7	5	10	10	3	1	6.5	7.11	2.14	8.57	24.9%
#2	3	3	6	9	9	10	7	10	9	6	7	6	8	10	4	8	10	5	3	6.5	7.00	1.86	8.07	23.0%
#3	3	7	5	9	8	12	6	8	4	12	11	9	6	10	10	9	12	11	3	7	8.16	2.42	9.13	26.5%
Total	7	15	16	27	28	29	21	25	25	25	28	26	20	27	19	27	32	19	7	6.5	22.26	3.59	25.64	14.0%

The data above is for reference only. The data of practical operations may vary with field situation, wind speed, firmware update, etc.

Selecting the proper size of spiral feeder?

Need to consider the dosage per hectare, flight route, flight speed, spray calibration, granules shape and size, spread width.

$$Total\ Dosage = \frac{Spread\ Calibration\ Rate / Motor\ speed}{Total\ area / (Flight\ Speed \times Spread\ Width)}$$

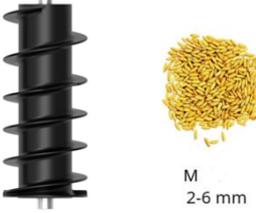
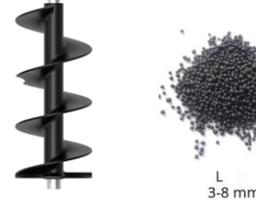
Where,

Parameters	Description	Unit
Total dosage	Total consumption of granules	kg
Spread Calibration Rate	Calculated by calibration process. It can differ as the change of granules type and spiral feeder size	r/kg
Motor Speed	Spiral feeder motor, rotation per minutes	r/minute
Total Area	Total area of each flight	m ²
Flight Speed	UAV flight speed, related to ground speed	m/s
Spread Width	The width that RevoCast can cover	m

Dosage error may come from,

- Spiral Feeder Motor: The minimum rpm of spiral feeder is 1000 rpm. The best performance of motor is approximately between 4000 and 9000 rpm. Please be aware of that the closer the spiral feeder motor reaches the limitation of rotation speed, the worse performance it has, which means the greater the error of dosage per hectare will be.
- Spreading Calibration: spreading system must be recalibrated for each type of granule or the change of spiral feeder. Otherwise, significant error will happen.
- Dosage per hectare: Use proper range of dosage per hectare. If the consumption of dosage per hectare is too low, the spiral feeder motor will inevitably decrease its rotation speed. This will result in spread error.
- Flight Route: It's suggested to have less turns in UAV spreading flight routes. Because this will cause dosage error. When the aircraft is turning, it must slow down or stop the spiral feeder motor to keep the dosage per hectare unchanged. The spiral feeder motor error take place during slow down or stop.
- Flight speed: The flight speed will have major impact on RevoCast operation. Similar with the reason from flight route, the RevoCast spreader must keep the dosage per hectare unchanged during the flight mission. If UAV speed up, the RevoCast will decrease the granule flow. If UAV slow down, the RevoCast will increase the granule flow. If the granule flow gets too low or too high, dosage error will occur.
- Granule density: if the granule density is uneven, it will lead to dosage error.
- Spread width: Spread width is controlled by spreader disc. Similar with flight speed, it can affect the dosage error.
- Granule shape and size: select the appropriate auger to ensure no material jamming (suggestion: spread fertilizer in large size, rice in medium size, rapeseed in small size. The auger shall be replaced reasonably according to the amount per mu)

There are three options for spiral feeder size. Please select the proper size of spiral feeder before use.

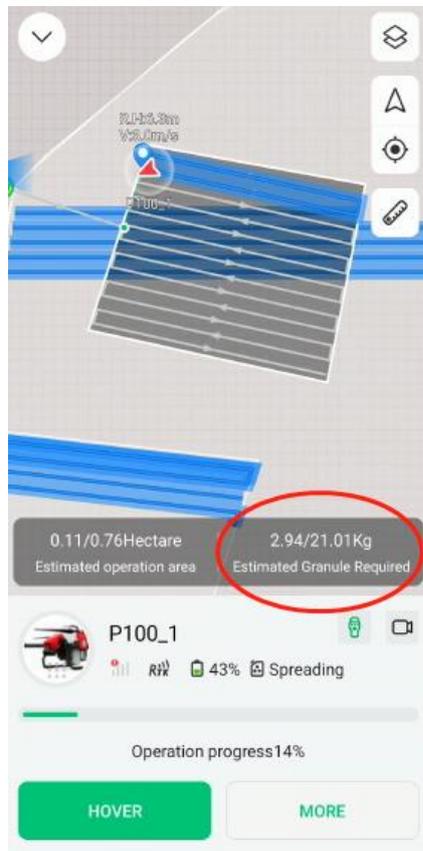
Spiral Feeder Size	Photo	Scenario
Small	 <p>The photo shows a small black spiral feeder on the left. To its right is a small pile of dark, fine particles. Below the pile is the label 'S' and '1-3 mm'.</p>	Select small spiral feeder for the diameter in the range of 1~3 mm, or using low usage per hectare
Middle	 <p>The photo shows a medium black spiral feeder on the left. To its right is a pile of yellow, medium-sized particles. Below the pile is the label 'M' and '2-6 mm'.</p>	Select medium spiral feeder for the diameter in the range of 2~6mm, or using medium usage per hectare
Large	 <p>The photo shows a large black spiral feeder on the left. To its right is a pile of dark, large particles. Below the pile is the label 'L' and '3-8 mm'.</p>	Select large spiral feeder for the diameter in the range of 3~8mm, or using high usage hectare

If the wrong spiral feeder size is applied, it could result in jam or dosage error.





The value of “Estimated granule required” is only for reference, as it is calculated by APP, not detected by RevoCast.



Obstacle Sensing & Avoidance System

Dynamic Radar

Dynamic radar works in millimeter wave with operating frequency of 24GHz. As a non-contact sensor, dynamic radar can scan and detect incoming obstacles during flight. It's capable to detect the obstacle's size, position, distance, vector direction, and speed within 40 meters ahead and above to achieve prediction and bypassing. Please be aware of that Dynamic radar can be significantly influenced by obstacle's size, material, and speed. Thus, user should not completely rely on dynamic radar during obstacle avoidance. Instead, all the obstacles should be marked in field mapping.



Terrain Radar & Optical Flow Sensor

The terrain radar works in millimeter wave with operating frequency of 24GHz. As a non-contact sensor, terrain radar can scan and measure the vertical distance from the UAV and ground. Users can either turn on or off terrain following mode before flight mission. If the terrain following mode is enable, the terrain radar will consistently measure the vertical distance to the ground or obstacles (trees, roof, etc). Please be aware of that the terrain radar will be automatically activated if the measured vertical distance is less than 1.5m.

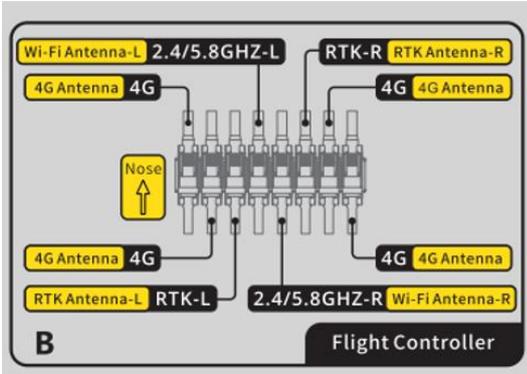
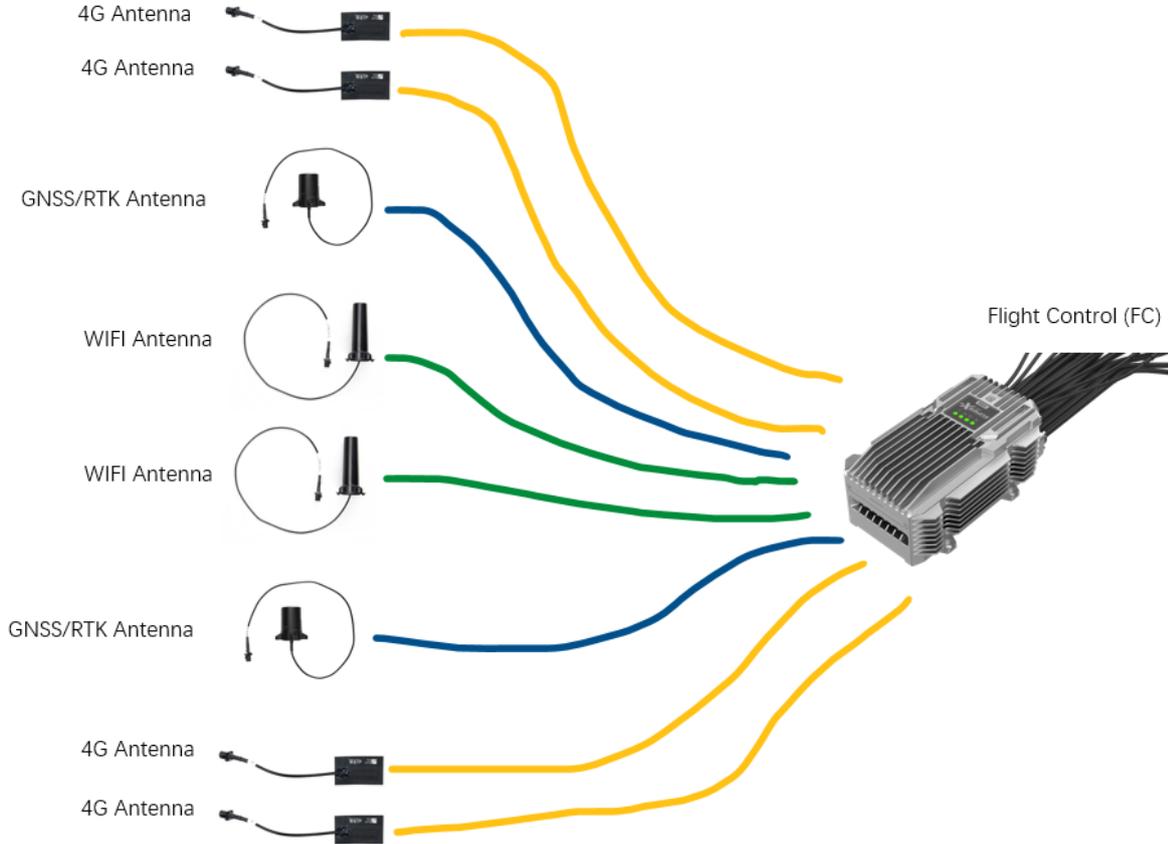
An optical flow sensor is a vision sensor capable of measuring optical flow or visual motion and outputting a measurement based on optical flow. Its configuration is an image sensor chip connected to a processor programmed to run an optical flow algorithm. This will allow the UAV maintain its hovering position when the GNSS/RTK is lost.



Communication and Positioning System

Overall Antenna Layouts

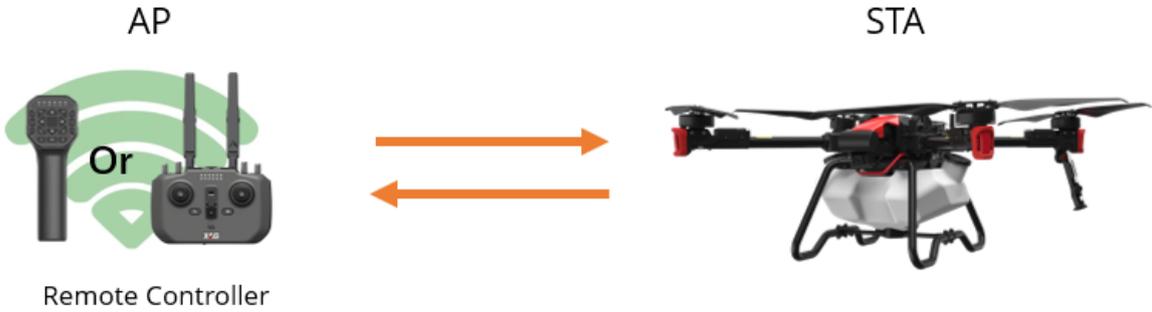
Wiring of 4G antenna, GNSS/RTK antenna, WIFI antenna and flight control



WiFi Communication system

Application

WiFi Communication system is used to link remote controller and UAV.



Types of remote controller:

No.	Remote Controller	Photo
1	ACS2 2021	
2	ARC3 Pro	

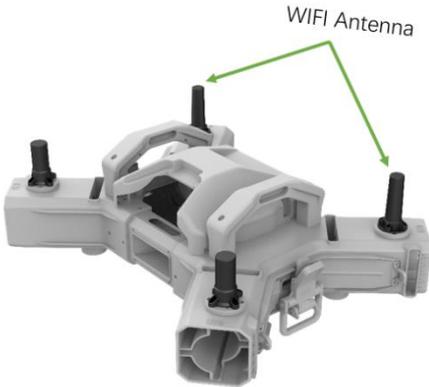
WiFi antenna

WiFi antenna is wireless networking device that converts the EM waves into electrical signals, and vice versa. There are two WiFi antenna on the drone. One is on the left of the fuselage; Another one is symmetrically on the right.

WiFi Antenna Photo



WiFi Antenna Position



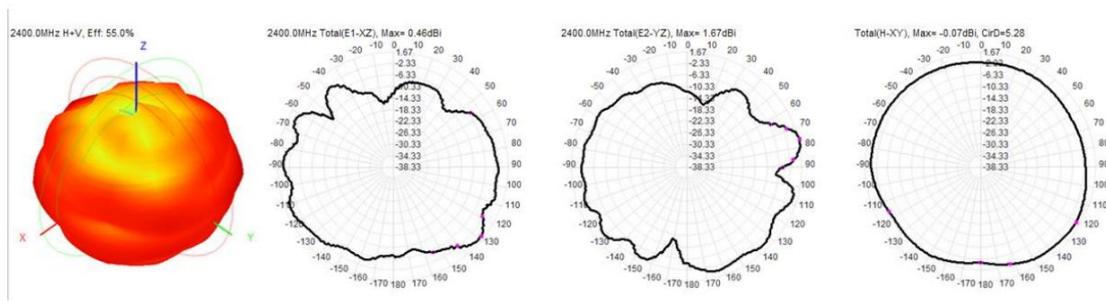
Electrical Characteristics

Frequency	2400-2500 / 5150-5850 MHz
V.S.W.R.	≤ 2.0 @2400-2500MHz / 2.5 @5150-5850 MHz
Antenna Gain	3.50 / 3.65 dBi
Polarization	Linear

Environmental

Operation Temperature	- 40 Ć ~ + 80 Ć
Storage Temperature	- 40 Ć ~ + 80 Ć
Waterproof	Yes

Simulation of 2400MHz



4G Communication System

4G module

The main difference between Chinese version and English version is the 4G module.

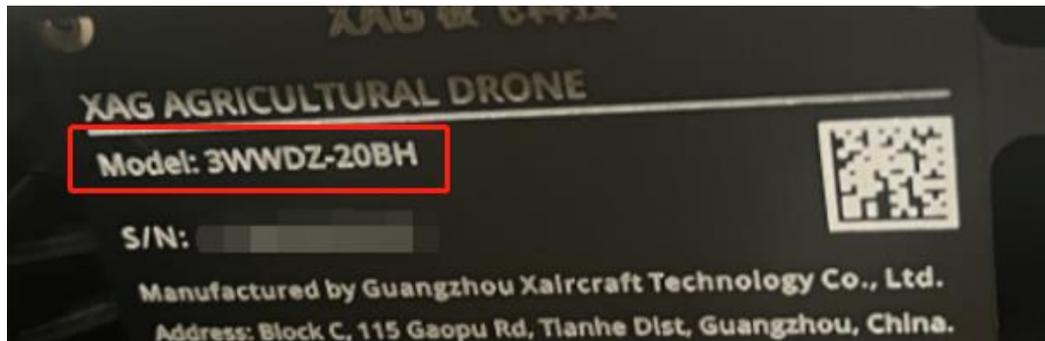
ACS2 2021/UAV	4G Module	Frequency Bandwidth	Comments
Domestic version or Chinese version	EC20-CN	LTE-FDD: B1/B3/B5/B8 LTE-TDD: B34/B38/B39/B40/B41 WCDMA: B1/B8 GSM: B3/B8	It's compatible with telecom bandwidth in China but not in other countries.
International version or English version	EG25-G	LTE-FDD: B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/B19/B20/B25/B26/B28 LTE-TDD: B38/B39/B40/B41 WCDMA: B1/B2/B4/B5/B6/B8/B19 GSM: B2/B3/B5/B8	It's compatible with most telecom bandwidth all round the world.

Distinguishing Chinese / English Version (4G bandwidth difference)

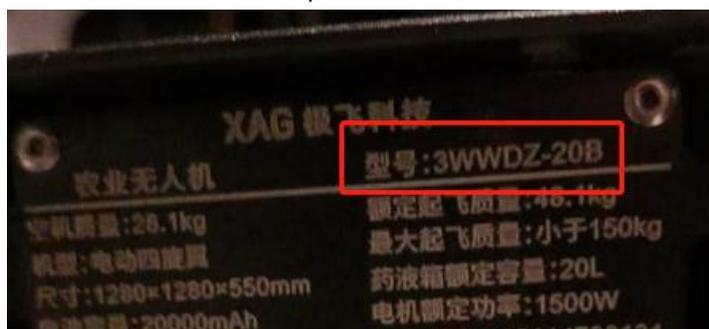
Item	Chinese version	English version
V40	3WWDZ-15.2A	3WWDZ-15.2AH
P40	3WWDZ-20B	3WWDZ-20BH
P100	3WWDZ-40A	3WWDZ-40AH
ACS2 2021	ACS2	ACS2G

Device versions are displayed in the nameplate.

For example, P100 English version nameplate



P40 Chinese version nameplate.



4G LTE antenna

In telecommunications, Long-Term Evolution is a standard for wireless broadband communication for mobile devices and data terminals, based on the GSM/EDGE and UMTS/HSPA standards. It improves on those standards' capacity and speed by using a different radio interface and core network improvements. Because LTE frequencies and bands differ from country to country, only multi-band UAV (globe version) can use LTE in all countries where it is supported. 4G LTE antenna is used to transmitting data on the physical layer using 4G LTE technology.

4G Electrical Characteristics

Frequency	824-960MHz, 1710-2690MHz
V.S.W.R.	@<4.0
Antenna Gain	>1dBi
Polarization	Linear

Environmental

Operation Temperature	- 40 ℃ ~ + 85 ℃
Storage Temperature	- 40 ℃ ~ + 90 ℃
Waterproof	No

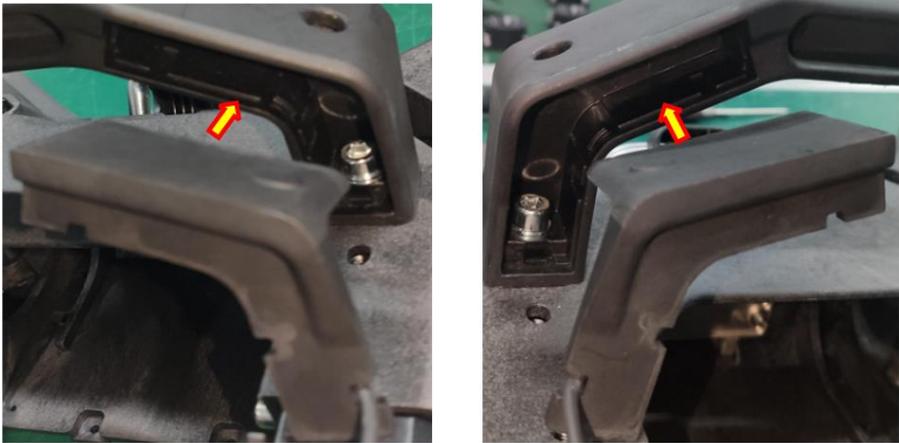
4G Antenna Photo



Position

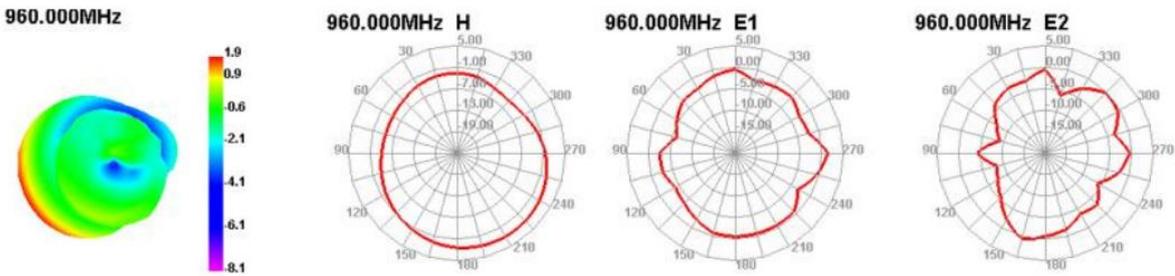


Please be aware of 4G antenna installation.



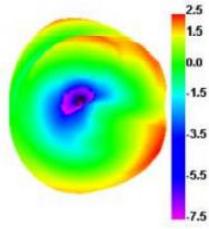
According to the antenna ideal simulation, we can know the signal coverage is not uniform in all direction, but let's say 800m on average. 4G antenna is susceptible to wireless interferences. There are many obstacles in the fields that interfere your WIFI signals - the main culprits being trees, terrain, buildings etc.

Simulation of 960MHz

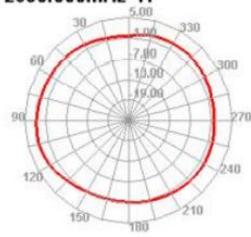


Simulation of 5800MHz

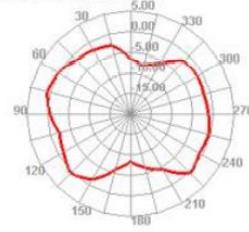
2690.000MHz



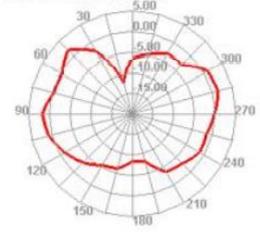
2690.000MHz H



2690.000MHz E1



2690.000MHz E2



Positioning System

P100/P100 Pro: Positioning Options

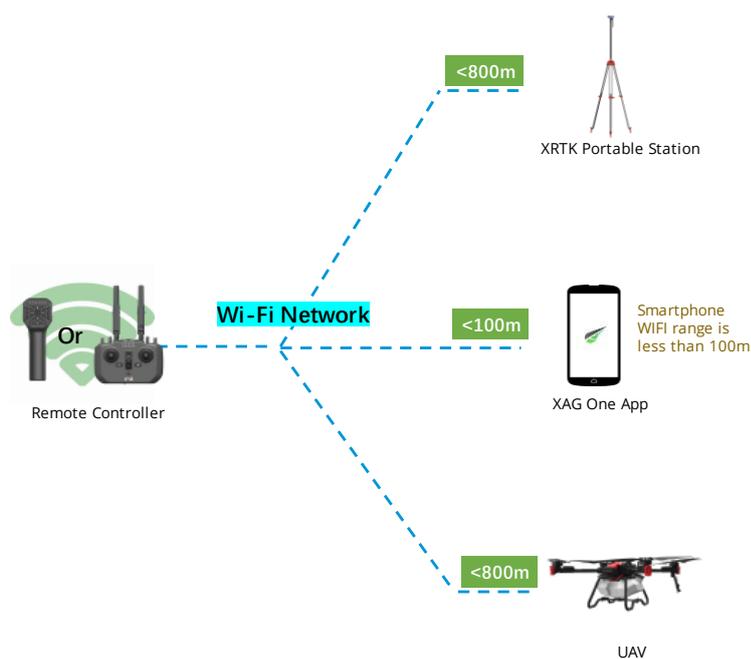
List of positioning option

- GPS
- RTK
 - RTK station
 - Portable station (RCN/LNT)
 - Portable station (4G)
 - Fix station (4G)
 - VRTK
 - CORS

RCN Positioning compatibility

Positioning	Local RCN	Standard RCN4G	Direct RCN4G	RCNWiFi
Portable station	Supported	supported	supported	Supported
Fix station	Not supported	supported	supported	Supported
CORS	Not supported	supported	supported	Supported
GPS	supported	supported	supported	supported
VRTK	supported	supported	supported	supported

Positioning Option #1: XRTK4 positioning

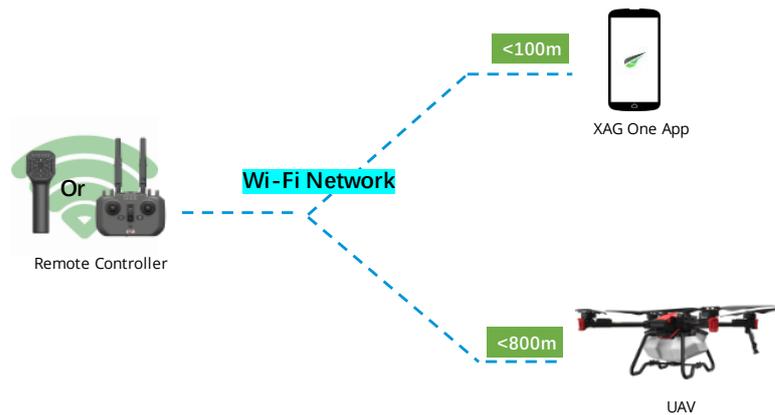


Positioning Option #2: VRTK positioning

Vrtk is called virtual rtk. You can imagine that when the drone is unmoved and stays in the take off position, it works as temporary portable rtk base station. Thus, when the drone takes off, it uses the virtual RTK position as base station reference.

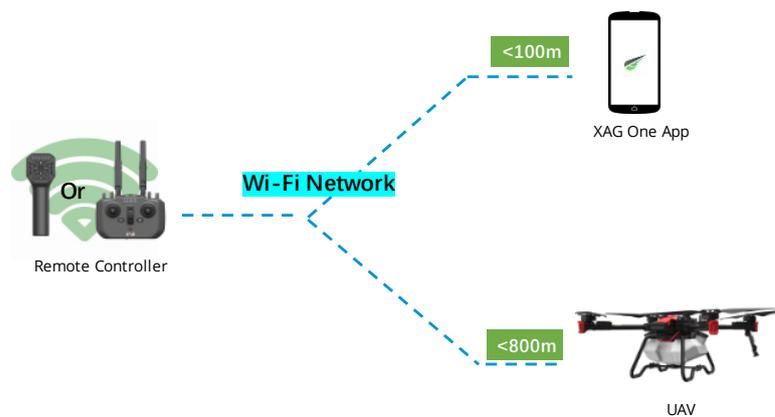
This accuracy of VRTK is between RTK and GPS.

The VRTK must adjust its accuracy every 2 hours.



Positioning Option #3: RC networking mode with GPS positioning

The drone only uses GPS to take off, fly and land.



GNSS/RTK antenna

A Global Navigation Satellite System (GNSS) is defined as a group of satellites strategically placed to generate and relay positioning, timing, and navigation data from space to connected sensors on the earth. GNSS uses satellite technology to provide insight into connected devices' geographic locations. GNSS is an inclusive term for the category of global systems, including:

GPS (United States)

GLONASS (Russia)

BeiDou (China)

Galileo (EU)

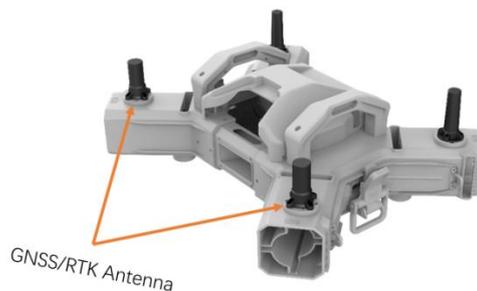
QZSS (Japan)

GNSS combined with RTK is a solution that can realize real-time precise positioning, and the positioning accuracy reaches centimeter level. It is used in application scenarios of UAV operation that the flight route and take-off/landing points requires high-precision positioning.

GNSS/RTK Electrical Characteristics

Frequency band	GPS L1/L2/L5/L-Band BDS B1/B2/B3 GLONASS L1/L2/L3 GALILEO E1/E5a/E5b/E6
V.S.W.R.	<2.0
Antenna Gain	33 ± 2dBi
Polarization	Circular

Environmental	
Operation Temperature	- 40 ℃ ~ + 70 ℃
Storage Temperature	- 55 ℃ ~ + 70 ℃
Waterproof	IP67
Humidity	95% with no condensing water

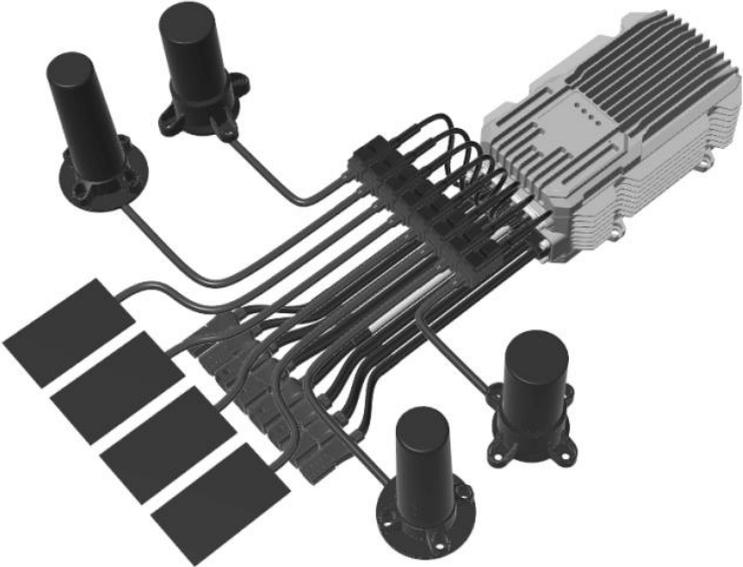
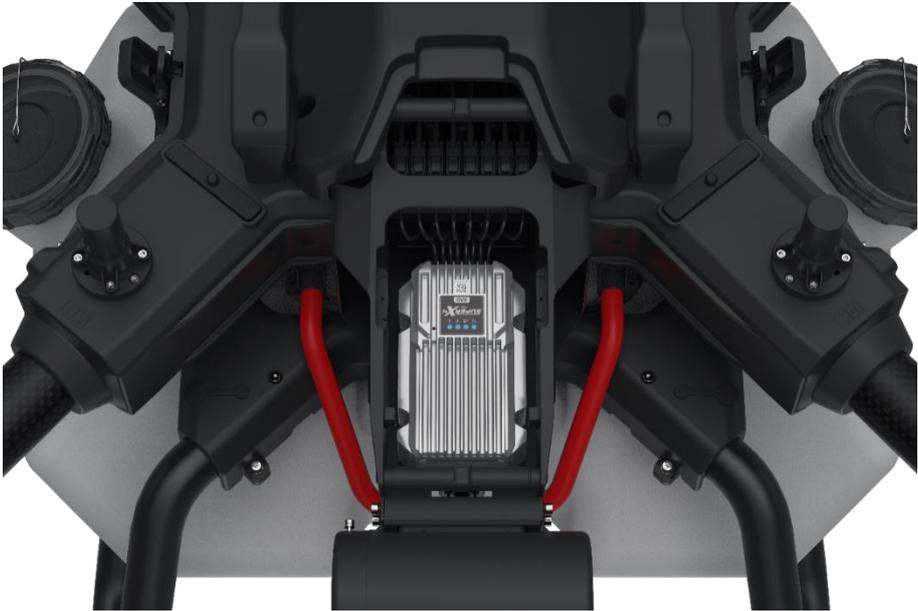


Please be aware that the GNSS/RTK antenna can be only used in the open field.

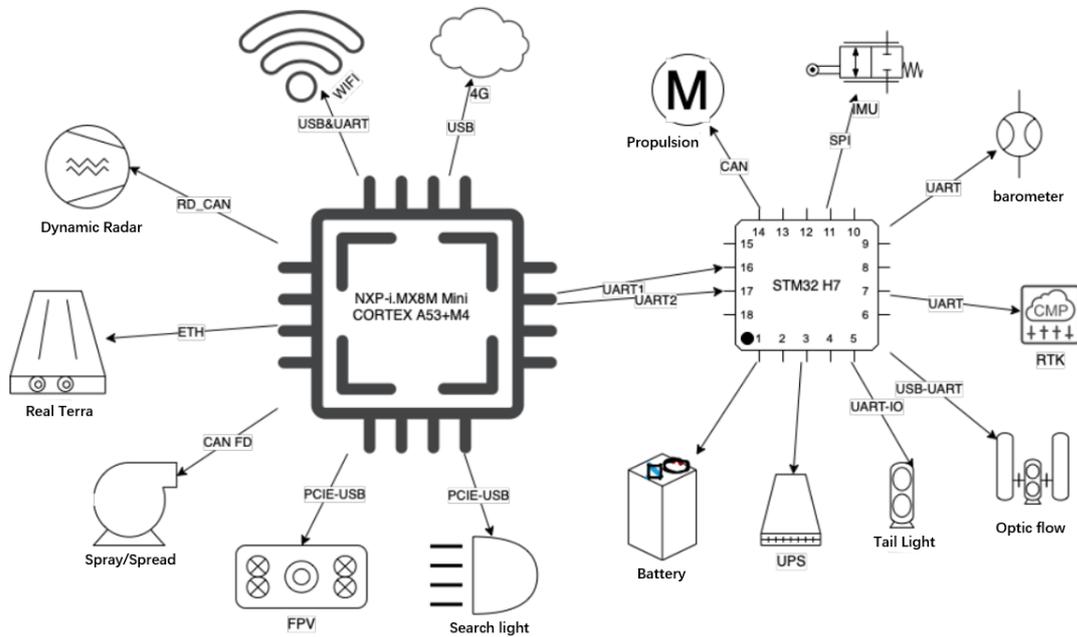
Control System

Flight control

Flight controller also called FC for short, stabilizes and controls a UAV for semi-autonomous and autonomous flights. It is one of the core components of a UAV. Flight controller primarily consists of a microcontroller, control circuit & a suite of sensors (gyroscope, accelerator, electronic compass, barometer, etc.). It has redundant sensors & power supplies and performs redundant switching in case of failure to ensure flight safety.



Use SuperX4 Pro as an example, it adopts real-time control unit, positioning navigation unit, data link and service unit, and spray & spreader control unit.



The real-time control unit and spray & spreader control unit adopt STM32H743 M7 core processor made by ST. Its CPU clock speed can reach up to 400MHz, 2MB maximum Flash, 1MB RAM; The positioning navigation unit adopts UM982, equipped with a three-axis accelerometer and gyroscope, barometer that can be auxiliary height measurement sensor.

The data link and service unit adopt NXP-i.MX8M Mini QUAD CORTEX A53+M4 processor made by Amlogic. Its CPU clock speed can reach up to 1.8GHz and it offers 16GB RAM, EMMC 5.1 storage and 2GB LPDDR4 running memory, on-board EC20-CN dual 4G module, WiFi module, interface ports that allows the communications with various peripherals.

Flight logs analysis requires years of professional UAV experience. Please contact XAG technicians for help.

UPS

UPS is a backup power supply dedicated for flight control. The purpose of UPS is to continue provide electricity to flight control if the main power source (smart battery) is cut off. It mainly consists of power management board, three pieces of 18650 lithium-ion battery.



	UPS discharge (to FC)	UPS charge (from B13960S battery)	Flight control powered by
UAV Battery on	No / Red light	Yes / Green light	Battery (B13960S)
UAV Battery off	Yes / Green light	No / Red light	UPS, approximately 2~5 minutes



Chapter 2

Communication Network and Infrastructure

Background

XAG is dedicated to bringing drones, robots, autopilot, artificial intelligence, and Internet-of-things into the world of agricultural production. During the development, the XAG UAV experiences a significant change on the communication Mechanisms.

XAG products roadmap

Year	2020	2021	2022
Model	XP2020	P40, V40	P100

Communication Mechanisms Comparison

	XP2020	P40, V40, P100		
<i>Communication Mechanisms</i>	Local computing + mesh network + 4G	Cloud Computing in IoT using 4G	Duo Channel (4G/WIFI)	Local Network Terminal
<i>Does it need 4G?</i>	Yes	Yes	Yes	No
<i>Does it use WIFI?</i>	Yes, mesh network	No	Yes	Yes, LNT work as a WIFI hub.
<i>Remote Controller</i>	ACS2 2020	ACS2 2021	ACS2 2021	ACS2 2021
<i>Android APP</i>	 XAG Agri 2	 XAG One	 XAG One	 XAG One
<i>RTK station</i>	Portable station (WIFI)	Fix Station (4G)	Fix Station (4G)	Portable Station (WIFI)

Overview

For XAG agriculture UAV (model 2021 above), the essential components of UAV-based network and infrastructures are UAV, ACS2 2021, XRTK4 portable station and XAG One App running on smartphone. Respected to different environment, there are three networking mode.

No.	Networking mode	Under Environment
1	Cloud Computing in IoT (4G)	Good 4G Network
2	Duo Channel (4G/WIFI)	Poor 4G Network
3	Local Network Terminal	No 4G Network

Network Devices

ACS2 Remote controller

Model	Description	Photo
ACS2 2020	Used on XP2020 with XRTK4 portable station, fixed station, and CORS Identical hardware as ACS2 2021 But with ACS2 2020 firmware installed	
ACS2 2021	Used on V40/P40/P100 with XRTK portable, fixed station and CORS Identical hardware as ACS2 2020 but with ACS2 2021 firmware installed	



Indeed, you can literally update the ACS2 firmware from 2020 to 2021 as they have the identical hardware, but our backend server will not recognize this device as its serial number is not registered as ACS2 2021 device. Thus, it's not allowed to add in your XAG One account.

RTK STATION

MODEL	Description	Photo
RTK FIX STATION	<p>Work as RTK base station, sending RTK/RTCM to cloud server through 4G network.</p>	 <p>A photograph of an RTK fix station. It consists of a metal frame with two solar panels mounted on top. A central pole extends upwards from the frame, topped with a red antenna. The entire unit is designed for stationary use.</p>
RTK PORTABLE STATION	<p>As RTK base station, it's optional to work with/without 4G network.</p> <p>If it works in 4G network, insert the 4G into it and bring the RTK online. It will broadcast RTK/RTCM data through 4G. Add the RTK station in App device list.</p> <p>If it works in WIFI, please add the RTK station in the LNT network. It will broadcast RTK/RTCM data through WIFI.</p>	 <p>A photograph of an RTK portable station. It features a silver tripod with yellow adjustment knobs. A central pole is attached to the top of the tripod, ending in a blue antenna. The station is designed for portability and ease of setup.</p>

Note: please be aware of that after the recent firmware update of RTK station, both portable and fix RTK station can broadcast RTCM/RTK through 4G network.

UAV Model

Model	Variant	Photo
P40	(CN) XAG P40 2021 STD UAV	
	(EN) XAG P40 2021 STD UAV	
V40	(CN) XAG V40 2021 STD UAV	
	(EN) XAG V40 2021 STD UAV	
P100	(CN) XAG P100 2021 STD UAV	
	(EN) XAG P100 2021 STD UAV	

Networking Mode

4G Networking Mode

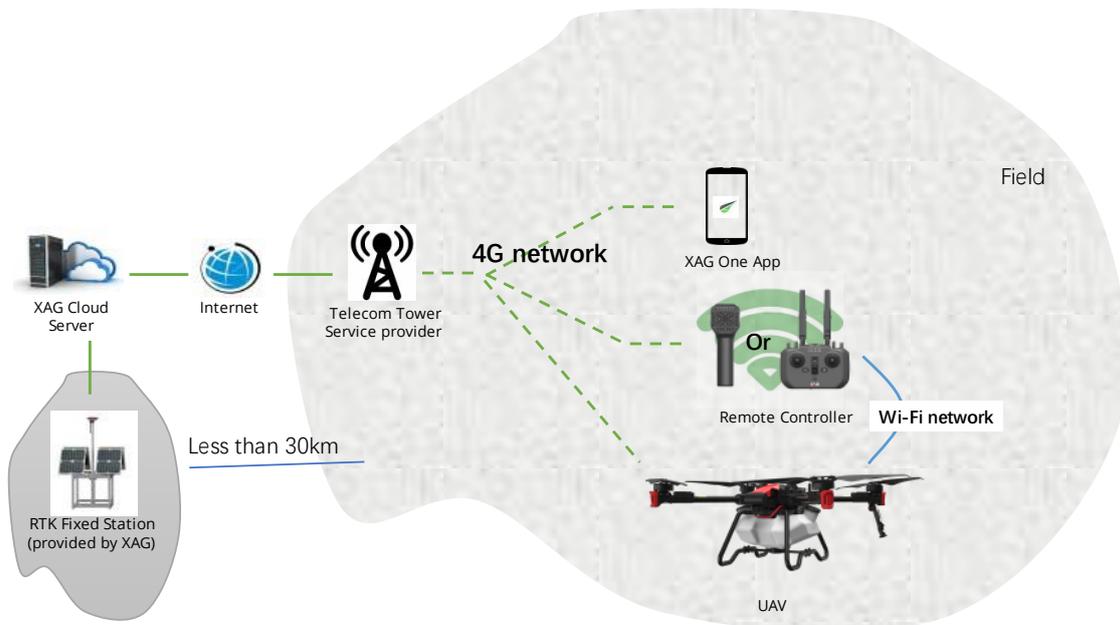
There are two variants of 4G networking mode. One is standard 4G networking mode, the other is Lite 4G networking mode. The difference between them is whether UAV has 4G SIM card inserted.

#1: Direct 4G Networking Mode: Cloud Computing in IoT

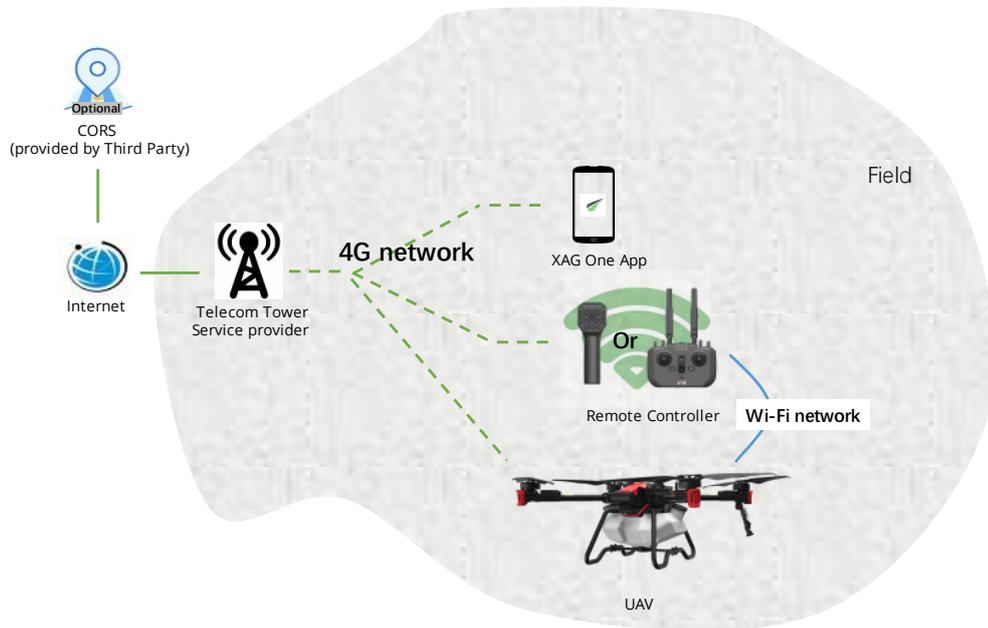
Introduction

When the 4G coverage and signal strength are good, all the devices can have the access to the XAG cloud server through 4G network. The advantage of using 4G networking mode is to eliminate the communication range. The disadvantage is that the UAV may be suffered from 4G network delay.

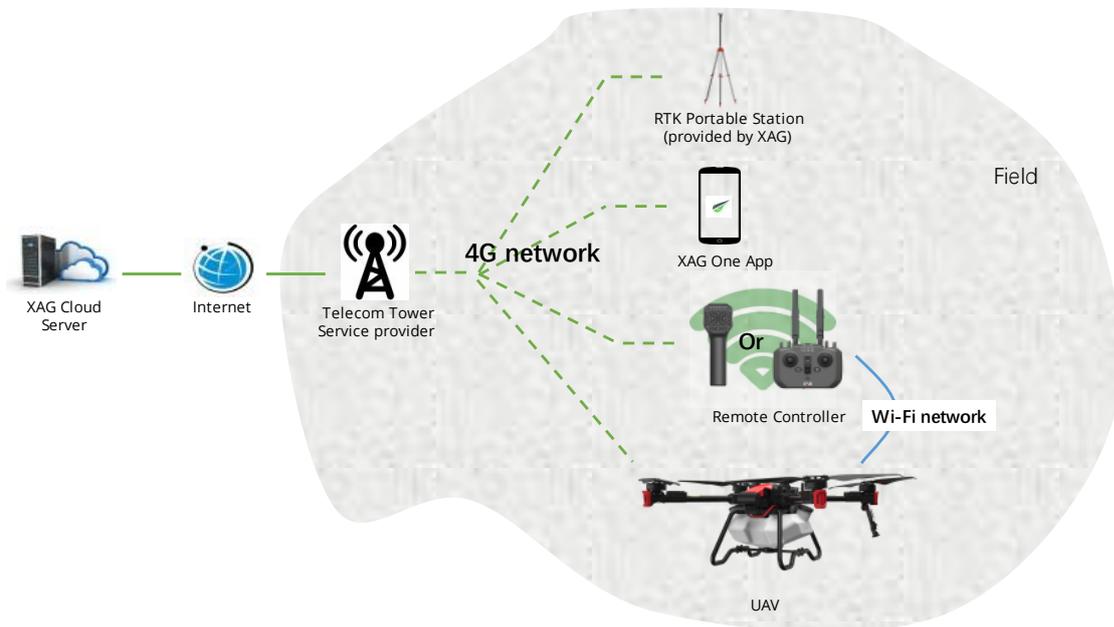
RTK Fix station:



CORS



Portable station:



When to use Direct 4G networking mode?

1. Good 4G coverage in operation area
2. Users have access to CORS or XAG Fixed station.

Equipment Status on Wireless

Equipment	4G Sim Card Inserted?	Wi-Fi
UAV	Yes	Connected to RC
RC	Yes	AP (Access Point)
XRTK4 (optional)	Yes	Disabled
Smartphone/Pad	Yes	Disabled

Requirements:

- Good 4G network coverage
- If use GNSS/XRTK Fix station, the distance between operation and station must be within 30km because the common number of satellites should be above 16 and the weather condition can differ.
- All the devices (XRTK Fixed Station/Smartphone/ACS2 2021/UAV) need to have 4G SIM card inserted. Depending on the use of UAV, the data plans can be varied. For reference:

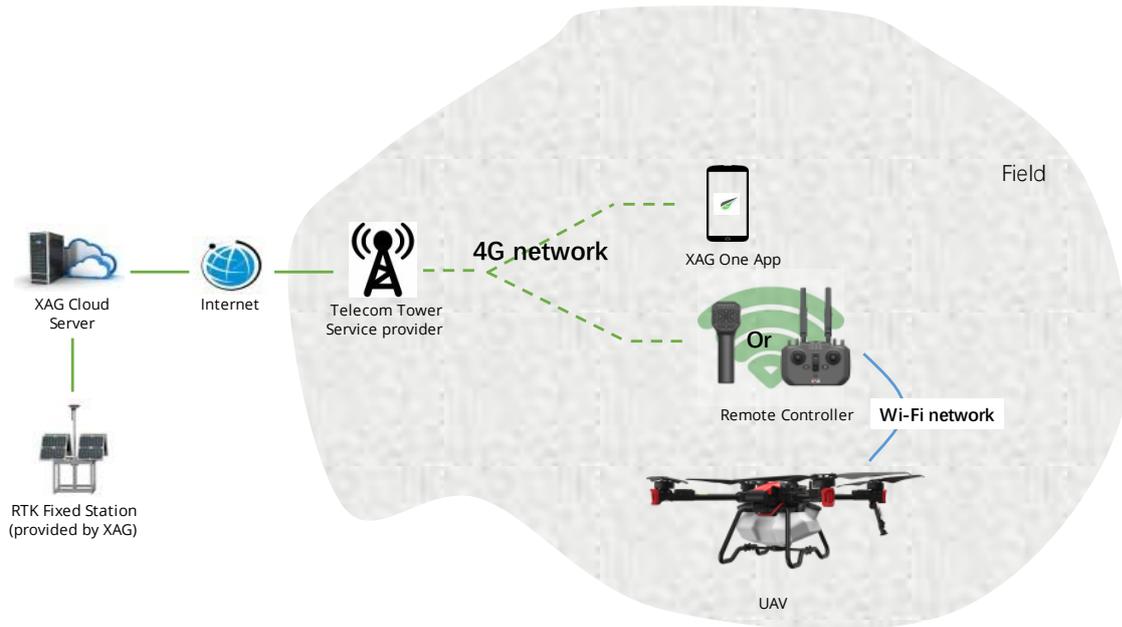
Items (device)	Data Plan
GNSS/RTK Fix Station	500M/month
Smartphone (XAG One App)	1G/month
ACS2 2021	300M/month
UAV	1G/month

#2: Semi-Direct 4G Networking Mode

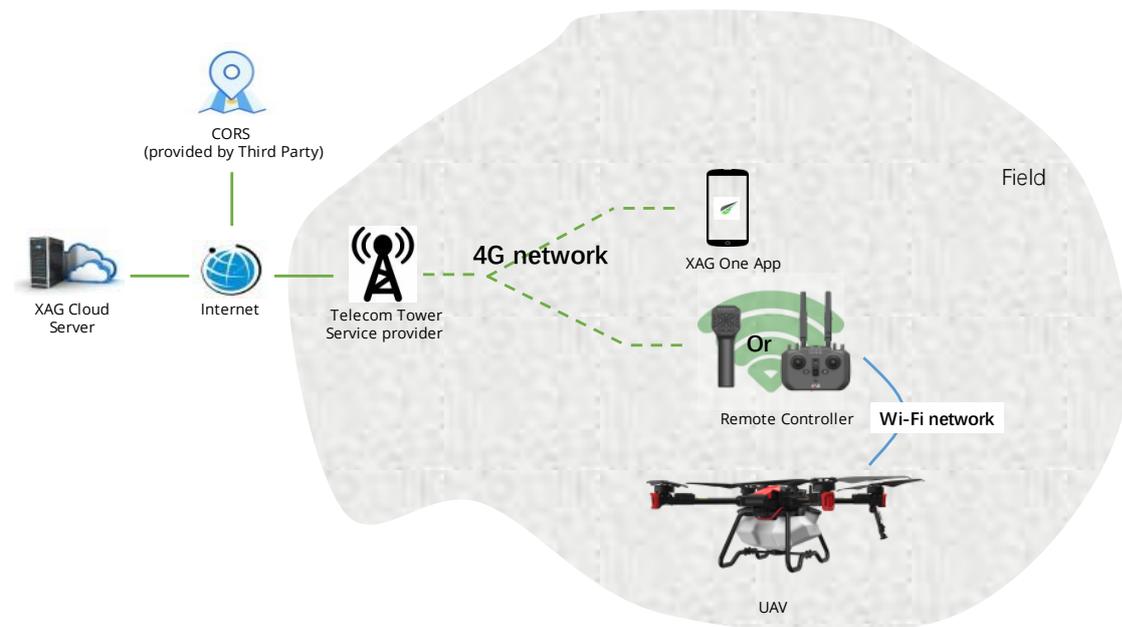
Introduction

Our user is allowed to enable Wi-Fi communication channel between remote controller and UAV. In such way, the UAV is no longer required to insert 4G SIM card. However, it requires users manually pair the UAV to remote controller. This mode allows UAV to access internet through remote controller.

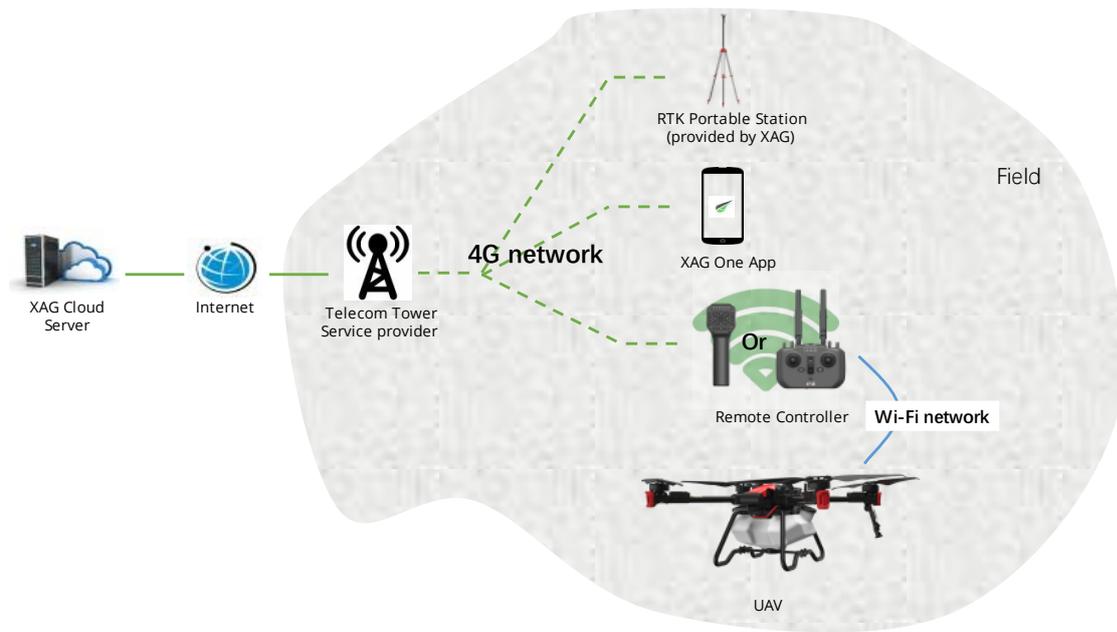
RTK Fixed Station



CORS



RTK Portable Station



When to use Semi-Direct 4G networking mode?

1. Good 4G coverage in operation area
2. Users have CORS account / XAG Fixed station.

Equipment Status on Wireless

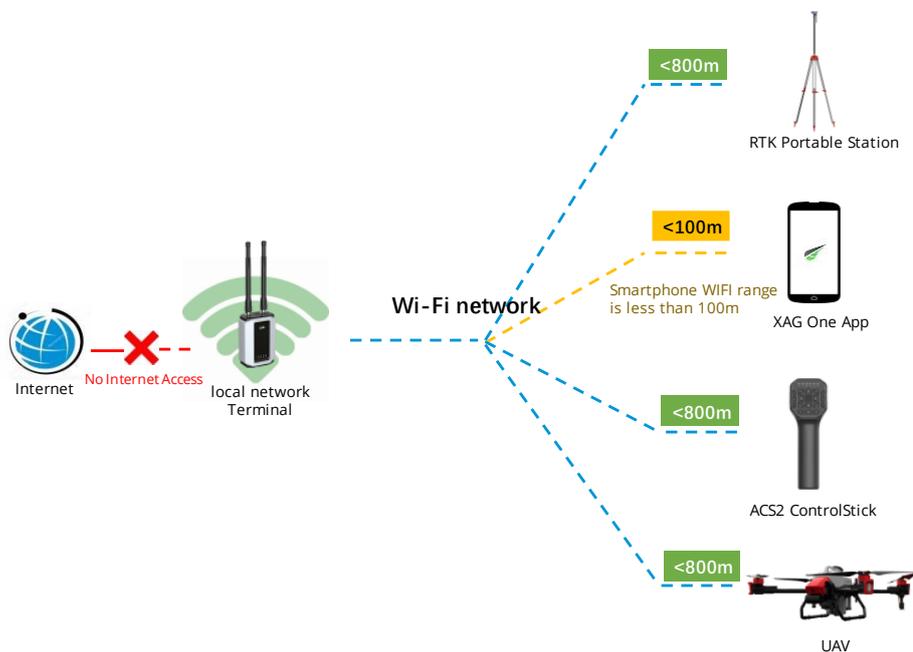
Equipment	4G Sim Card Inserted?	Wi-Fi
UAV	No	Connected to RC
RC	Yes	AP (Access Point)
XRTK4	Yes	Disabled
Smartphone	Yes	Disabled

LNT Networking Mode

There are two variants of LNT networking mode. One is standard LNT networking mode, the other is Field mapping LNT Networking Mode. The difference between them is whether UAV has 4G SIM card inserted.

#1: Standard LNT Networking Mode

Local network terminal, abbr, LNT, is a type of networking mode that works without internet. It works as a local IOT server and communicate with other devices through the local Wi-Fi network. You can regard the LNT as the substitution of the cloud Server. LNT and its IOT devices must be properly upgraded and configured before use.



DESCRIPTION

ITEMS (DEVICE)	4G network	WIFI (2.4/5.8GHz)
GNSS/RTK PORTABLE STATION	Not in use	Sent RTK/RTCM reference to LNT;
XAG ONE APP	Not in use	Communicate with LNT; UAV setting; Flight mission, UAV status, Field mapping, etc. firmware downloads and update,
ACS2 2021	Not in use	Communicate with LNT; Send manual control command to LNT
UAV	Not in use	Communicate with LNT
LNT	N/A	Local IOT server

Requirements:

- GNSS/XRTK **portable** station is a must.
- LNT must be put in a high place, with battery supply. The LNT WIFI only allows the maximum communication range of 800m without any interference.

Awareness

- As the smartphone can only reach the LNT within 100m, if the ACS2 hotspot is unstable during field mapping, user can switch to the field mapping of LNT. Please read the next page.

Advantage:

- No 4G network is required. Thus, Smartphone, ACS2 2021 and UAV do not need 4G Sim. Due to the hardware safety check, XRTK portable station still need 4G Sim inserted but will use no data.
- No RTK fix station is required. Instead, the RTK portable station will be used. It means that the users no longer rely on the RTK fix station (only 30km) and can move around as they want.

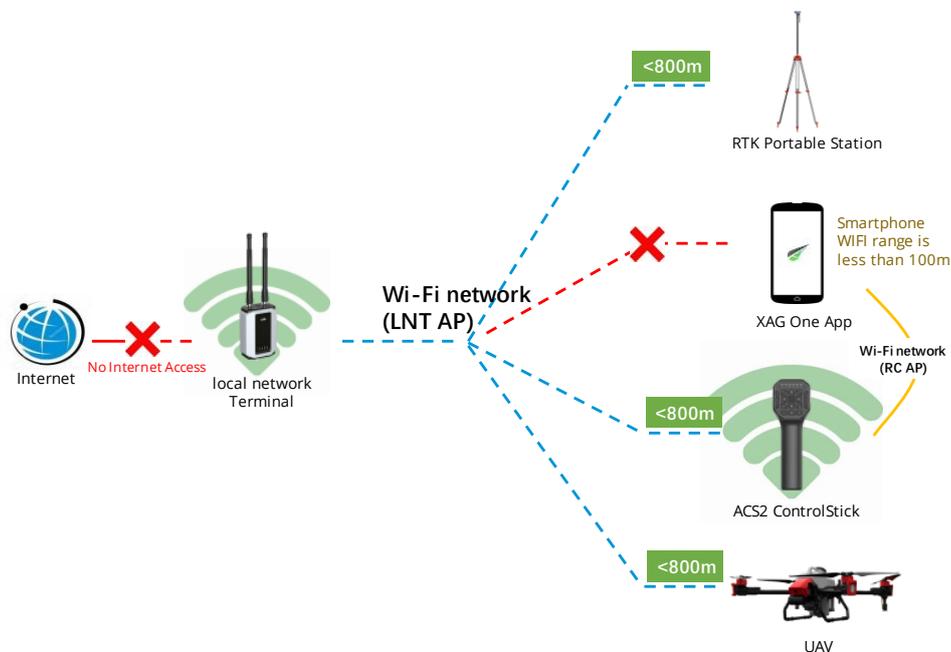
Disadvantage:

- LNT has limited communication range, maximum 800m. Depending on various environments, this communication range can differ.
- Smartphone has limited communication. only the maximum range of 100m between smartphone and LNT.
- LNT and its battery can be an extra cost.

#2: Field mapping LNT Networking Mode

This networking mode is only used in field mapping, please do not use it in flight mission. Otherwise, the UAV will suffer from huge network delay and keep switching between online and offline.

This mode is designed for field mapping. Some users may encounter huge network delay when using smartphone on field mapping as they usually walk into the field and stay far away from the LNT. As the smartphone only has the physical WIFI range less than 100 meters, the smartphone will disconnect from LNT if the smartphone stays too far from LNT. To solve the issue of short physical WIFI range between smartphone and LNT, we can connect our smartphone to ACS2 remote controller. From here, we can enhance the physical WIFI range of smartphone as ACS2 work as RP repeater.



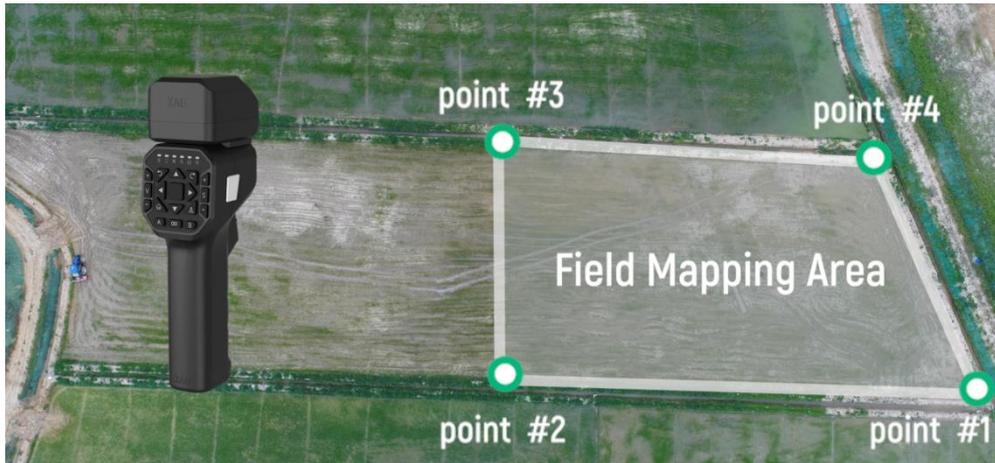
The benefit of this solution is that the communication range between smartphone and LNT increase from 100m to 800m in ideal environment. It's useful during field mapping, which the smartphone will be carried away from LNT.

Requirements:

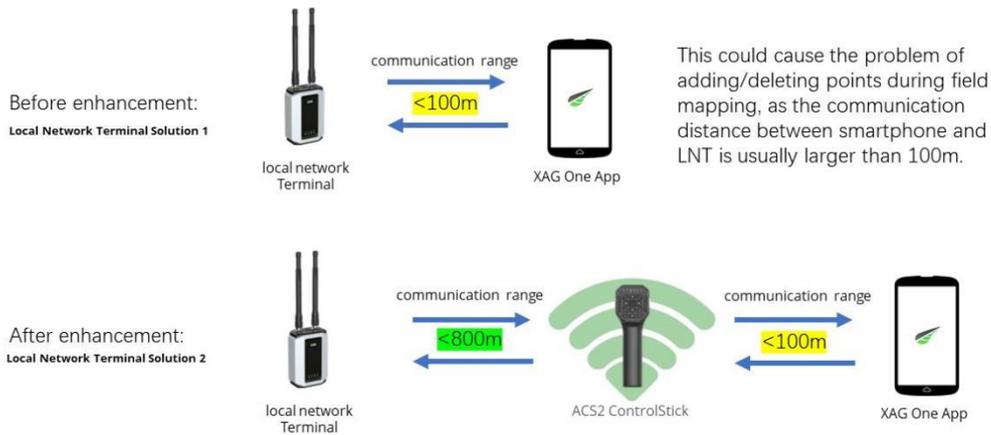
- GNSS/XRTK **portable** station is a must.
- LNT must be put in a high place, with battery supply. The WIFI antenna of LNT only allows the maximum communication range of 800m.
- Connect smartphone to ACS2 2021 remote controller's hotspot

Advantage/disadvantage:

Same as local network terminal



Smartphone's WIFI range enhancement (2.4/5.8 GHz)



DESCRIPTION

ITEMS (DEVICE)	4G network	WIFI (2.4/5.8GHz)
GNSS/RTK PORTABLE STATION	Not in use	Sent RTK/RTCM reference to LNT;
XAG ONE, ANDROID APP	Not in use	Communicate with LNT through ACS2 2021 remote controller; UAV setting; Flight mission; Field mapping; firmware downloads and update
ACS2 2021	Not in use	Communicate with LNT; Send manual control command to LNT
UAV	Not in use	Communicate with LNT
LNT	N/A	Local IOT server

Remote Controller Networking Mode (RCN)



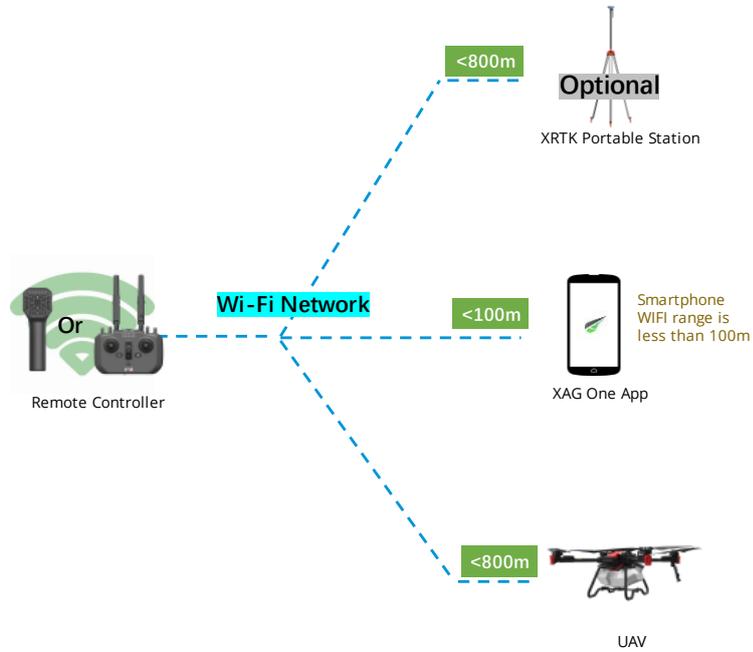
There are four variants of RCN mode.

- RCN Local
- Semi-Direct RCN4G
- Direct RCN4G
- RCNWiFi

#1: RCN Local

Introduction

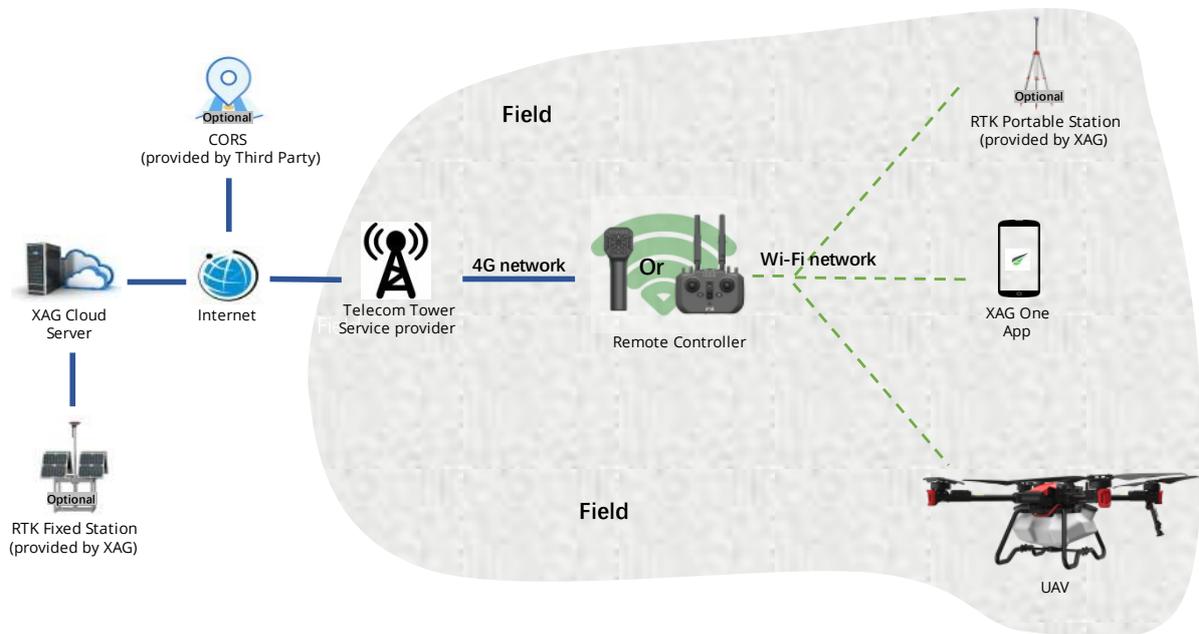
RC (Remote controller) networking mode is a type of networking mode that works without internet. It uses remote controller as the communication host in the local Wi-Fi network.



	Local RCN	
	4G SIM inserted?	Wi-Fi
UAV	N	Connect to RC
RC	N	AP
Smartphone/Pad	N	Connect to RC

#2: Semi-Direct RCN4G (Standard)

As local RCN mode is based on the local Wi-Fi network, which works perfectly fine when the field has no internet access. However, the internet inaccessibility will also affect the use of this UAV system. Basically, users may not be able to update the firmware online, or not able to use CORS, etc. Thus, semi-Direct RCN4G mode could solve these issues. Once a valid 4G SIM card is inserted into remote controller, the local RCN mode can automatically change to Semi-Direct RCN4G mode. Our UAV system will have communication to internet and allow users to use CORS or update firmware online.



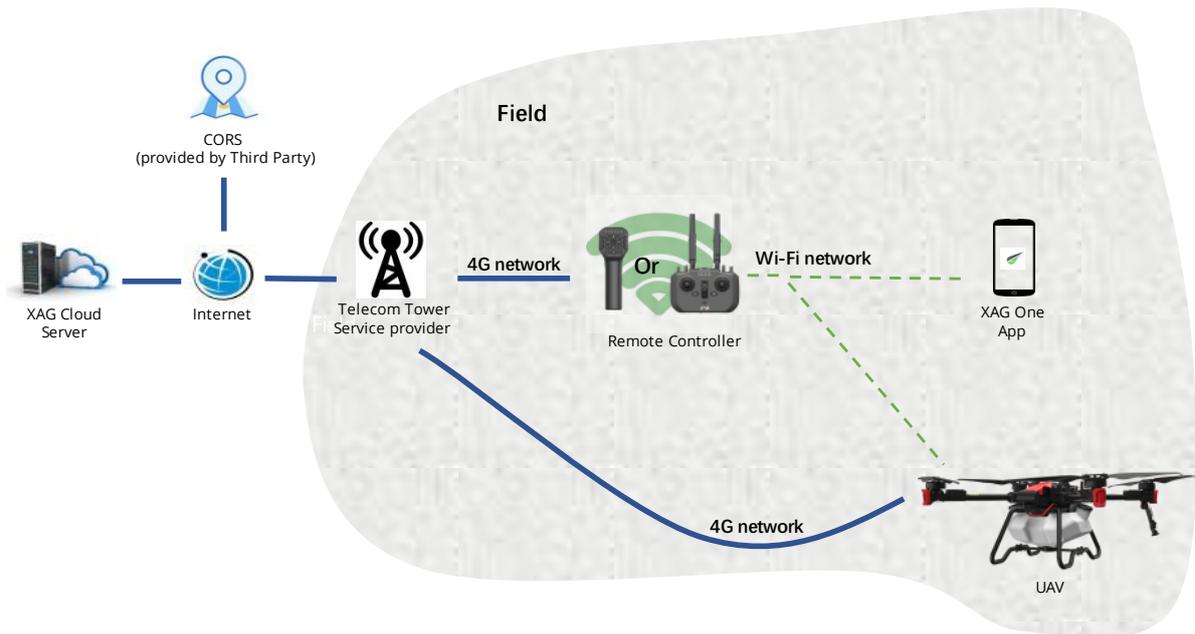
	Semi-Direct RCN4G	
	4G SIM inserted?	Wi-Fi
UAV	N	Connect to RC
RC	Y	AP
Smartphone/Pad	N/Y	Connect to RC

#3: Direct RCN4G

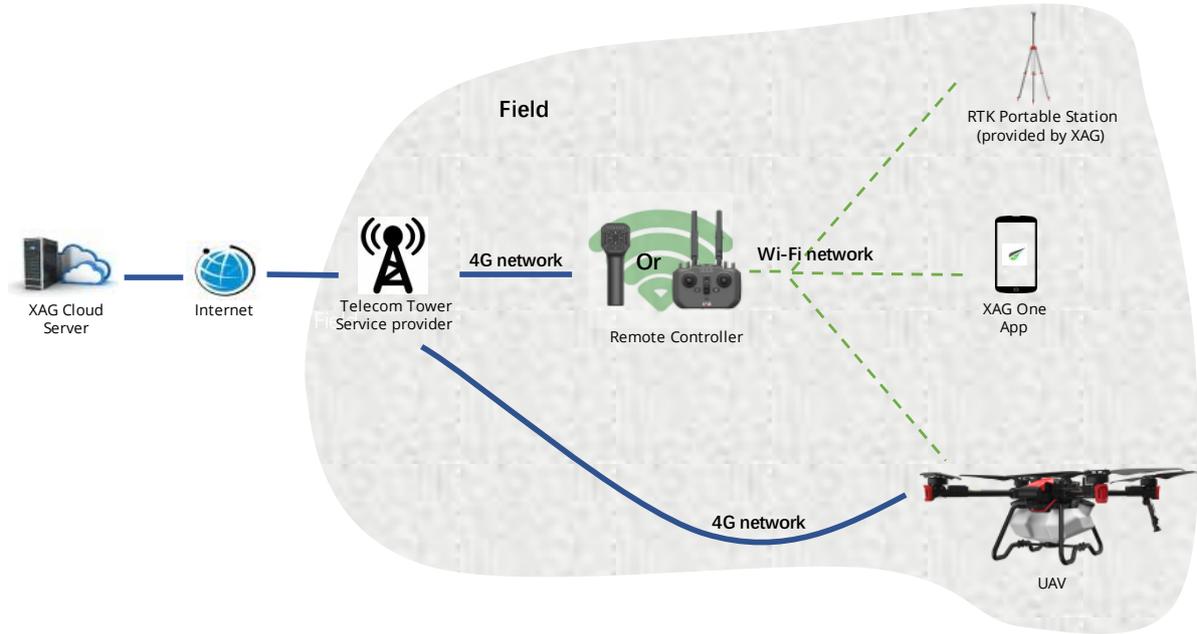
Semi RCN4G mode is good as our UAV system can have access to internet. But the remote controller works as AP and all other devices must go through it to access internet. However, the semi RCN4G may result in the high latency of CORS as the Wi-Fi network delay between UAV and RC happens in field operation. In this scenario, Direct RCN4G can solve this issue because the UAV can access internet directly without accessing RC Wi-Fi network. Once a valid 4G SIM card is inserted into remote controller, the Semi-Direct RCN mode can automatically change to Direct RCN4G mode.

	Direct RCN4G	
	4G SIM inserted?	Wi-Fi
UAV	Y	Connect to RC
RC	Y	AP
Smartphone/Pad	N/Y	Connect to RC

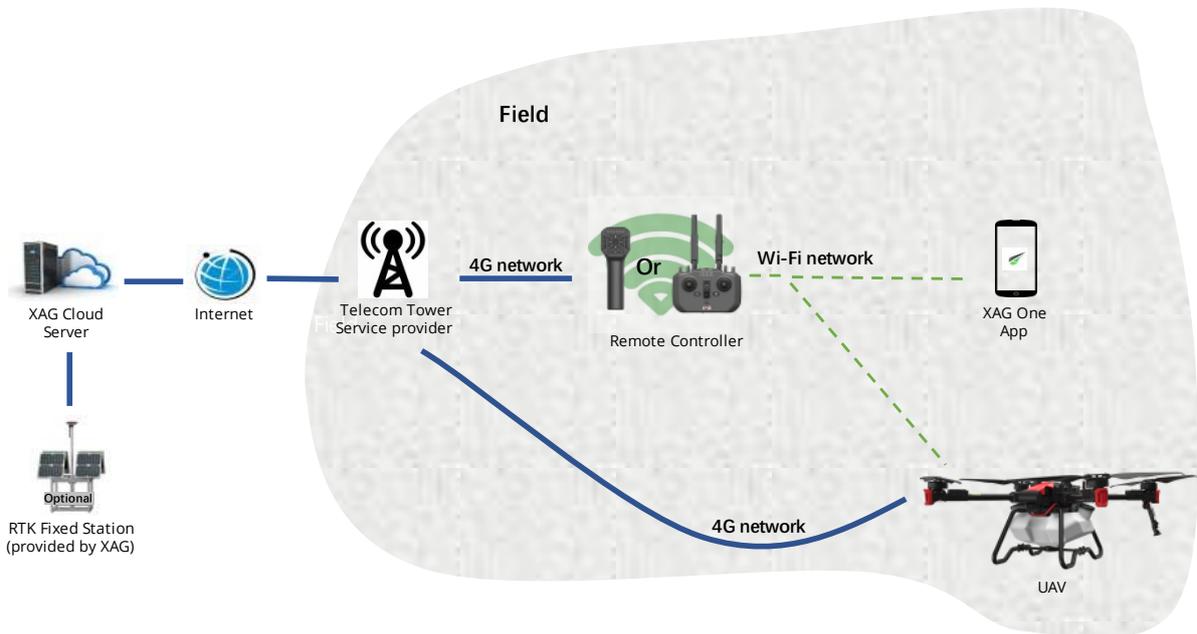
RCN4G – CORS



RCN4G – RTK Portable Station



RCN4G – RTK Fixed Station

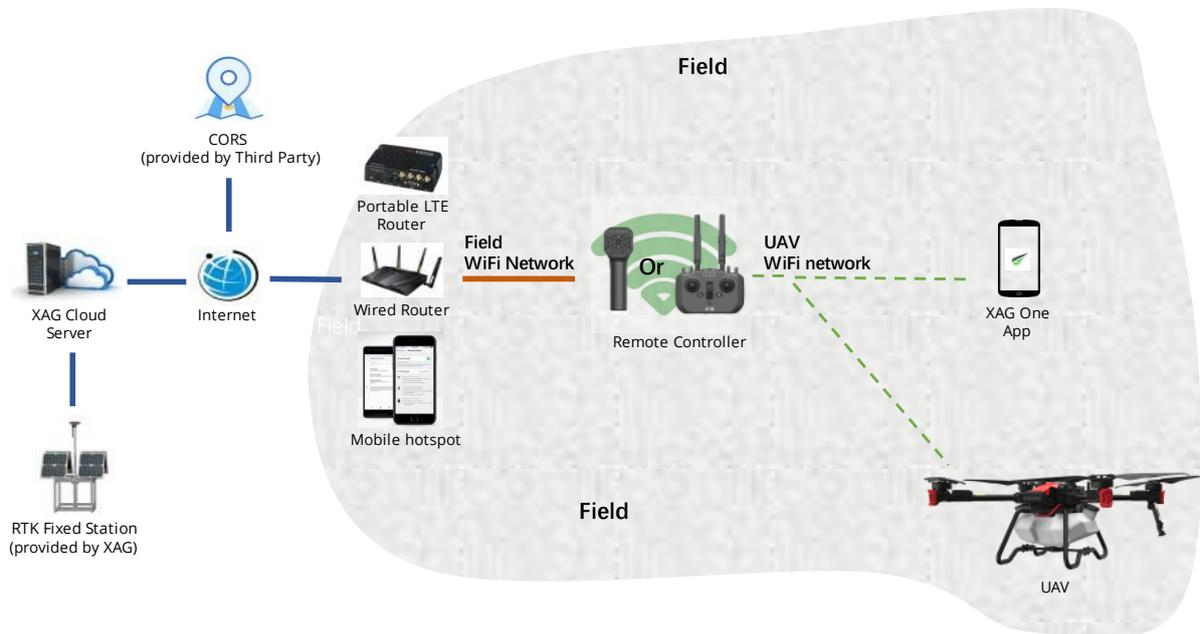


#4: RCNWiFi

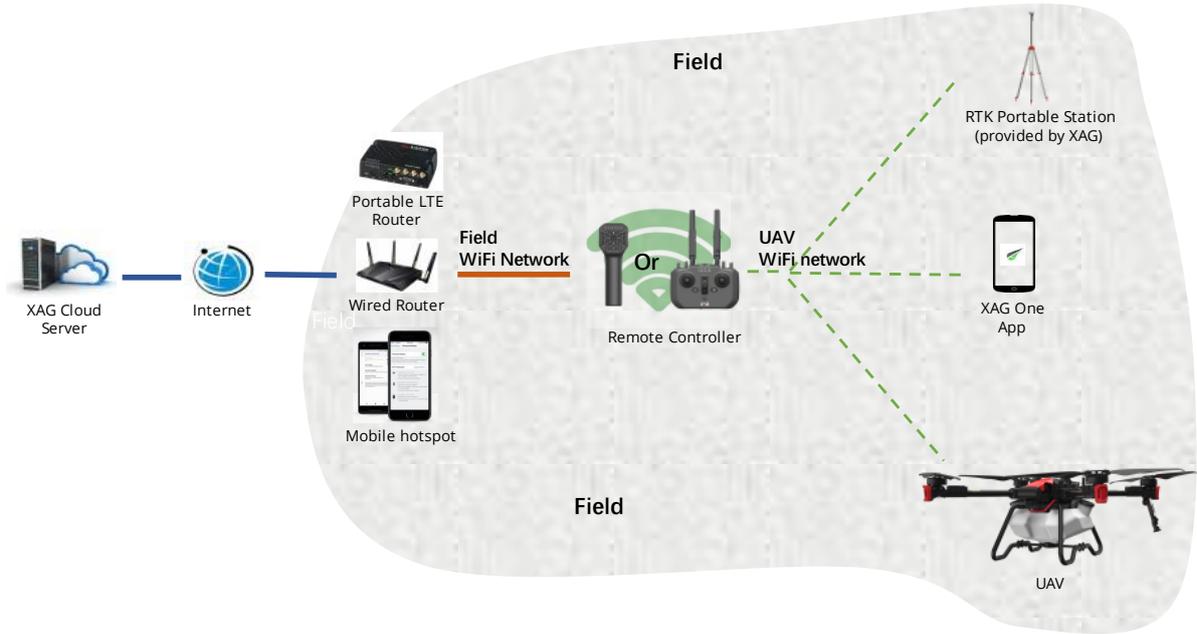
RCNWiFi mode is very similar to Semi Direct RCN4G mode. In Semi Direct RCN4G, the remote controller connects to router. While in RCNWiFi, the remote controller connects to wireless access point (wired router or portable router). Field WiFi network may be provided by portable LTE router, wired router or mobile hotspot.

	RCNWiFi	
	4G SIM inserted?	Wi-Fi
UAV	N	Connect to RC
RC	N	AP1: UAV/Phone; AP2: office/home router
Smartphone/Pad	N	Connect to RC

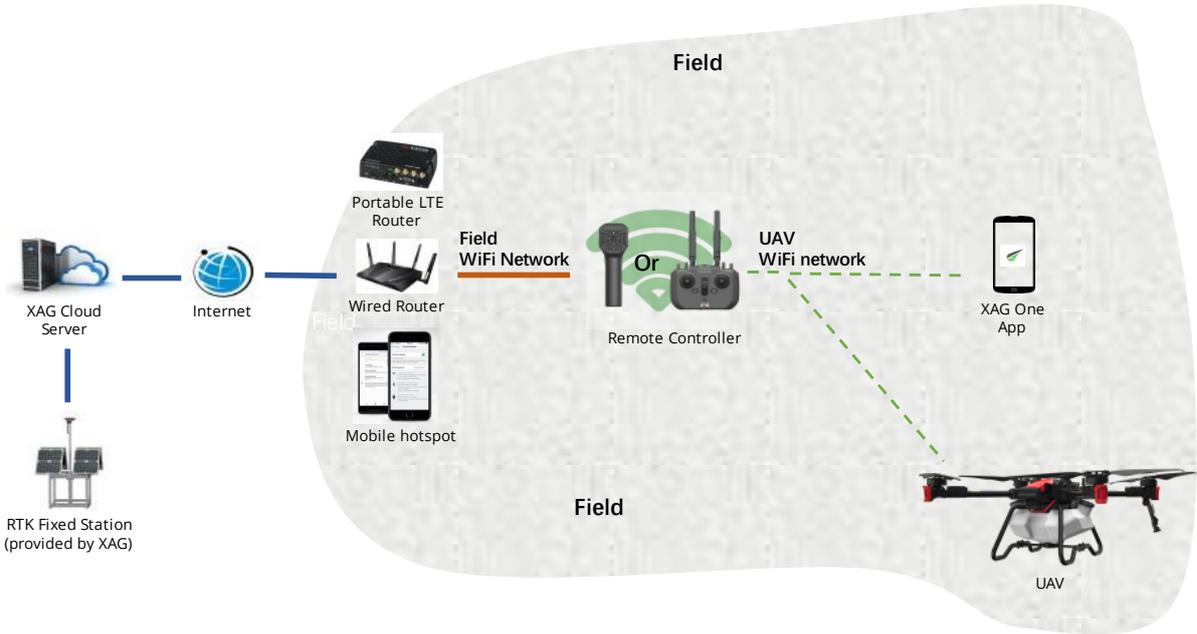
RCNWiFi - CORS



RCNWiFi - RTK portable station



RCNWiFi – RTK fixed station

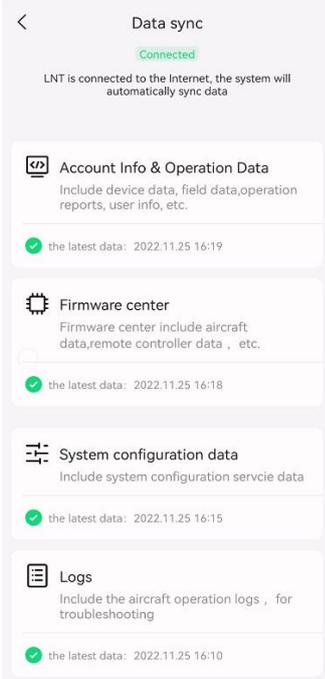


Chapter 3

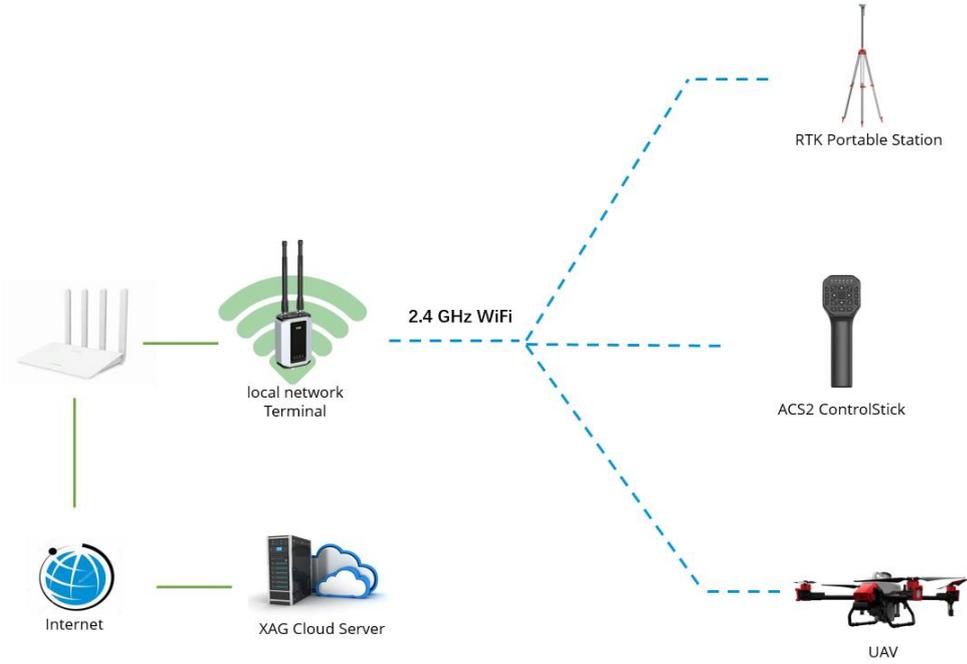
Firmware Update or Change

Firmware Online Update under LNT networking mode

Update the LNT to the latest firmware version.
added devices (UAV/ACS2/XRTK4) under LNT networking mode
connect LNT to internet, leave the LNT for a while during data sync.



Once sync completed, use XAG One App to update the device firmware to the latest version.



Firmware Online Update under 4G networking mode

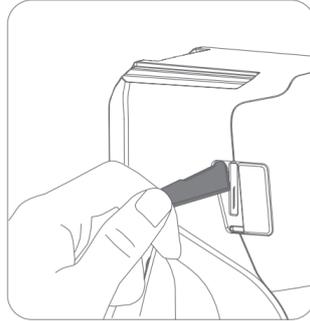
ACS2 2021 Online Update in XAG One App using 4G

Preparation

No.	Item	Description
1	Android Smartphone, Battery Fully Charged	
2	ACS2 2021, Battery Fully Charged	
3	SIM card, the frequency bandwidth must be compatible with your ACS2 version (Domestic/Global)	
4	XAG One account	

Operating Procedure

1. Insert SIM card into ACS2 2021



2. Power up, wait for 60 seconds, until the Power (1st) and Terminal LED (2nd) indicators are illuminated in green



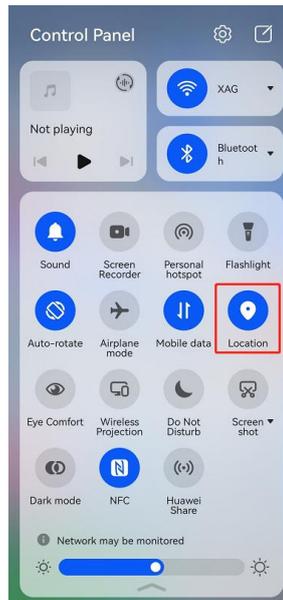
- Power LED indicator illuminated in green. It implies that the remaining battery is more than 30%
- Terminal LED indicator  illuminated in green. It implies that the ACS2 2021 has been connected to the XAG cloud server through internet.



3. Make sure your smartphone can access to internet via 4G or WIFI router. Test it by browser

website.

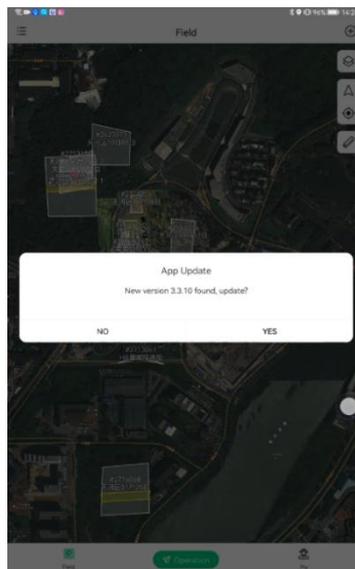
4. Turn on location service



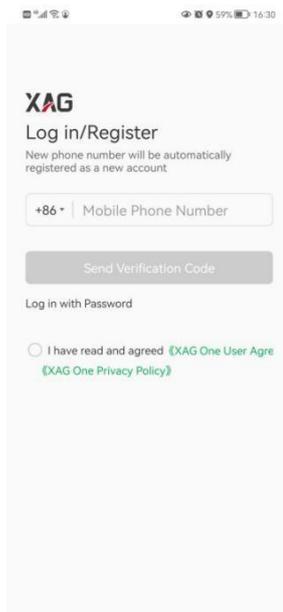
5. Download XAG One



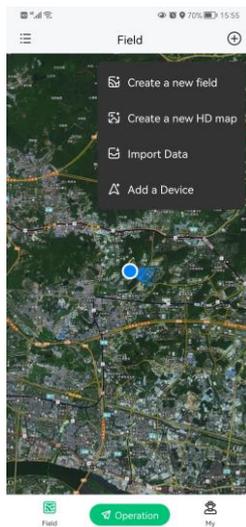
6. Update the App to the latest version



7. Sign in XAG One account



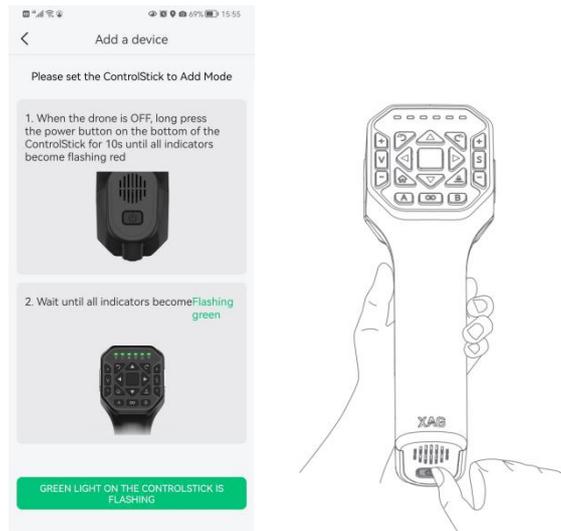
8. Click , press  Add a Device



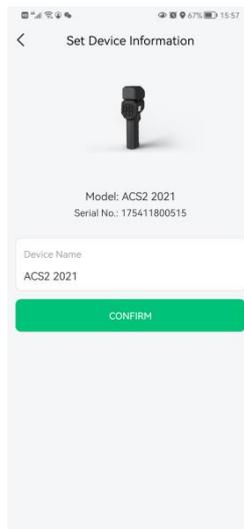
9. Input ACS2 2021 serial number manually or by scanning QR code



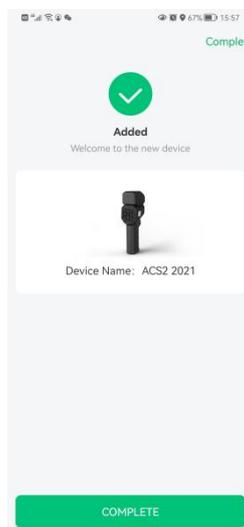
10. Follow the guide to reset ACS2 2021



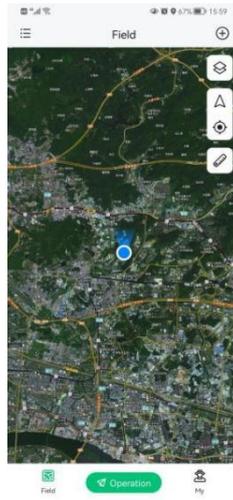
11. Input ACS2 2021's device name and press "COMFIRM"



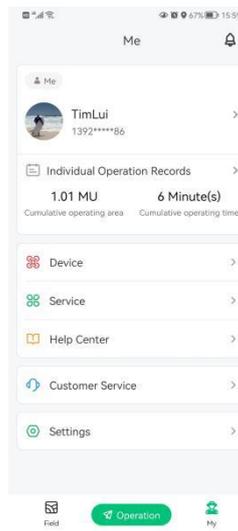
12. Device added successfully, press "COMPLETE" to return home page



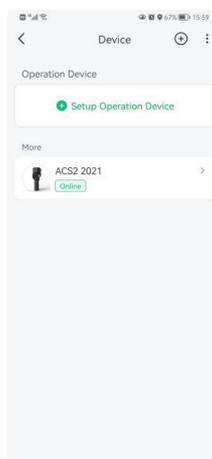
13. press  My



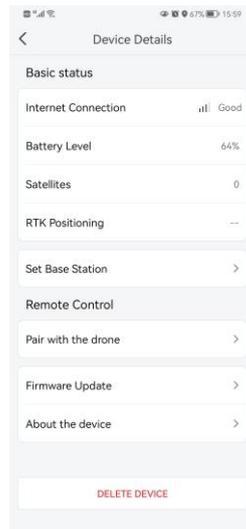
14. Press  Device



15. Press  ACS2 2021 Online



16. Press "Firmware Update"

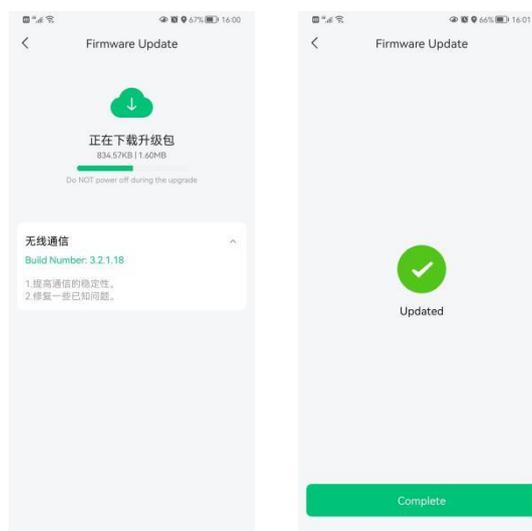


17. Press "Download and update"



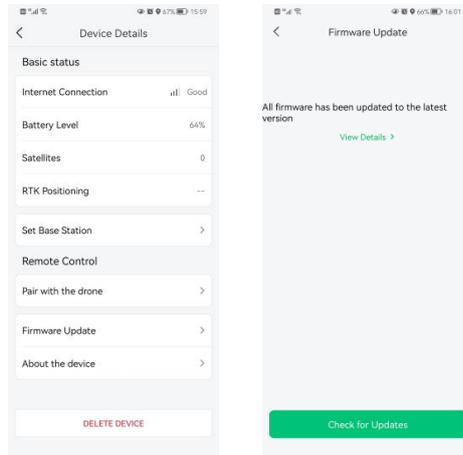
18. Wait until the update process is completed

Press "Complete" to return the device details page



19. Press “Firmware Update” again, Press [View Details >](#)

Double check if the firmware has been updated to the latest version

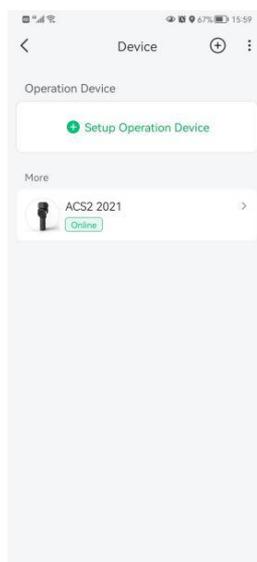


20. Capture the screenshot of this page for the record

The firmware version information is necessary for issue debug.



21. Delete ACS2 from XAG One account



XRTK4 Online Update in Agri 2 App/ACS2 2020 using 4G

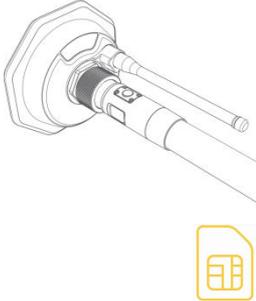
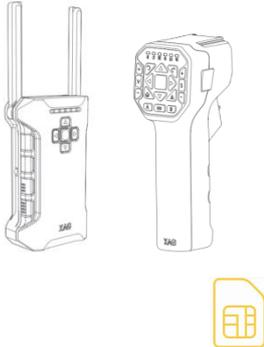
Applicability

RTK stations that manufactured before May 2022.

Introduction

XRTK4 portable station can be updated through mesh network. To update the firmware of XRTK4 portable station, we do not use XAG One App. Instead, we use XAG Agri 2 App with ACS2 2020/ACB1 because they are supporting mesh network.

Preparation

No.	Item	Description
1	Android Smartphone, Battery Fully Charged	
2	XRTK4 Portable station, with Sim card inserted	
3	Remote Controller: ACS2 2020 (with SIM card that can access to internet) or ACB1	
4	XAG Agri 2 App	
5	XAG Agri 2 Account (Firmware Privilege)	Please ask Xcare to push the LNT related firmware privilege on

Attention

1. Make sure all your device batteries are fully charged.
2. ACB1 can only be used in Android 10 or below, otherwise the device will not work. ACS2 2020 don't have this problem.
3. You cannot use ACS2 2021 here because it doesn't support mesh network. Please use ACS2 2020 or ACB1.

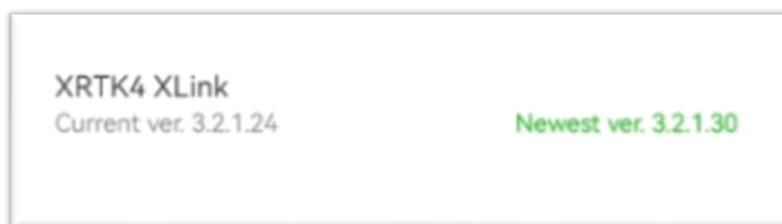
Devices	Mesh network
ACS2 2020	✓
ACS2 2021	×
XRTK4 Portable Station	✓
ACB1	✓

4. If you don't have ACS2 2020, you can downgrade your ACS2 2021 to 2020. This method is not recommended as it has the risk of damage the mainboard. Thus, it only allows to use when in urgent situation. Please contact XAG technician regarding the downgrade procedures.

Operating Procedures

1. Please apply for account privilege. Provide Xcare your account ID.

This account will have privilege access of the XRTK XLink V3.2.1.XX firmware.



you need to contact Xcare to apply for account privilege.

2. On your smartphone. Please download XAG Agri 2 v1.9.4



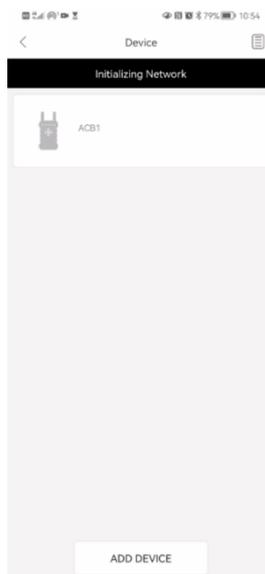
3. Turn on location service



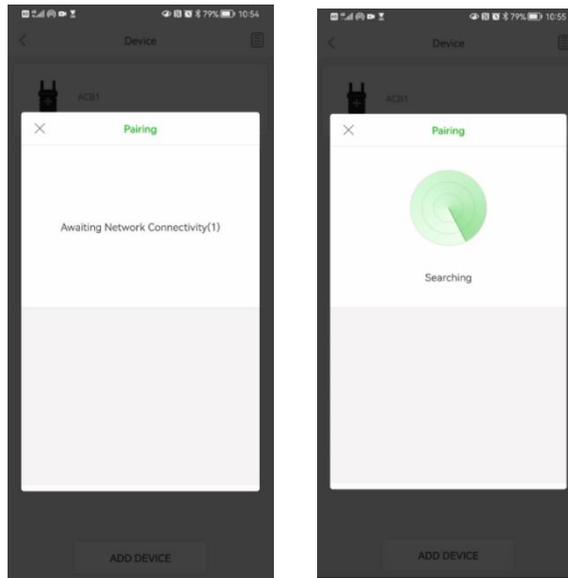
4. Open XAG Agri 2 and login to your account
5. Connect remote controller
 - a) ACS2 2020: insert SIM card; Power up ACS2; Wait until the terminal (3rd) LED stops flash and become dim; connect your smartphone to ACS2 2020 hotspot.
 - b) ACB1: change your phone hotspot authentication to the ACB1 preset hotspot; the default hotspot is XAG123 / 20070401. Power up ACB1; wait Until the ACB1 and smartphone are connected successfully. The first 2 LED indicators of ACB1 illuminated in green
6. Power up XRTK module
7. Press DEVICE button or menu item on the app



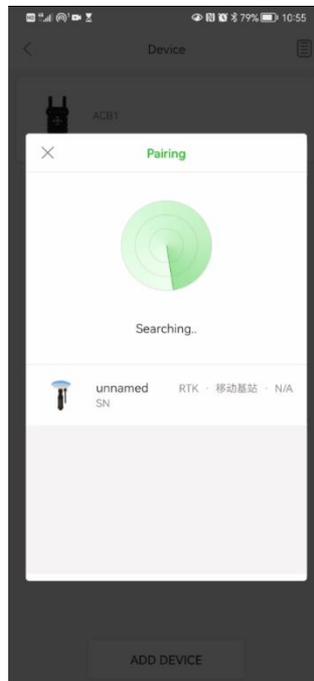
8. Press ADD DEVICE, then long press F2 button on XRTK module until "Beep" sound is heard.



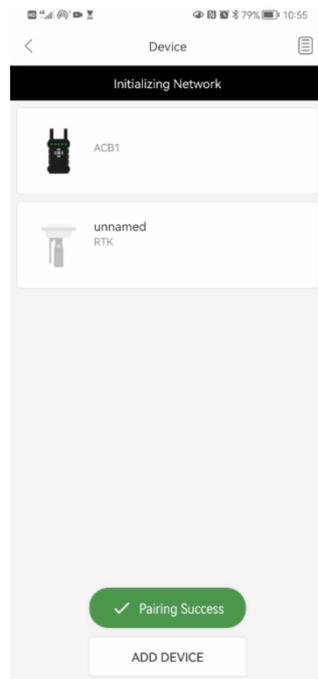
9. Pairing in process



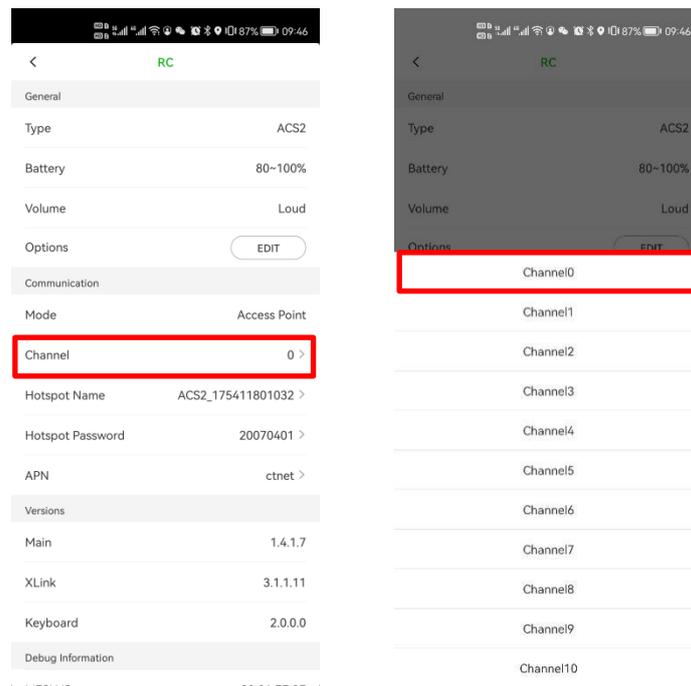
10. Press XRTK module to add



11. Pairing Success

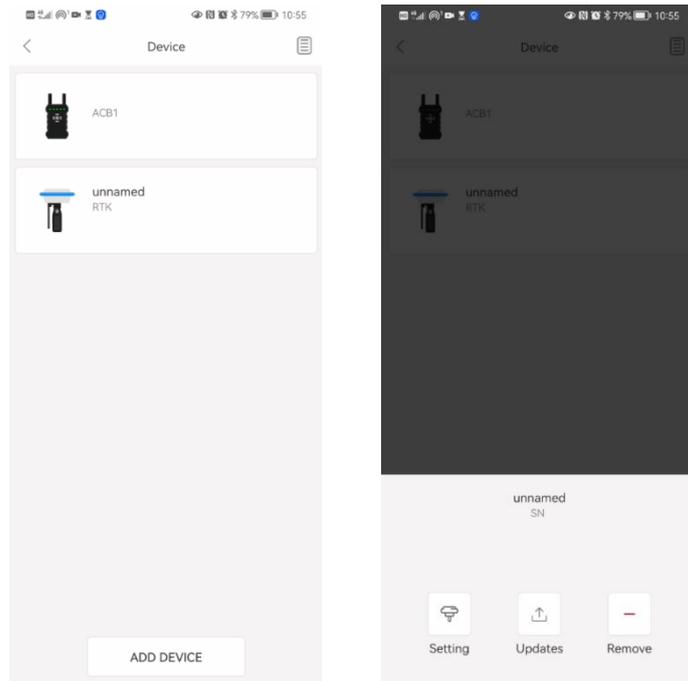


- If XRTK fails to pair with ACS2 2020, we may need to change ACS2 2020 remote controller's channel to 0, and then pair again.

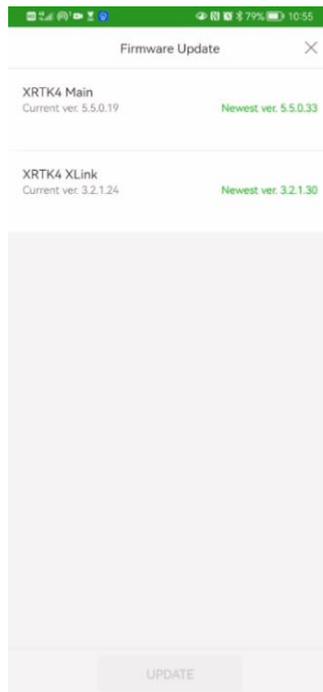


- If the problem persists and XRTK fails to connect ACS2 2020, please contact XAG technician or change your XRTK.

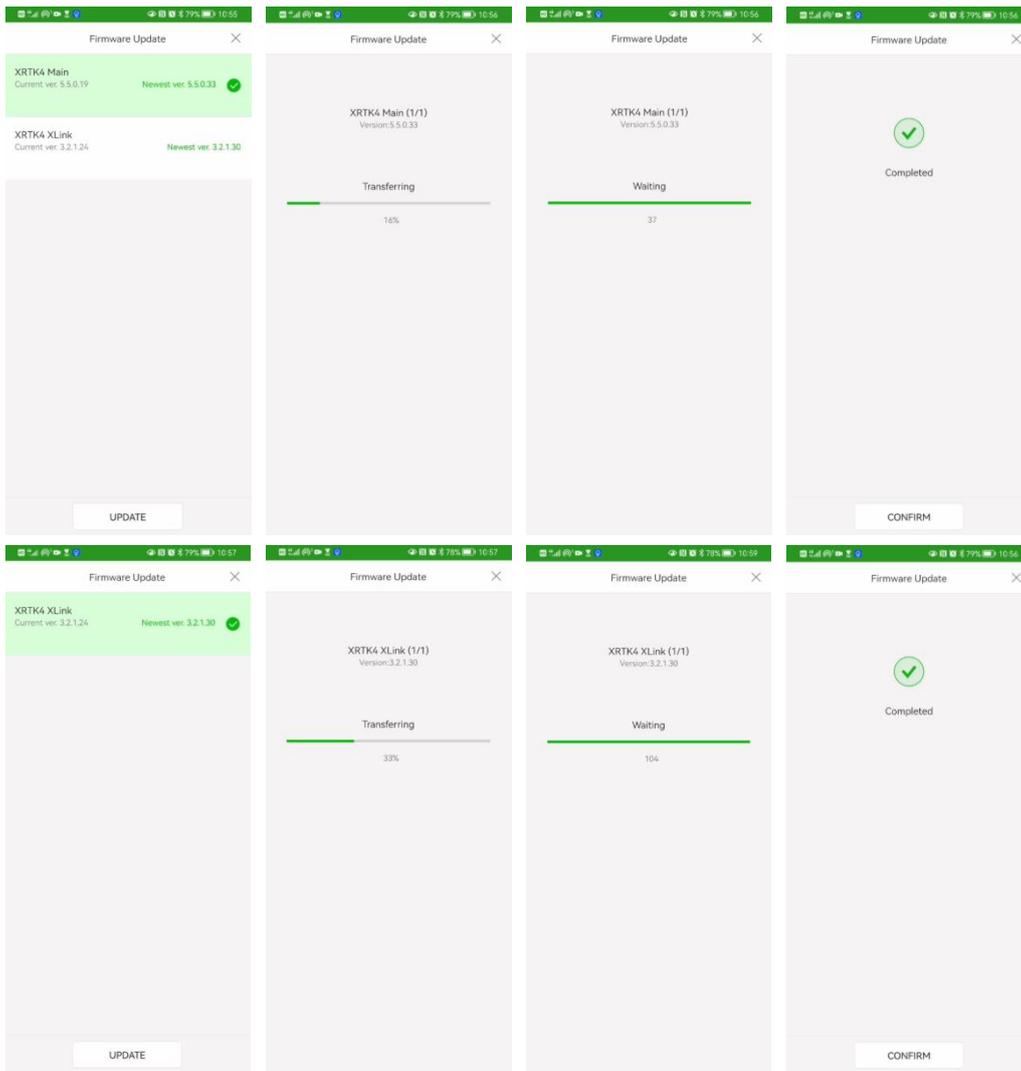
12. Wait until XRTK online, then Press XRTK module to open the menu, press update



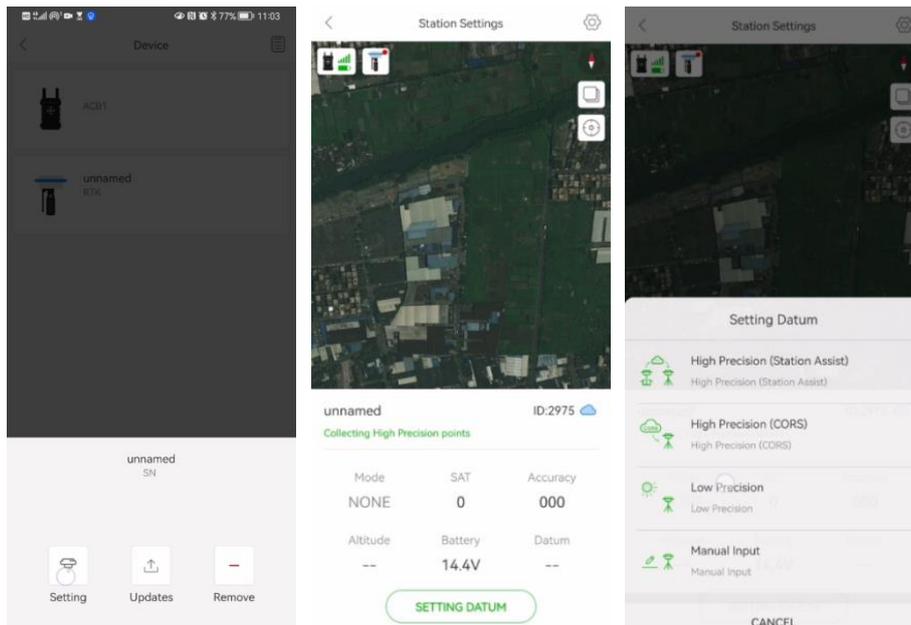
13. Update the firmware one by one, and it's not necessary to restart RTK module after each firmware update. In this example, there are 2 firmware that ready to update.



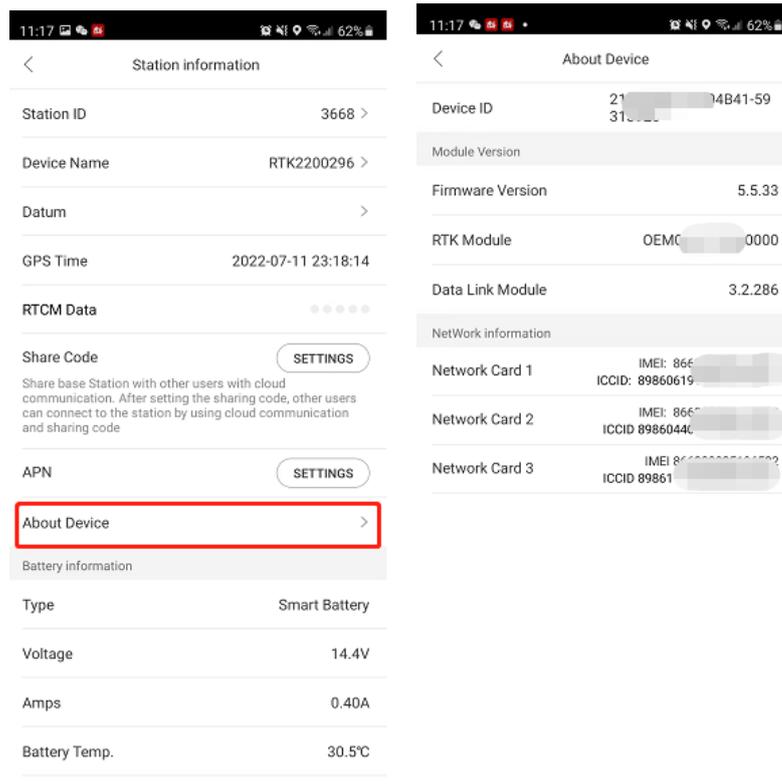
14. Update in process



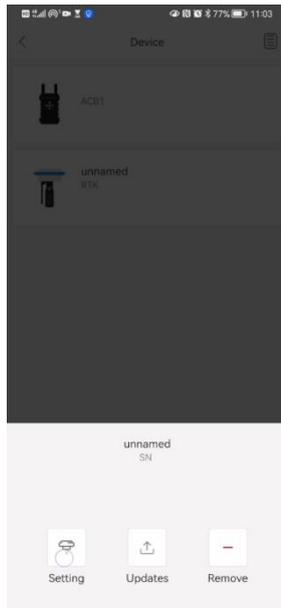
15. XRTK firmware update completed. If the XRTK module is offline for too long, please delete the XRTK4 from the App, restart XRTK4, and add it to the App again
16. Optional: To test XRTK4, you can go to Setting, setting DATUM, select Low Precision. Check if XRTK4 can go into "FIX" mode. Make sure you place the XRTK4 in the open field, otherwise it can't search any satellites.



- Go to “Station Information-About Device” to capture the screenshot of module version and network information. Please make sure that the app can read the IMEI and ICCID under network information. Otherwise, the XRTK4 may fail to add in LNT.

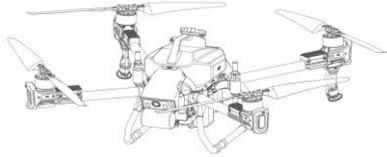


- It’s not necessary to remove the XRTK4 from your Agri 2 account since XAG Agri 2 and ONE are two independent applications. But if you want to remove XRTK4, you can do so.



UAV Online Update in XAG One App using 4G

Preparation

No.	Item	Description
1	Android Smartphone, Battery Fully Charged	
2	UAV (model 2021/2022)	
3	SIM card, the frequency bandwidth must be compatible with your UAV version (Domestic/Global)	
4	XAG One account	

Attention

- i. Cloud Communication LED indicator of the FC must illuminate in green. It implicit the 4G connection is OK.
- ii. Taillight must flash in green. It implicit that the UAV's RTK module has found enough satellites and is able to compute its geographic position. Otherwise, the smartphone and UAV pairing will fail. This is due to that the cloud server must confirm the geographic position between smartphone and UAV before pairing.

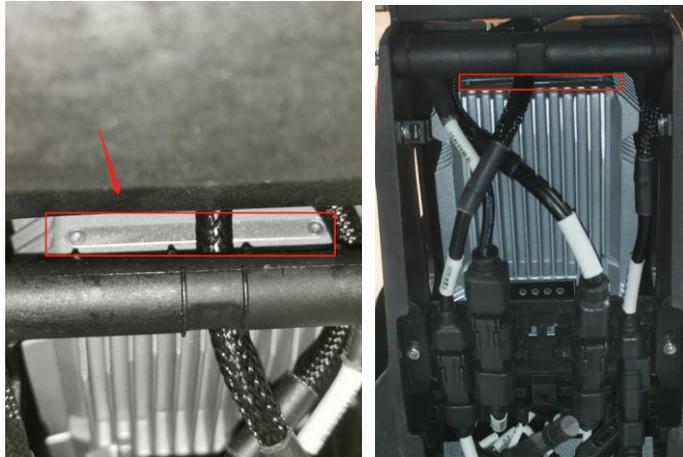
Operating Procedure

1. Insert SIM card into flight control

SuperX4 (V40/P40)



SuperX4 Pro (P100)



2. Power up UAV, wait for 60 seconds until SuperX4 connects 4G. To verify the 4G connection, check the 2nd light indicator (remote server) light indicator is flashing in green. The UAV should be placed outside, and the taillight should be green flashing.

Flight control is not connecting to internet through 4G as the 2nd light indicator (remote server) is in red.



Flight control is connecting to internet through 4G as the 2nd light indicator (remote server) is in green.



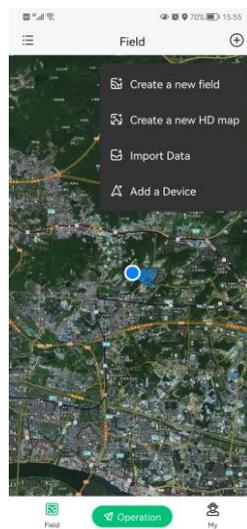
3. Connect your Android smartphone to internet (4G/WIFI). Test it by browser website.



4. Turn on location service



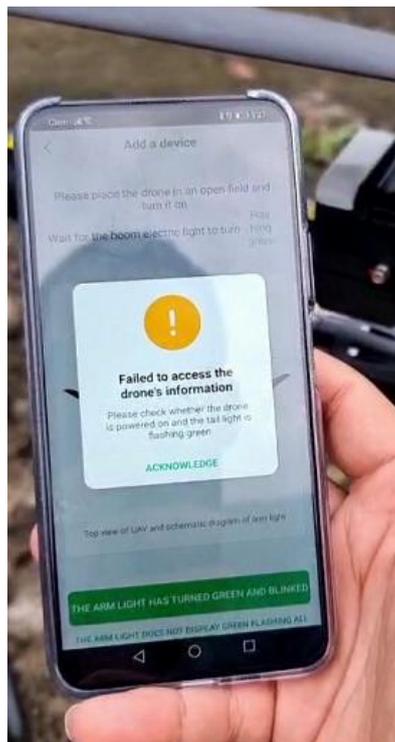
5. Click , press  Add a Device



6. Input UAV serial number manually or by scanning QR code. The UAV serial number is on the nameplate.



If the error “Failed to access the drone’s information” is prompted, it’s because your drone is either not connecting to 4G or losing GNSS positions. Please check your 4G connection and bring your drone to an open field with good CNSS position signal.



If the GNSS positioning signal is good, the 1st light indicator will be in green. If the 1st light indicator is in red, the GNSS positioning signal is bad.

Usually if it’s the first time adding the drone, the drone needs to report its physical location to the remote cloud server for security check. Thus, the drone needs to have GNSS position, which means it need to be brought onto an open field, for getting better satellites broadcast signal.

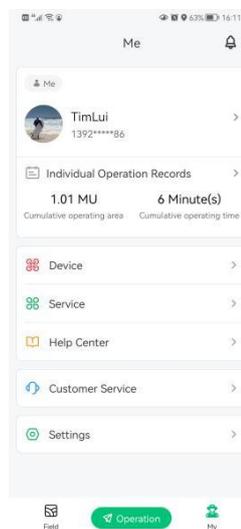
There is no GNSS position signal. Please bring your drone to an open field.



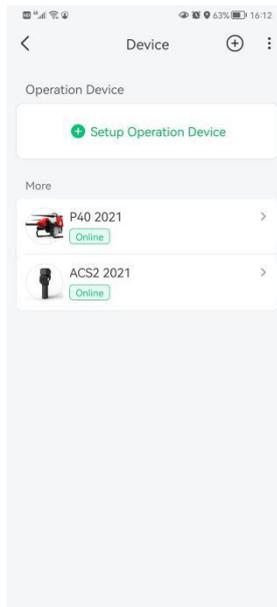
7. Set device name and press confirm
8. UAV added successfully, press complete to return



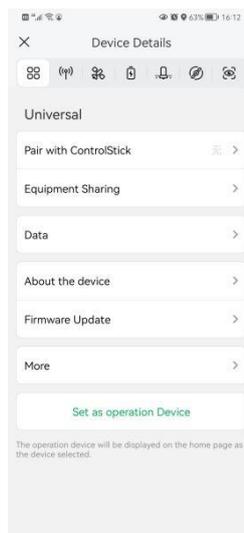
9. Go to My



10. Select your UAV, "P40 2021"



11. Press Firmware update



12. After checking for updates, the list of firmware is shown



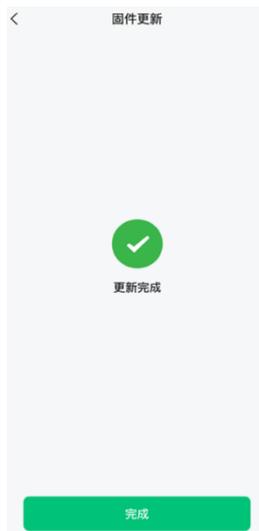
13. Download Firmware



14. Install Firmware



15. Firmware update completed



Firmware Offline Update Using Laptop (No Internet Access)

ACS2 2021 Offline Update

Overview

Process of offline local update:



ACS2021 offline update consists of two parts,

- Mainboard firmware, download link: please refer to Appendix I
- WIFI module firmware, download link: please refer to Appendix I

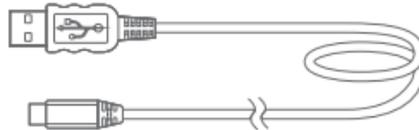
Mainboard Firmware Update

1. Introduction:

This method allows us to manually update the ACS2 2021 firmware without internet. But it requires USB-Type-C cable, PC and ACS2 2021 latest firmware. Simply copy the firmware file into ACS2 2021 when it's in USB-Flash drive mode, and restart, the firmware will automatically update by itself.

2. Preparation:

- ACS2 2021, please fully charge lithium battery before use
- ACS2 2021 mainboard firmware, download link: please refer to Appendix I
- USB-Type-C cable



- PC, windows 10/11



3. Operating Procedure:

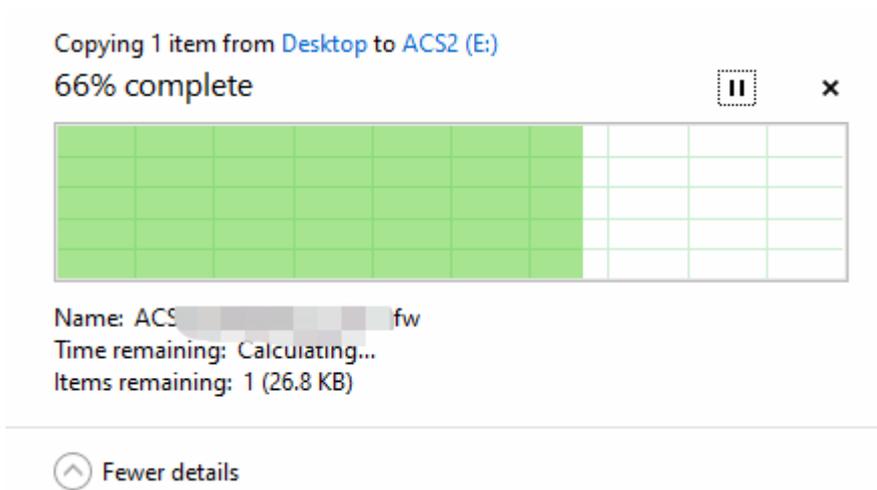
- i. Make sure that the ACS2 is power off.
- ii. Press and hold the Down button (altitude control) for 1~2 seconds, then press the Power button, wait for a while. Once you see all the six LED indicator lights are illuminated in red, the ACS2 is on USB flash drive mode.

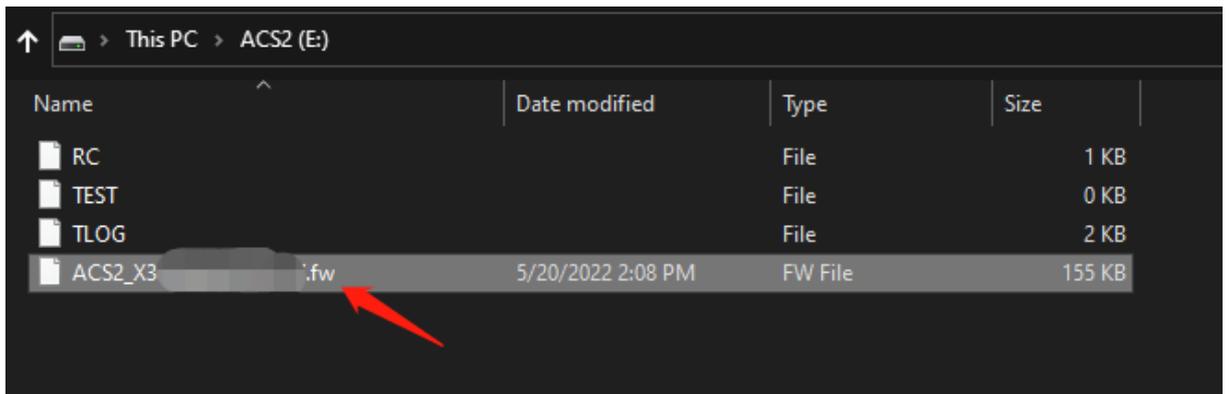


- iii. Connect the ACS2 to PC through USB-Type-C cable

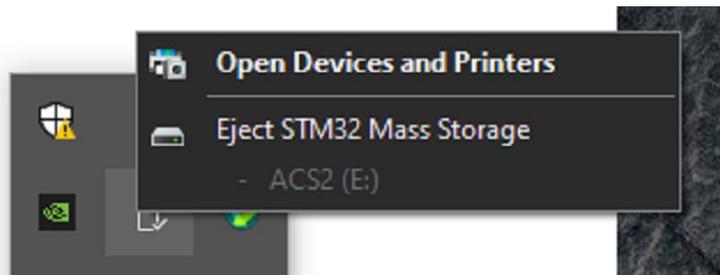


- iv. Access the ACS2 flash drive on PC
- v. Copy the firmware file (.fw) to the ACS2 flash drive root directory





- vi. Eject the ACS2 flash drive



- vii. Unplug the USB-Type C cable from ACS2
- viii. Press and hold the Down button (altitude control) for 1~2 seconds, then press the Power button, wait until all the six indicator lights off. The ACS2 ControlStick quits on USB flash drive mode.
- ix. Single press the ACS2 power button. The ACS2 will upgrade its firmware. Wait until all the lights indicator off. The mainboard firmware installation is completed.

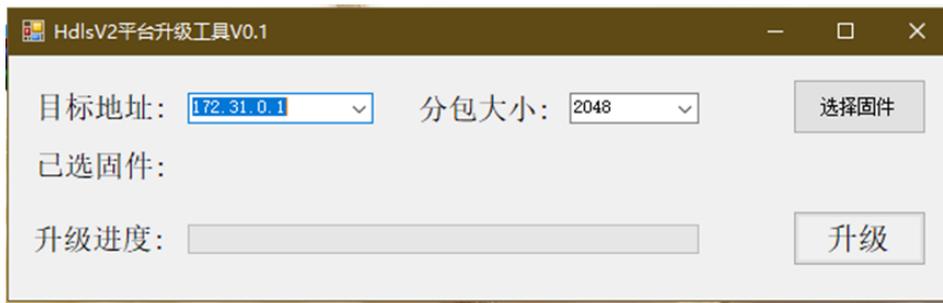
WiFi Module Update

1. Preparation

- i. ACS2 2021
- ii. PC
- iii. HDLS update tool, a software that runs on windows (acquired from XAG technician), download link: please refer to Appendix I
- iv. Firmware File, download link: please refer to Appendix I

2. Operating Procedure:

- i. Power up ACS2 2021 (ACS2 mainboard firmware version above 2.0.1.18)
- ii. Use PC to connect ACS 2021 hotspot (hotspot name: ACS2_XXXXXXXXXXXX, where XXXXXXXXXXXX is the serial number), password is 20070401.
- iii. Open HDLS update tool on your PC, set the parameter as shown (目标地址: 172.31.0.1, 分包大小: 2048), press “选择固件” to select the firmware file (e.g. xlinkhs_platform_2023_V3.2.1.52_20230224.fw)



- iv. press "升级"
- v. Wait until the update complete

XRTK4 Firmware Offline Update

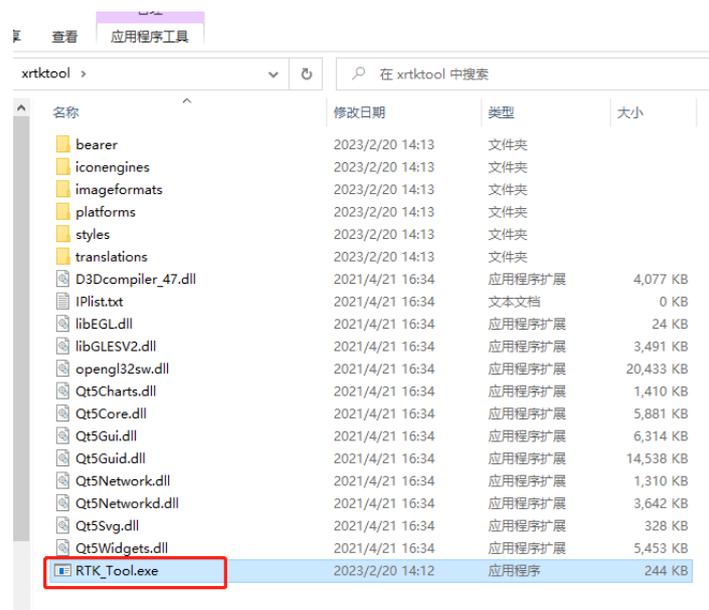
XRTK4 Mainboard Firmware Offline Update

Preparation:

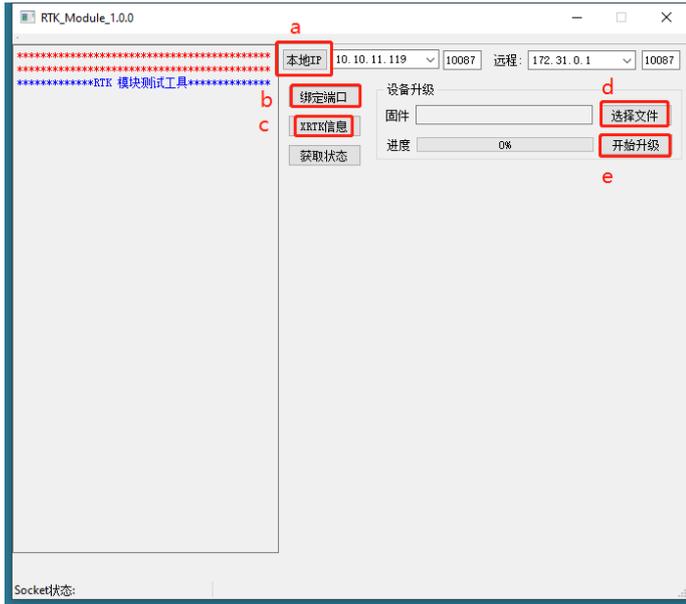
1. Laptop
2. XRTK4 mainboard firmware, please find the link
Download Link: please refer to the Appendix I
3. RTK_Tool (firmware update tool under windows)
Download Link: please refer to the Appendix II

Procedure:

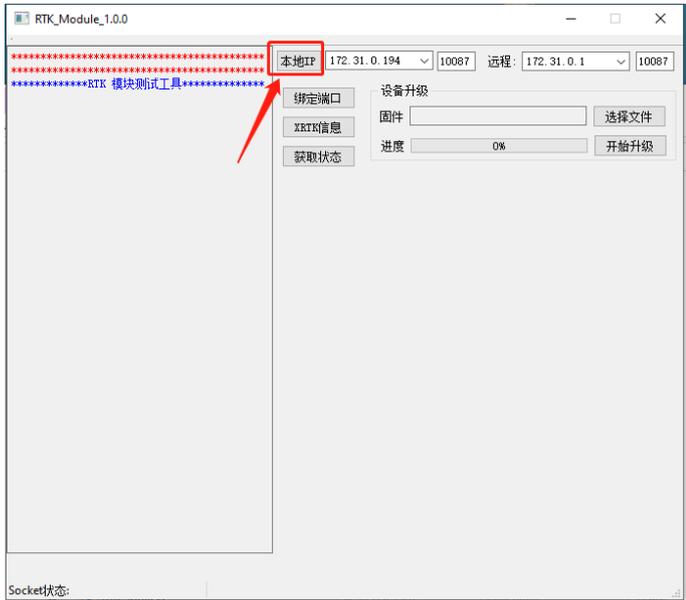
1. Power on the XRTK, wait for the F1 light to stay on, press and hold the F1 button until you hear a beep sound, release, and then use the laptop to search and connect the XRTK's hotspot named XBASE_XXXXXXX. XXXXXXXX is the SN of the XRTK
2. Open the RTK_TOOL.exe on your laptop



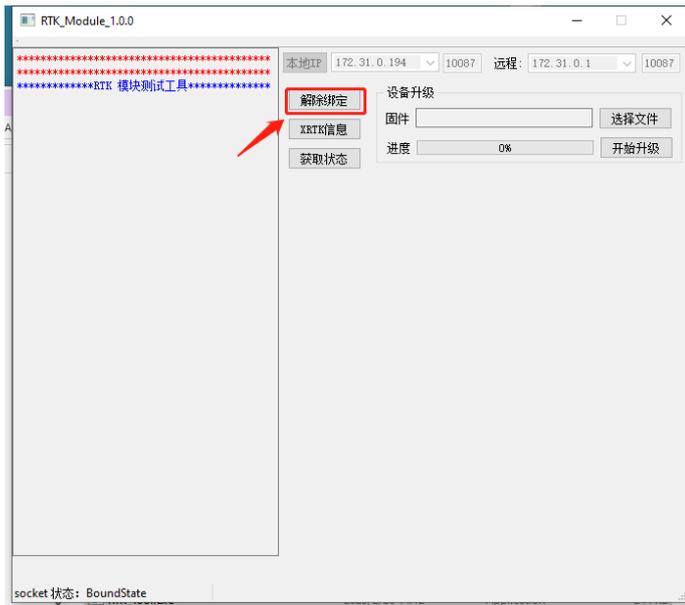
3. Make sure the button a-e are available



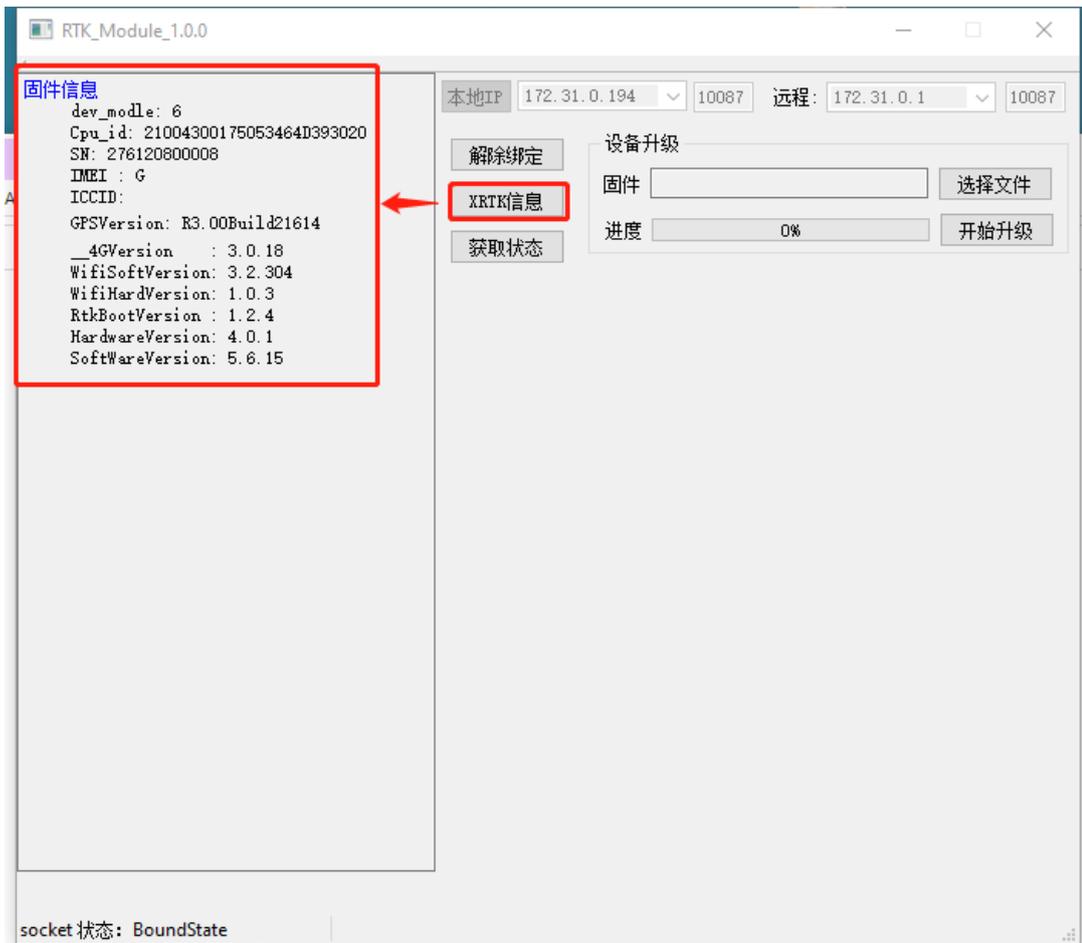
4. Click the button 本地 IP (local IP first)



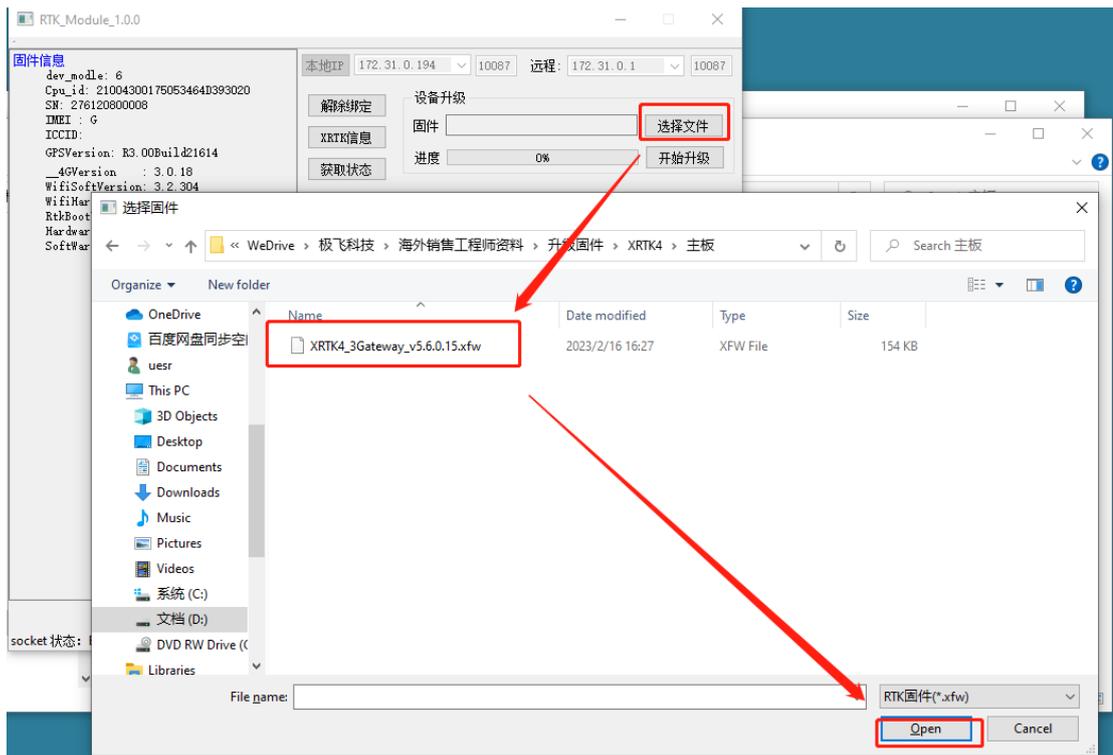
5. Press the button 绑定端口 (binding the port)



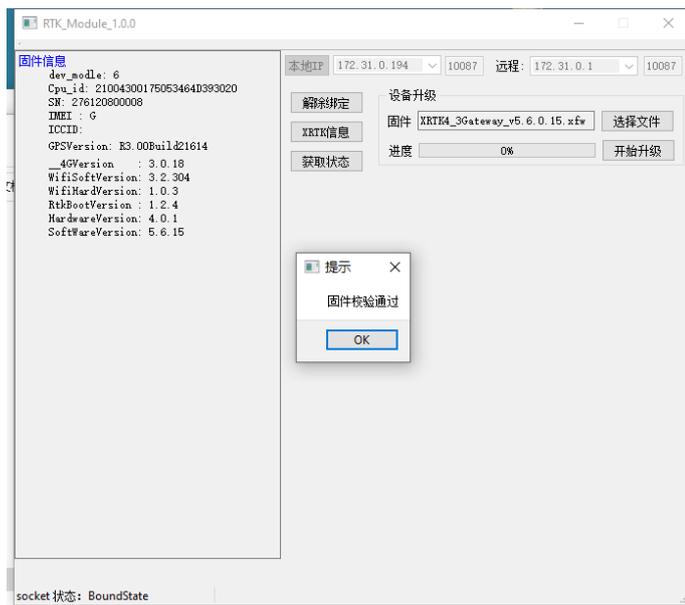
- click the button XRTK 信息 (XRTK information) to obtain XRTK firmware version
the XRTK information will display on the right the panel



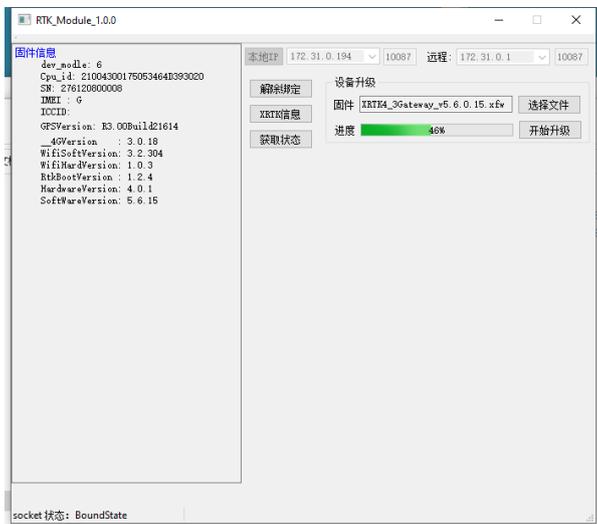
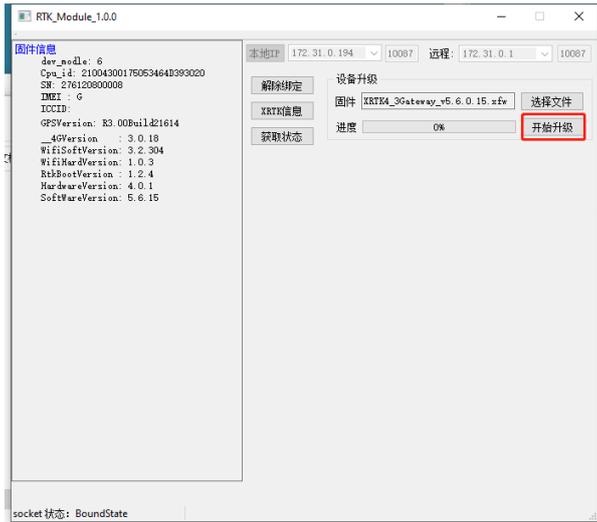
- click the button 选择文件 (choose firmware file) that needs to be upgraded, wait the file verification pass and click “OK” . in this example, we use “XRTK4_3Gateway_v5.6.0.15.xfw”.



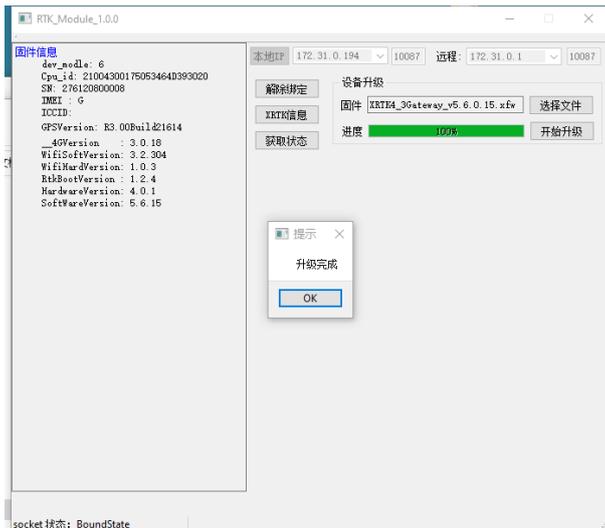
8. Firmware verification OK



9. Click the button 开始升级 (start update), and there will be a progress bar prompt during the upgrade period, indicating the upgrade process. When the XRTK receives the firmware, F3 will flash blue, and when the upgrade is complete, it will beep twice.



10. the XRTK mainboard firmware update is done



11. Restart the XRTK and check the XRTK version.

XRTK4 WiFi Firmware Offline Update

How to offline update XRTK WIFI firmware. Video link:

<https://drive.google.com/file/d/1GR5r7fwb5V3DoW1LOJelYF4Kr6IkEHBb/view?usp=sharing>

Preparation:

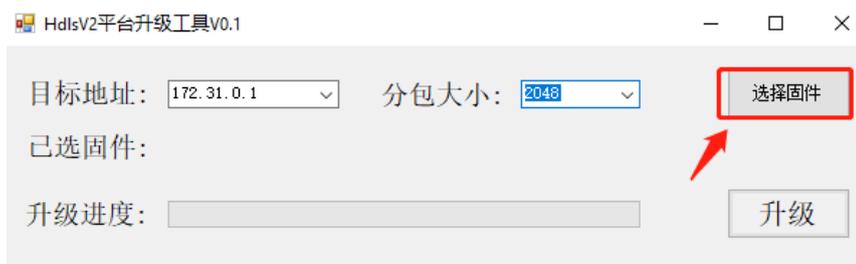
1. laptop, windows 10
2. Update tool: 2-hdls_fwupdate.exe
Download Link: please refer to the Appendix II
3. XRTK WIFI Firmware, download link: please refer to Appendix I

Procedure:

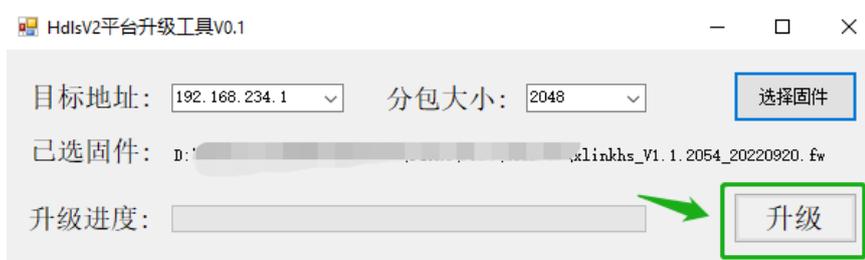
1. Turn on XRTK4 station, long press F1 to enable the XRTK4 WIFI
2. connect laptop to XRTK4 hotspot
3. open 2-hdls_fwupdate.exe and input parameters (172.31.0.1 and 2048)



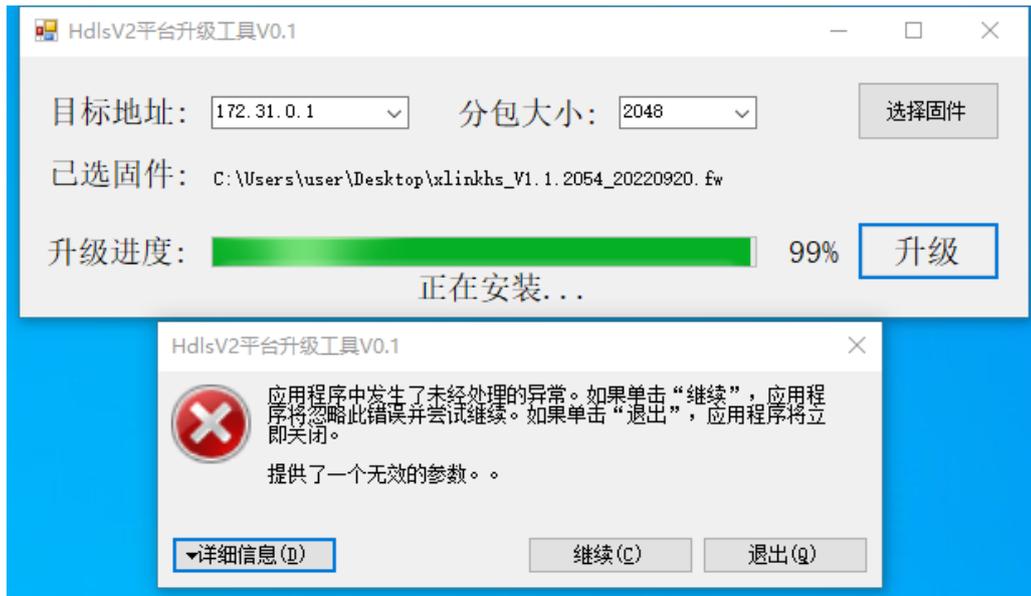
4. Choose firmware, xlinkhs_VX.X.XXXX_XXXXXXXXX.fw



5. update XLINK firmware



6. The tool will stop at 99% as the XRTK4 is restarting its WIFI module. Please ignore the warning. Wait for approximately 5 minutes.

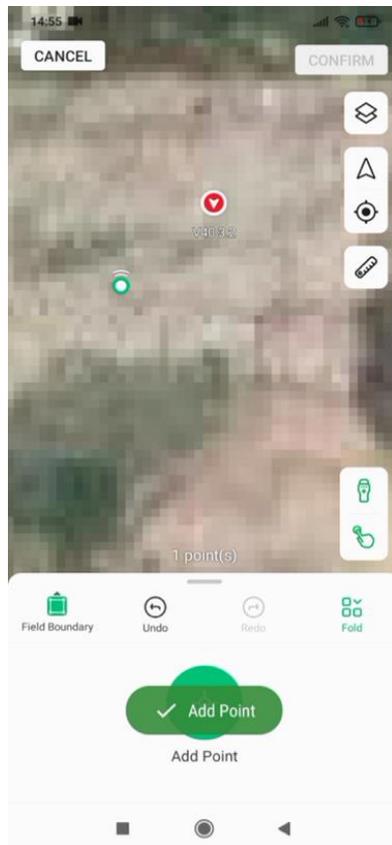


7. check XRTK4 station firmware version

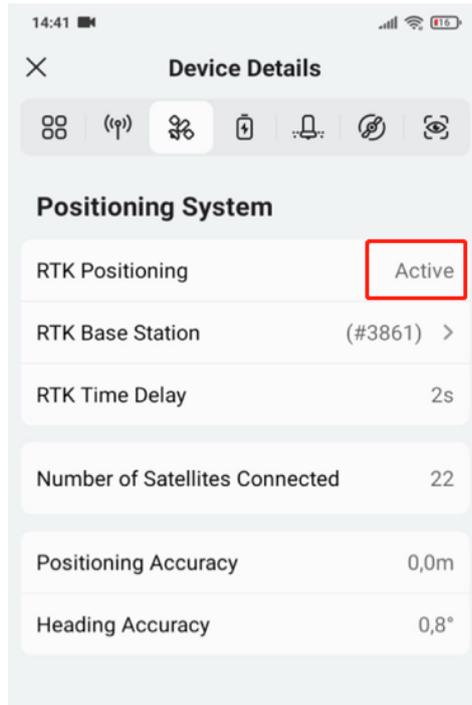
- connect XRTK4 to ACS2 2020, check if XAG Agri 2 App shows firmware versions.
- connect XRTk4 to LNT, check if XAG One App shows firmware versions

8. Test XRTK4

- Use ACS2 to do the field mapping, check if ACS2 can add points



- Connect UAV to XRTK4, check if the RTK status is active



XRTK4 WiFi version Tips:

When the XRTK4 Data Link Module version is greater than 3.2.1.30, the XRTK4 can enable WIFI hotspot.

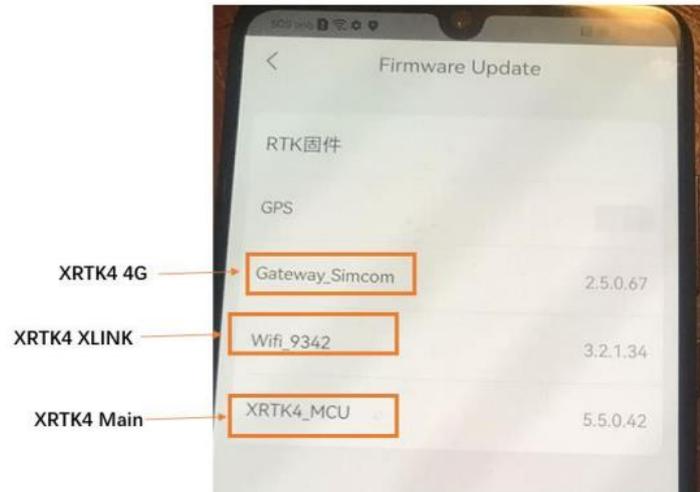
Device information using XAG Agri 2 App

1. This firmware version refers to the firmware version of RTK mainboard. Due to the app display, it's indeed equivalent to 5.5.0.42

2. This refers to the firmware version of Data Link Module. Due to the app display, 3.2.290 is equivalent to 3.2.1.34, where 290-256=34.

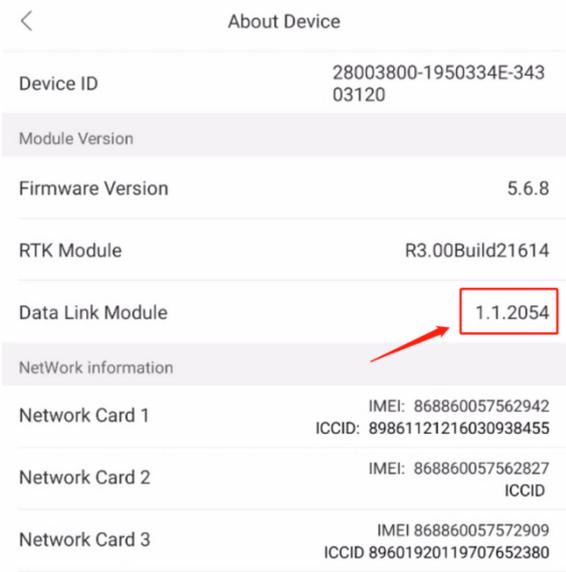
About Device	
Device ID	1B002C00-0B503443-35 373620
Module Version	
Firmware Version	5.5.42
RTK Module	R3.00Build21614
Data Link Module	3.2.290
NetWork information	
Network Card 1	IMEI: 868860057520023 ICCID: 89860621290010779269
Network Card 2	IMEI: 868860057517607 ICCID: 89860492192070666322
Network Card 3	IMEI: 868860057515908 ICCID: 89861121216030862168

RTK firmware version using XAG One App



If your XRTK has the data link module is not 3.X.XXXX in XAG Agri2 or 3.X.X.XX in XAG One, then you will not be able to use this method and have to use ACS2 2020 for XRTK firmware update.

Below is the example of data link module 1.1.22054, which doesn't have the feature of XRTK WIFI hotspot.



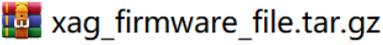
About Device	
Device ID	28003800-1950334E-34303120
Module Version	
Firmware Version	5.6.8
RTK Module	R3.00Build21614
Data Link Module	1.1.2054
NetWork information	
Network Card 1	IMEI: 868860057562942 ICCID: 89861121216030938455
Network Card 2	IMEI: 868860057562827 ICCID
Network Card 3	IMEI 868860057572909 ICCID 89601920119707652380

UAV Offline Update

Offline update is only recommended when there is prolonged internet latency.

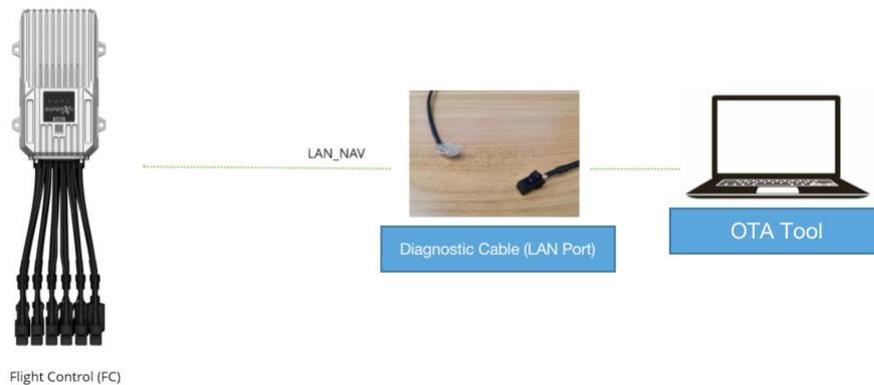
Offline Update with OTA Tool

Preparation

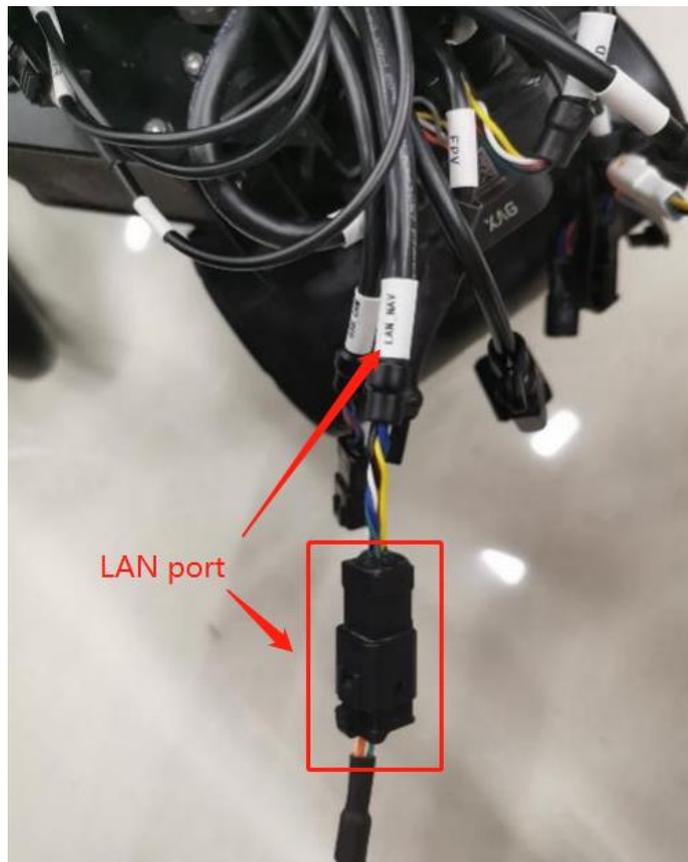
No	Item	Description
1	UAV, Model 2021/2022	
2	Laptop	
3	01-027-01519 SuperX4 Diagnostic Cable (LAN Port) UAV model: P40/V40	
4	01-027-02113 SuperX4 Pro Diagnostic Cable (LAN Port) UAV model: P100 or later	
5	OtaTool, a PC software	
6	Firmware	

Operating Steps:

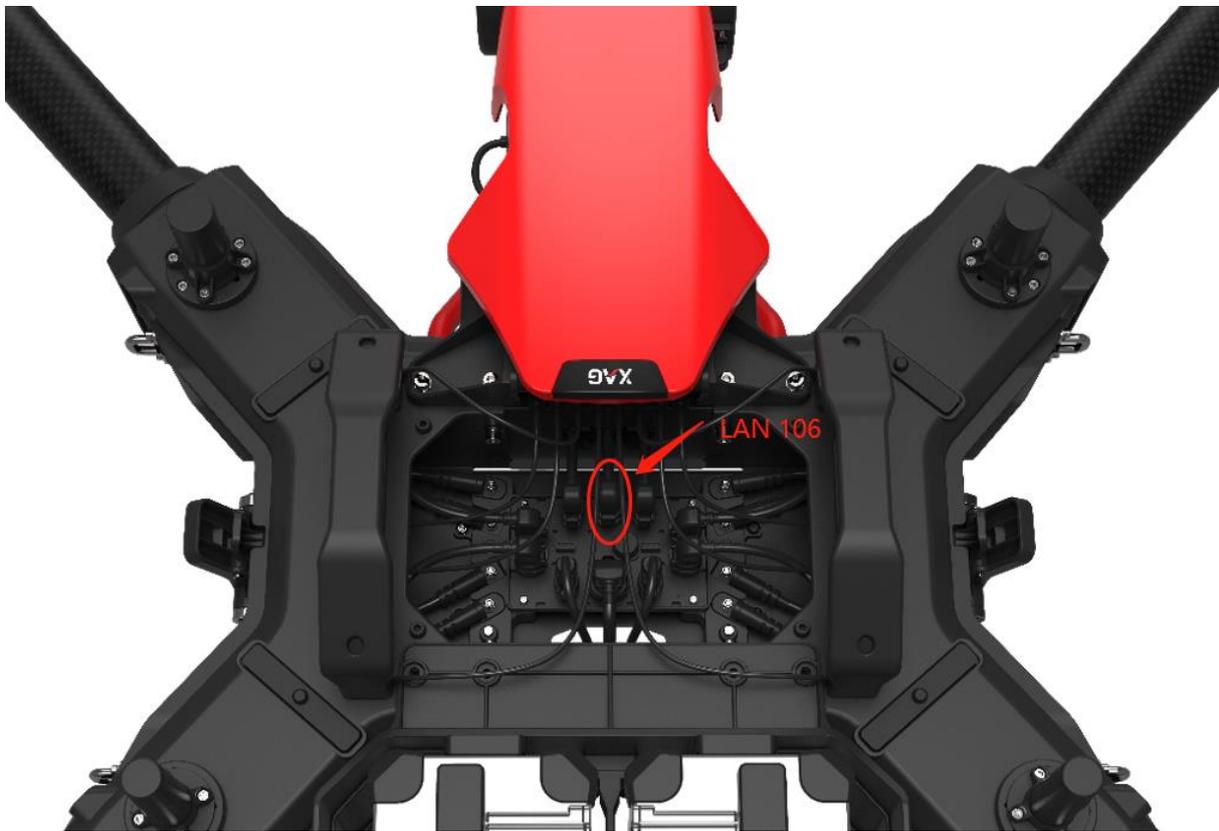
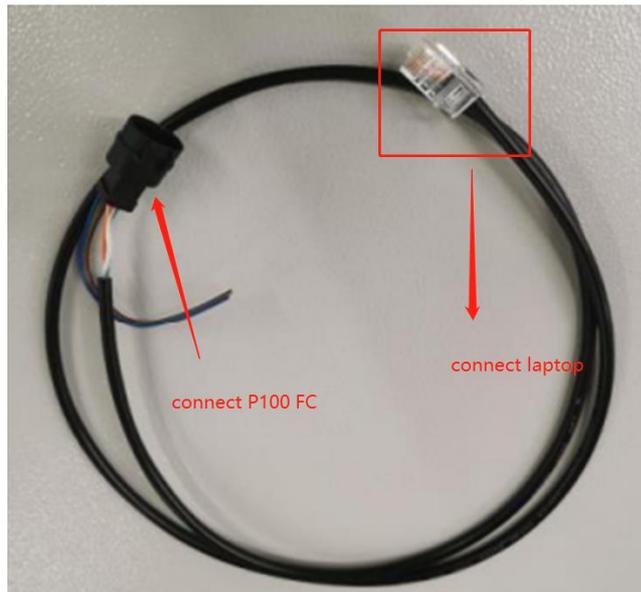
1. Provide the XAG technology support team with drone type and ask for the latest offline update firmware package. Please be aware that all the package has a unified name as “xag_firmware_file.tar.gz” for the FC to execute automatically, so do NOT change the file name, and it is recommended to tag the file by folder name.
2. Connect UAV to laptop with a SuperX4 Diagnostic Cable (LAN Port)



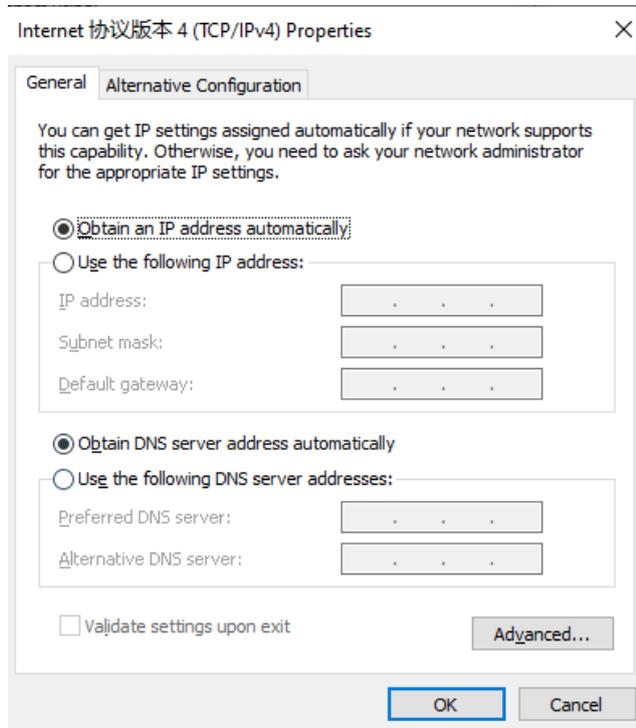
when connecting P40/V40 SuperX4 LAN cable, please be aware of that:



when connecting P100 LAN cable, please be aware of that:



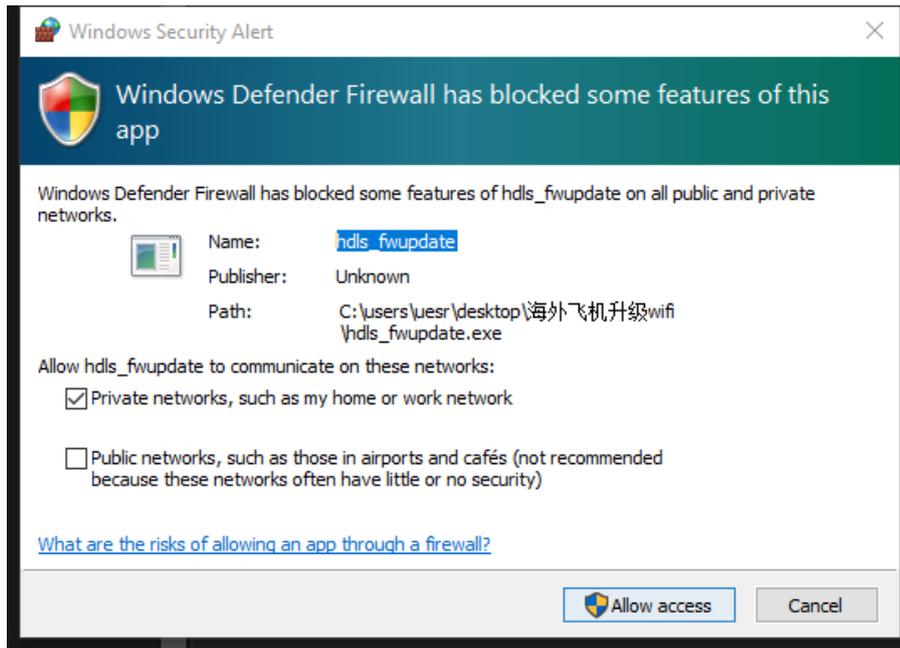
3. Make sure your laptop internet setting is “Obtain an IP address automatically”. Turn off the firewall in case it prevents the device from connecting.



4. Open OtaTool.exe,

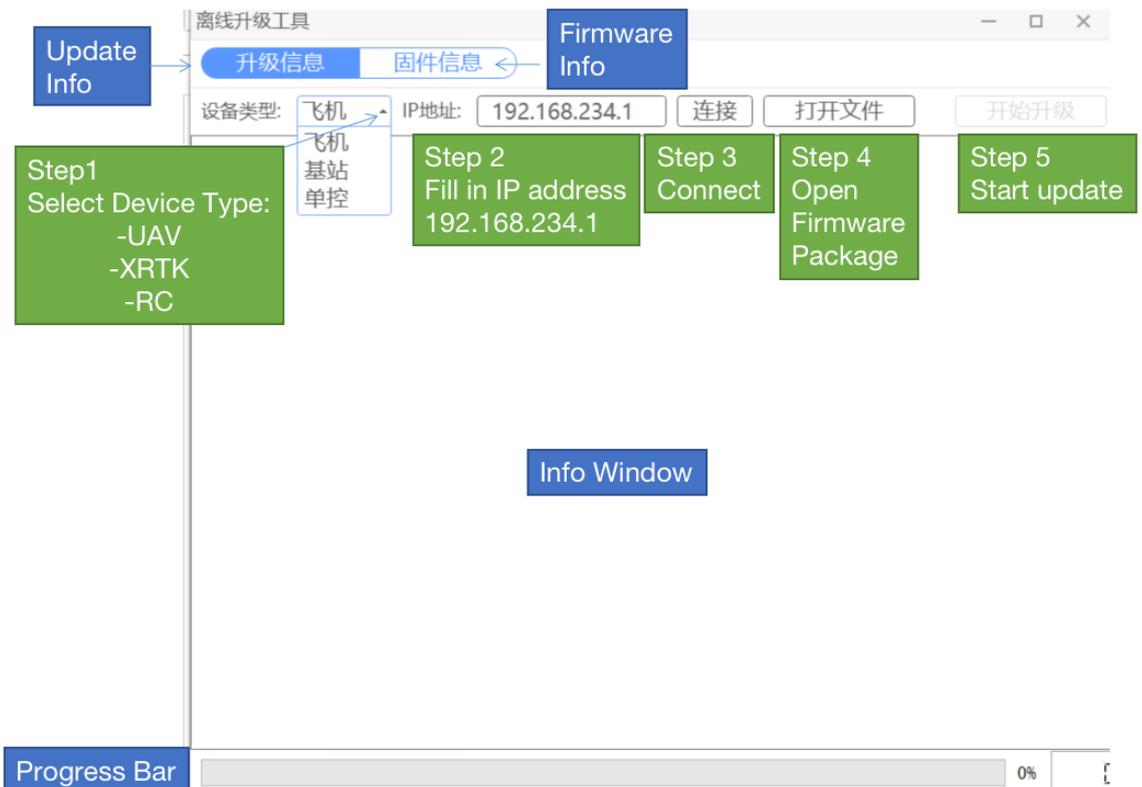
名称	修改日期	类型	大小
bearer	2023/3/10 16:21	文件夹	
etc	2023/3/10 16:21	文件夹	
iconengines	2023/3/10 16:21	文件夹	
imageformats	2023/3/10 16:21	文件夹	
platforms	2023/3/10 16:21	文件夹	
styles	2023/3/10 16:21	文件夹	
translations	2023/3/10 16:21	文件夹	
D3Dcompiler_47.dll	2014/3/11 18:54	应用程序扩展	3,386 KB
I	2023/4/7 10:23	文件	1 KB
libcrypto-1_1.dll	2022/7/9 14:58	应用程序扩展	3,261 KB
libEGL.dll	2021/11/19 16:22	应用程序扩展	30 KB
libgcc_s_dw2-1.dll	2018/3/19 21:12	应用程序扩展	112 KB
libGLESv2.dll	2021/11/19 16:22	应用程序扩展	4,409 KB
libstdc++-6.dll	2018/3/19 21:12	应用程序扩展	1,507 KB
libwinpthread-1.dll	2018/3/19 21:12	应用程序扩展	46 KB
opengl32sw.dll	2016/6/14 21:08	应用程序扩展	15,621 KB
OtaTool.exe	2023/3/10 16:20	应用程序	6,414 KB
Qt5Core.dll	2023/3/10 16:21	应用程序扩展	6,479 KB
Qt5Gui.dll	2021/11/19 16:22	应用程序扩展	6,799 KB
Qt5Network.dll	2021/11/19 16:22	应用程序扩展	1,849 KB
Qt5Svg.dll	2021/11/19 16:36	应用程序扩展	369 KB
Qt5Widgets.dll	2021/11/19 16:22	应用程序扩展	6,192 KB
zlib1.dll	2022/7/7 18:12	应用程序扩展	116 KB

- Click “Allow access” if it shows up.



- When the tool window shows up, follow the steps indicated in the diagram below. Be sure to input “192.168.234.1” as the root IP and click “连接” (connect), a prompt will be shown in the info window to show connect successful or not.

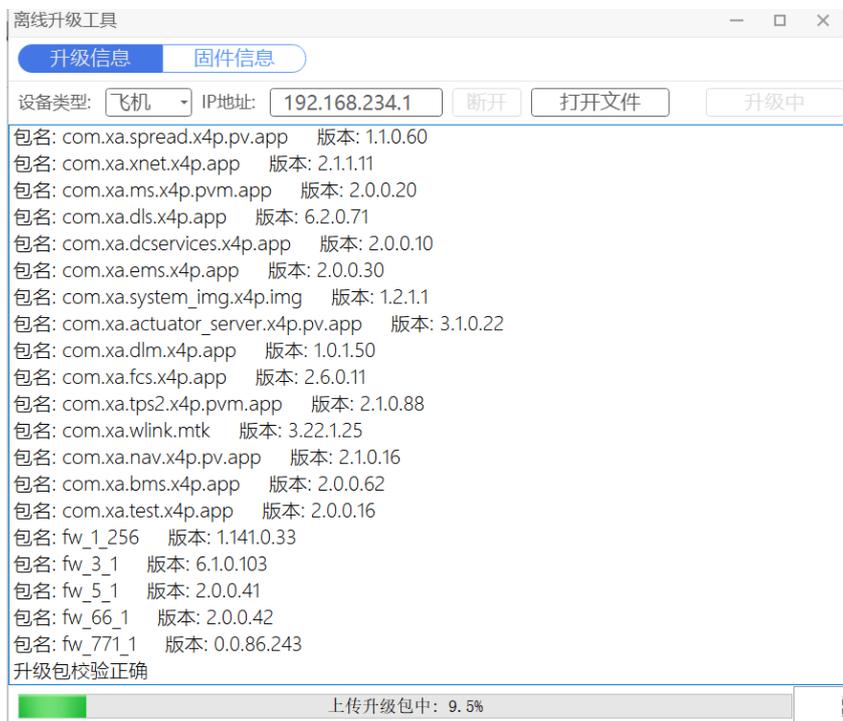
OTATool Guide



7. After opening the firmware, “打开文件”, the “开始升级 ” (“Start Update”) button will be activated if the package is analysed as valid.



8. After clicking the “开始升级 ” (“Start Update”) button, the device will begin to update all firmwares in the package, and the progress bar will display the progress of uploading and updating.



9. When the progress bar show 100%, the update is completed. Disconnect the FC from the laptop and restart the drone, check firmware versions via XAG One.



How to use ACS2 2021 as ACS2 2020

If you want to have ACS2 2020 but you only have ACS2 2021 in your hand, you can use the following method to change ACS2 2021 to ACS2 2020.

For example, this method is very useful when sometimes we want to update XRTK4 firmware using ACS2 2021. As we know previously, XRTK4 firmware update need to use ACS2 2020, so we can change the firmware ACS2 2020 to ACS2 2020 since they have the same hardware. We first downgrade ACS2 2021 to ACS2 2020, update XRTK4 using ACS2 2020 and XAG Agri 2 App, Update ACS2 2020 to ACS2 2021



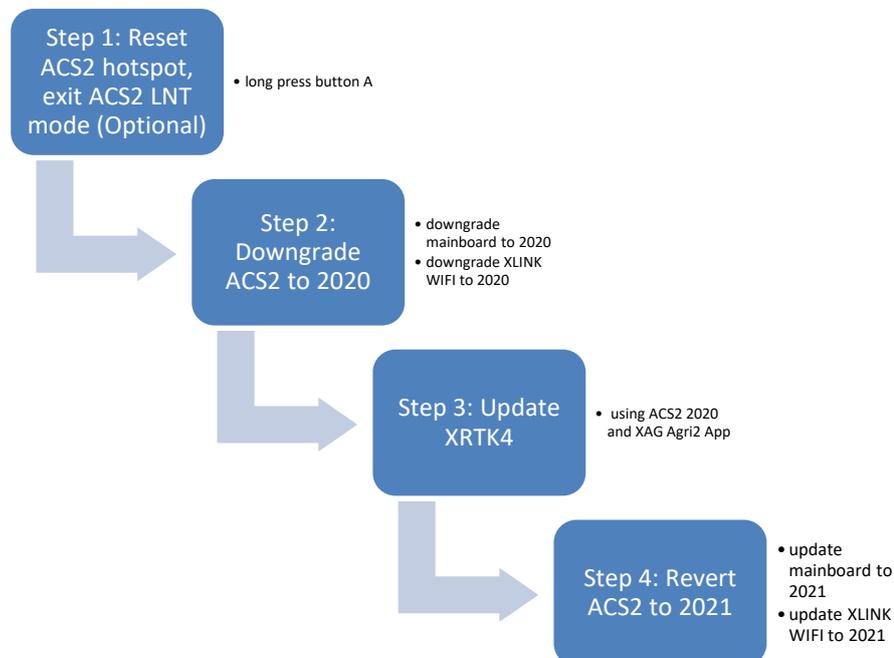
This method is only used under XAG Technical Team advice. Change ACS2 firmware between the version 2020 and 2021 has some unknown risks that may damage the device.



Before ACS2 2021 downgrade, please check if

- ACS2 2021 can access 4G network (insert 4G SIM card into ACS2, check if the second light illuminate in green)
- ACS2 2021 can turn on hotspot (you may need a smartphone and laptop to check this)
- ACS2 2021 firmware list (it's better to take a screenshot)

Brief Process:



Procedures:

Step 1: Reset ACS2 hotspot, quit ACS2 LNT mode (if applicable)

 **ACS2 WIFI hotspot cannot be found after linked to LNT.**

If your ACS2 haven't been linked to LNT, please ignore

Question: How can we possibly know if your ACS2 is linked to LNT?

Answer:

- b) Check if the 5th LED indicator light is illuminated in either green or yellow



- c) Check if you can find the ACS2 hotspot



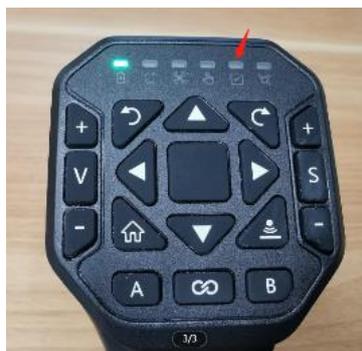
Question: How can unlink ACS2 from LNT and quit LNT mode?

Answer:

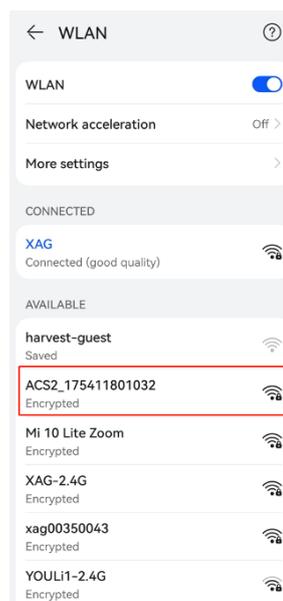
- a) **long press button A** until you hear the AI voice prompt and the 5th LED indicator light become dim.



- b) Make sure that the 5th LED indicator light become dim. If yes, your ACS2 remote controller has been reset successfully.



- c) Next, use your smartphone WLAN to search ACS2 WIFI hotspot

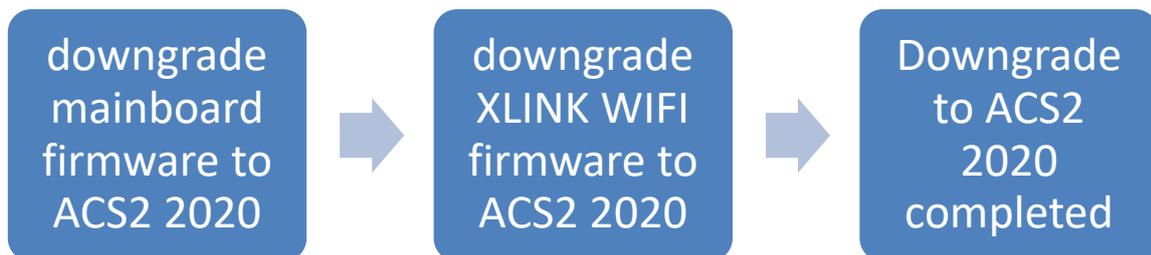


Step 2: Downgrade ACS2 to 2020

Overview

ACS2021 offline update consists of two parts,

- mainboard firmware, download link: please refer to Appendix I
- WIFI module firmware, download link: please refer to Appendix I



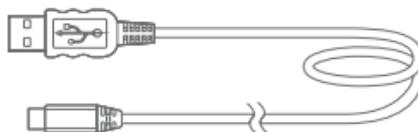
Downgrade Mainboard Firmware to ACS2 2020

1. Introduction:

This method allows us to manually update the ACS2 2021 firmware without internet. But it requires USB-Type-C cable, PC and ACS2 2021 latest firmware. Simply copy the firmware file into ACS2 2021 when it's in USB-Flash drive mode, and restart, the firmware will automatically update by itself.

2. Preparation:

- ACS2 2021, please fully charge lithium battery before use
- ACS2 2021 firmware (acquired from XAG Technician)
- USB-Type-C cable



- PC



3. Operating Procedure:

- i. Make sure that the ACS2 is power off.
- ii. Press and hold the Down button (altitude control) for 1~2 seconds, then press the Power button, wait for a while. Once you see all the six LED indicator lights are illuminated in red, the ACS2 is on USB flash drive mode.



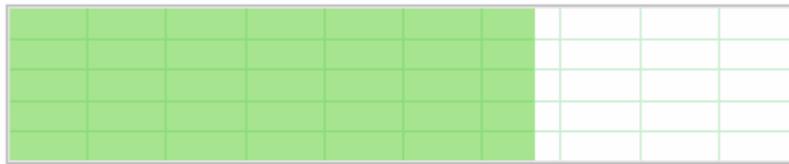
- iii. Connect the ACS2 to PC through USB-Type-C cable



- iv. Access the ACS2 flash drive on PC
- v. Copy the firmware file (.fw) to the ACS2 flash drive root directory

Copying 1 item from Desktop to ACS2 (E:)

66% complete

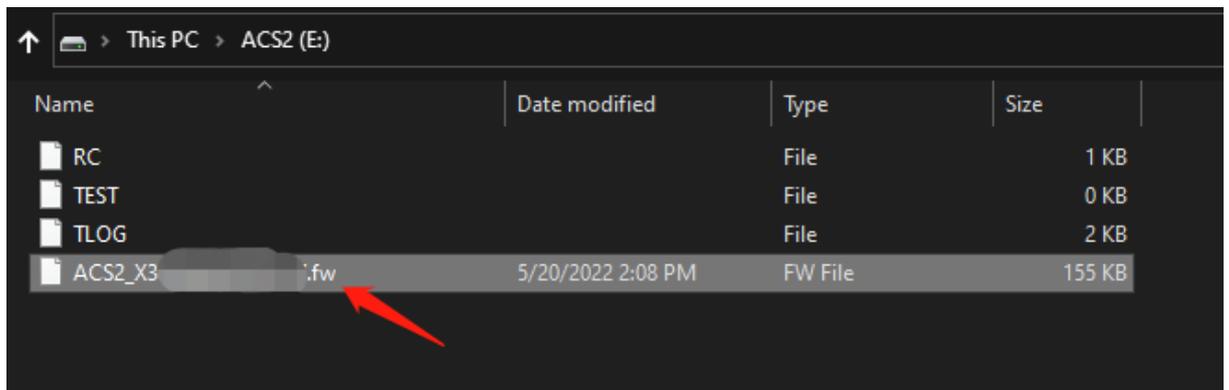


Name: ACS2_X3_2021_fw

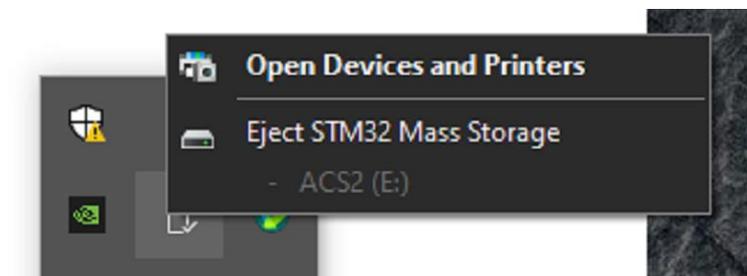
Time remaining: Calculating...

Items remaining: 1 (26.8 KB)

Fewer details



vi. Eject the ACS2 flash drive



vii. Unplug the USB-Type C cable from ACS2

viii. Press and hold the Down button (altitude control) for 1~2 seconds, then press the Power button, wait until all the six indicator lights off. The ACS2 ControlStick quits on USB flash drive mode.

ix. Single press the ACS2 power button. The ACS2 will upgrade its firmware. Wait until all the lights indicator off. The mainboard firmware installation is completed.

Downgrade XLINK WIFI firmware to ACS2 2020

1. Preparation

- i. ACS2 2021
- ii. PC

iii. HDLS Update tool,

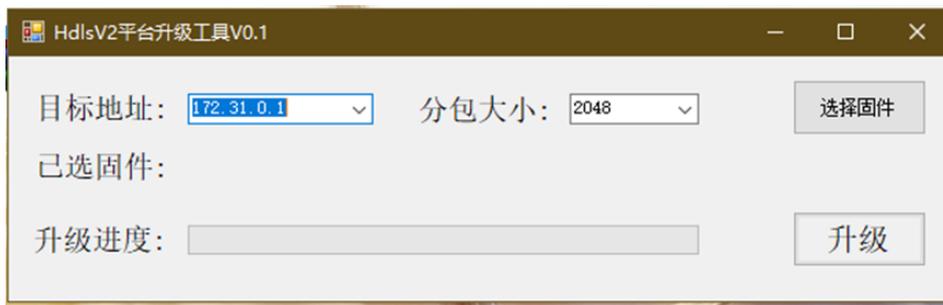
Download link: please refer to Appendix II

2. Operating Procedure:

i. Power up ACS2 2021 (Firmware version above 2.0.1.18)

ii. Use PC to connect ACS 2021 hotspot (hotspot name: ACS2_XXXXXXXXXXXX, where XXXXXXXXXXXX is the serial number), password is 20070401.

iii. Open HDLS update tool on your PC, set the parameter as shown (目标地址: 172.31.0.1, 分包大小: 2048), press “选择固件” to select the firmware file (e.g. xlinkhs_platform_2022_V3.2.1.27_20220412)



iv. press "升级"

v. Wait until the update complete

Step 3: Use ACS2 2020 as needed (XRTK4 update/ RC)



For example, Update XRTK4 using ACS2 2020 and XAG Agri2 App

Please refer to the section of “XRTK4 Online Update in XAG Agri 2 App using 4G”

Step 4: Revert ACS2 2020 back to 2021

Overview

ACS2021 offline update consists of two parts,

- mainboard firmware, download link: please refer to Appendix I
- WIFI module firmware, download link: please refer to Appendix I



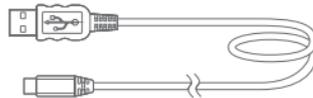
Update Mainboard Firmware to ACS2 2021

1. Introduction:

This method allows us to manually update the ACS2 2021 firmware without internet. But it requires USB-Type-C cable, PC and ACS2 2021 latest firmware. Simply copy the firmware file into ACS2 2021 when it's in USB-Flash drive mode, and restart, the firmware will automatically update by itself.

2. Preparation:

- ACS2 2021, please fully charge lithium battery before use
- ACS2 2021 firmware (acquired from XAG Technician)
- USB-Type-C cable



- PC



3. Operating Procedure:

- Make sure that the ACS2 is power off.
- Press and hold the Down button (altitude control) for 1~2 seconds, then press the Power but

ton, wait for a while. Once you see all the six LED indicator lights are illuminated in red, the ACS2 is on USB flash drive mode.



iii. Connect the ACS2 to PC through USB-Type-C cable



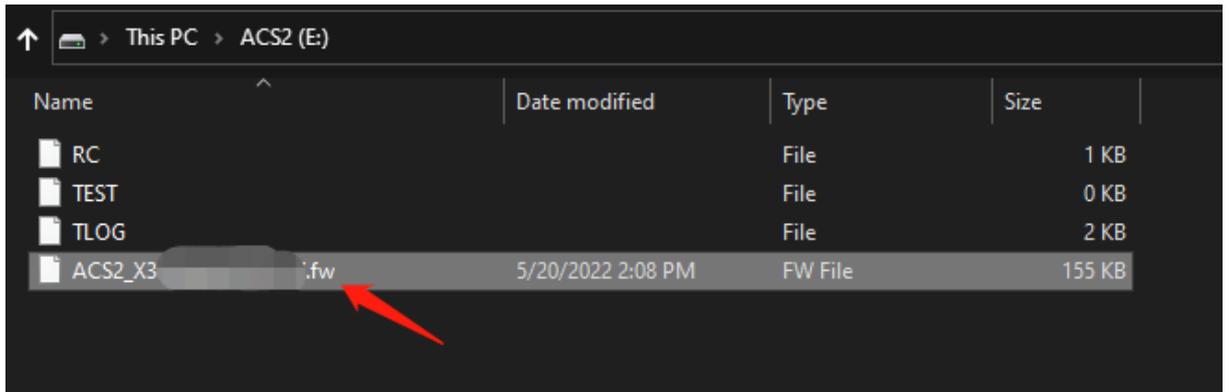
- iv. Access the ACS2 flash drive on PC
- v. Copy the firmware file (.fw) to the ACS2 flash drive root directory

Copying 1 item from Desktop to ACS2 (E:)
66% complete ⏸ ✕

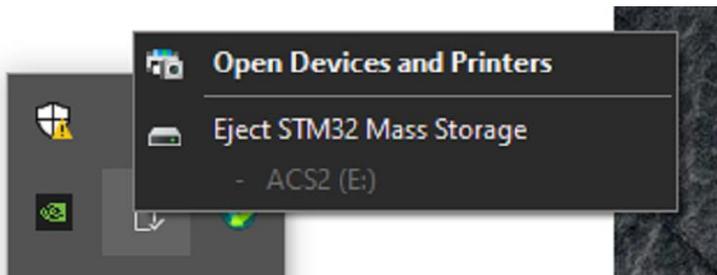
66%											
-----	--	--	--	--	--	--	--	--	--	--	--

Name: ACS [redacted] fw
Time remaining: Calculating...
Items remaining: 1 (26.8 KB)

⏪ Fewer details



- vi. Eject the ACS2 flash drive



- vii. Unplug the USB-Type C cable from ACS2
- viii. Press and hold the Down button (altitude control) for 1~2 seconds, then press the Power button, wait until all the six indicator lights off. The ACS2 ControlStick quits on USB flash drive mode.
- ix. Single press the ACS2 power button. The ACS2 will upgrade its firmware. Wait until all the lights indicator off. The mainboard firmware installation is completed.

Update WIFI Firmware of ACS2 2021

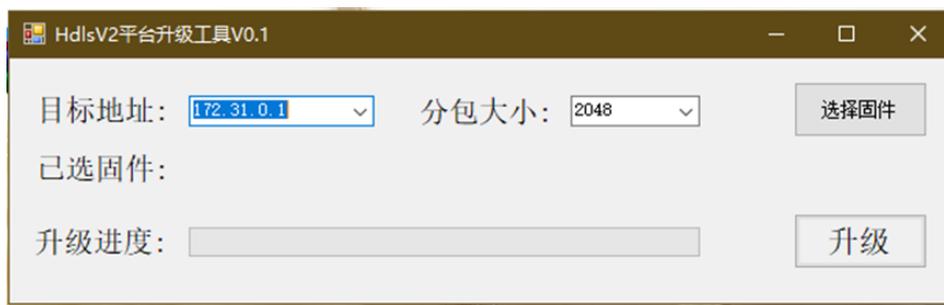
1. Preparation

- i. ACS2 2021
- ii. PC
- iii. HDLS update tool.
Download link: please refer to Appendix II
- iv. XLINK firmware
Download link: please refer to Appendix I

2. Operating Procedure:

- i. Power up ACS2 2021 (Firmware version above 2.0.1.18)
- ii. Use PC to connect ACS 2021 hotspot (hotspot name: ACS2_XXXXXXXXXXXX, where XXXXXXXXXXXX is the serial number), password is 20070401.
- iii. Open HDLS update tool on your PC, set the parameter as shown (目标地址: 172.31.0.1, 分

包大小: 2048), press “选择固件” to select the firmware file (e.g. xlinkhs_platform_2022_V3.2.1.XX_202XXXXX)



- iv. press "升级"
- v. Wait until the update complete

Chapter 4

4G Networking Mode

Introduction to 4G networking mode

Use condition

Good 4G network coverage

Applicable models

P100H/P100/P40CN/P40EN/V40CN/V40EN

Device Pairing requirement

1. Remote controller (RC) has a 4G SIM card inserted
 - a. Second light (Cloud IOT) illuminates green
2. UAV has a 4G SIM card inserted
 - a. Second light (Cloud IOT) flashes green
 - b. Third light (WiFi) flashes green
3. XRTK4 has a 4G SIM card inserted
 - a. F1 light illuminates red
 - b. F2 light double flashes green
4. Smartphone/Pad has a 4G SIM card inserted

Procedure: Device pairing under 4G networking mode.

1. Remote controller (RC)
 - a. Insert 4G SIM card into remote controller.
 - b. Second light (Cloud IOT) illuminates green.
 - c. Turn off the remote controller.
 - d. Long press the power button of remote controller until all six LED light indicators flash green
 - e. Open XAG One App, go to add device and input/scan remote controller serial number, input device name and confirm.
 - f. Wait until the remote controller gets online; If not, kill and restart the APP.
2. XRTK4
 - a. Insert 4G SIM card into XRTK4.
 - b. Turn on XRTK4, wait until that,
 - i. F1 light stop flashes and illuminate red
 - ii. F2 light double flashes
 - c. Long press (2~3 seconds) XRTK4 F3 button, until F1/F2/F3 are flashing simultaneously, which indicates the XRTK4 is allowed to be added
 - d. Open XAG One App, go to add device and input/scan XRTK4 serial number, input device name and confirm.
 - e. Wait until the XRTK4 gets online; If not, kill and restart the APP.
3. UAV

-
- a. Insert 4G SIM card into UAV.
 - b. Turn on UAV, wait until both WIFI and Cloud light flash green.
 - c. Open XAG One App, go to add device and input/scan UAV serial number, input device name and confirm.
 - d. Wait until the UAV gets online; If not, kill and restart the APP.
 - e. Bind UAV and RC

Chapter 5

Remote Controller Networking mode (RCN)

Semi-Direct RCN4G Configuration

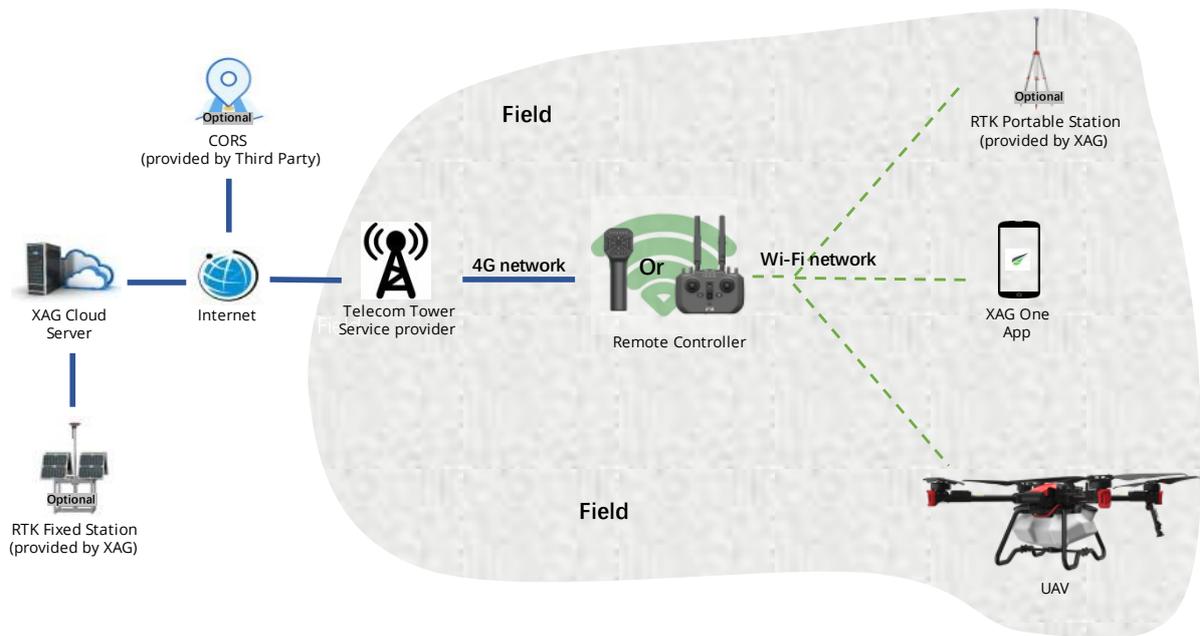
Use condition

4G network coverage

Applicable models

P100PH/P100H/P40EN/V40EN

Semi-RCN4G Device Pairing requirement



	Semi-Direct RCN4G	
	4G SIM inserted?	Wi-Fi
UAV	N	Connect to RC
RC	Y	AP
Smartphone/Pad	N/Y	Connect to RC

1. Remote controller (RC) has a 4G SIM card inserted
 - a. Second light (Cloud IOT) illuminates green
2. UAV has **no** SIM card inserted.
 - a. Second light (Cloud IOT) flashes red
 - b. Third light (WiFi) flashes red
3. XRTK4 has **no** SIM card inserted
 - a. F1 light illuminates red
 - b. F2 light single flashes green
4. Smartphone/Pad do not need 4G SIM card

Procedure: Semi-RCN4G Pairing

1. Add Remote controller to XAG One Account
 - a. Insert 4G SIM card into remote controller
 - b. Second light (Cloud IOT) illuminates green
 - c. Update the remote controller firmware, make sure the RC board version is above 2.1.1.40 and the Wireless Communication version is above 3.2.1.52.
 - d. Turn off remote controller
 - e. Long press the power button of remote controller until all six LED light indicators flash green
 - f. Open XAG One App, go to add device and input/scan remote controller serial number, input device name and confirm
 - g. Wait until the remote controller gets online; If not, kill and restart the APP
2. Pair XRTK4 to Remote Controller (RC)
 - a. Update the XRTK4 firmware to the latest version. make sure the XRTK4_MCU version is over 5.6.0.22 and the Wireless Communication version is over 3.2.1.52. Offline update method is available.
 - b. Turn on the remote controller, make sure the second light illuminates green, which indicates that the RC has access to IOT cloud server.
 - c. long press remote controller power button to enter pairing mode, release the power button until the third light indicator flashes yellow.



- d. Turn on XRTK4, wait until the F1 light stops flashing and illuminate red.



- e. Turn on XRTK4, short press (0.5 second) the F1 button. you will soon hear it beeps twice, which indicates that the pairing mechanism is in process.
- f. Pairing success indication

-
- i. ACS2 2021: voice prompt “connect success”. Meanwhile, the third light becomes dim.
 - ii. ARC3 Pro: no voice prompt, but you will hear a beeping sound. Meanwhile, the third light becomes dim.
- g. Wait about 5minutes, the F2 indicator will flashes three times in 1s (triple flash)

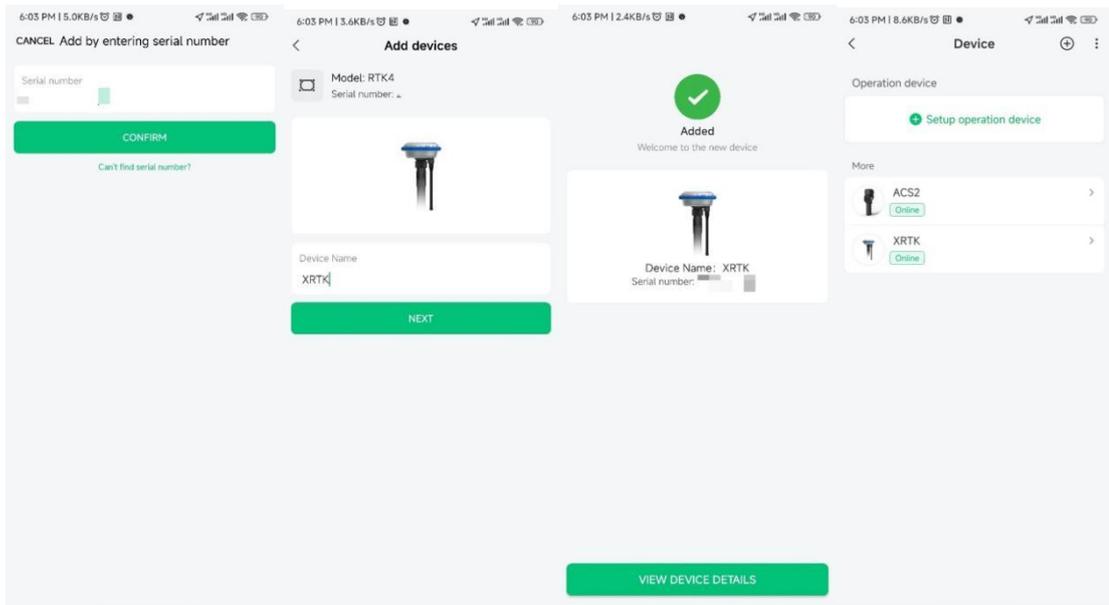


h. Add XRTK4 to XAG One account

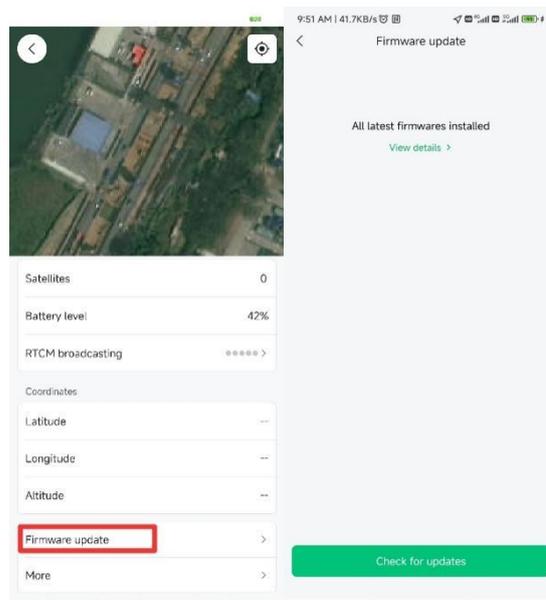
- i. Restart XRTK4, wait until F2 light triple flashes. This means the XRTK4 has connected to XAG IOT server through remote controller network.
- ii. Turn on XRTK4, long press (2~3 seconds) F3 button to enter adding mode, wait until F1/F2/F3 are flashing simultaneously.



- iii. Open XAG One App, go to add device and input/scan XRTK4 serial number, input device name and confirm



- iv. Wait until the XRTK4 gets online; If not, kill and restart the APP
- v. You can update the XRTK4 firmware through RCN



3. Pair UAV to Remote controller (RC)

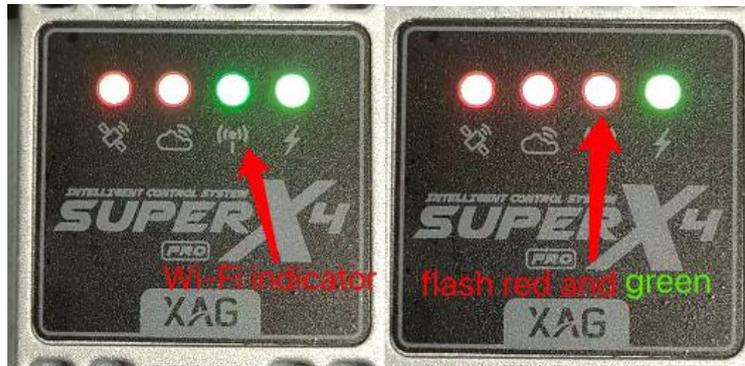
- a. Update UAV to the latest firmware version
- b. On remote controller
 - i. Turn on remote controller (RC)
 - ii. make sure the second light illuminates green, which indicates that the RC has internet access to IOT cloud server.
 - iii. long press and hold the remote controller (RC)'s power button, release the power button when the third light indicator is flashing yellow



- c. Turn on UAV and put UAV into pairing mode. There are two options.
 - i. Option 1: long press and hold UAV battery power button,



1. For P100H, release the battery power button when the arm light slowly flashes yellow, and the WiFi light indicator (the third light of flight control) alternates between green and red..

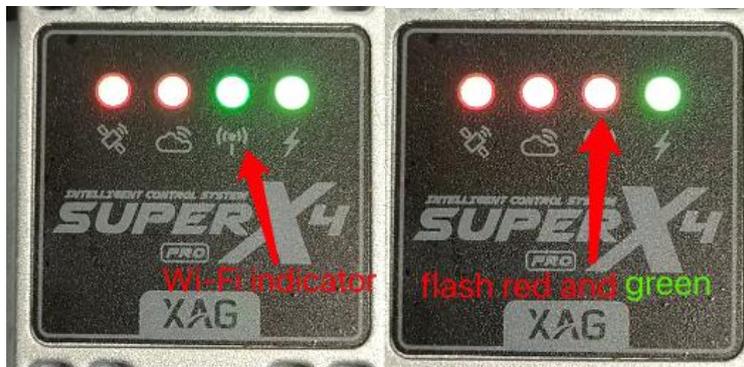


2. For P40 EN and V40 EN, release the battery power button when the taillight slowly flashes yellow-green and the WiFi light indicator (the third light of flight control) alternates between green and red.

- ii. Option 2: Long press the reset button of flight control



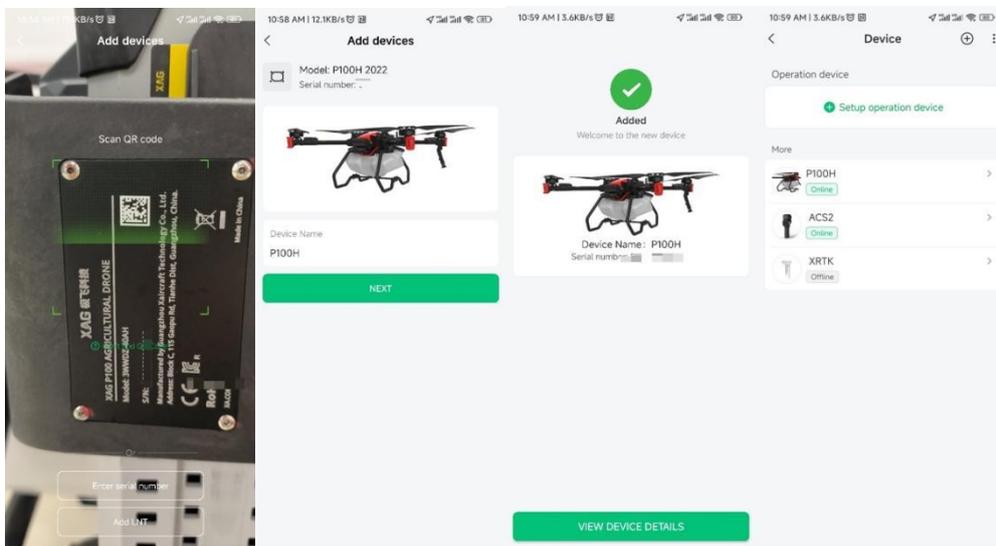
1. For P100H, release reset button of flight control when WiFi light indicator (the third light of flight control) alternates between green and red; Arm light slowly flashes yellow.



2. For P40 EN and V40 EN, release reset button of flight control when WiFi light indicator (the third light of flight control) alternates between green and red; Taillight slowly flashes yellow-green.
- d. Place remote controller (RC) close to UAV, wait for 30 seconds,
 - e. pair success indication
 - i. ACS2 2021: voice prompt “connect success”. Meanwhile, the RC third light becomes dim.
 - ii. ARC3 Pro: no voice prompt, but you will hear a beeping sound. Meanwhile, the RC third light becomes dim.
 - iii. UAV: flight control second light indicator (Cloud) flashes in green. It means that the UAV is online and connected to XAG IOT server. The UAV is ready to be added to the XAG One App account.
 - f. In case you only hear the voice prompt or the beep sound but the second light indicator (cloud) does not flash in green, wait for 5 minutes until the Cloud services indicator flashes green



4. Add UAV to XAG One account
 - a. Connect smartphone to remote controller hotspot
 - b. Open XAG One App, go to add device and input/scan UAV serial number, input device name and confirm



- c. Wait until the UAV gets online; If not, kill and restart the APP
 - d. Bind UAV and remote controller
 - e. Restart UAV and wait for 120 seconds until the flight control second light indicator (Cloud) flashes in orange. It means that the RCN4G mode is ready.



Mode switch (from Semi-Direct RCN4G to Others)

1. Semi-Direct RCN4G -> Direct RCN4G, insert 4G SIM card into UAV
2. Semi-Direct RCN4G -> Local RCN, remove 4G SIM card from RC
3. Semi-Direct RCN4G -> RCNWiFi, remove 4G SIM card from RC and connect RC to home/office router

RCNWiFi Configuration

Use condition

No 4G network accessibility, local WiFi with internet access available

Applicable models

P100PH/P100H/P40EN/V40EN

RCNWiFi Pairing requirement

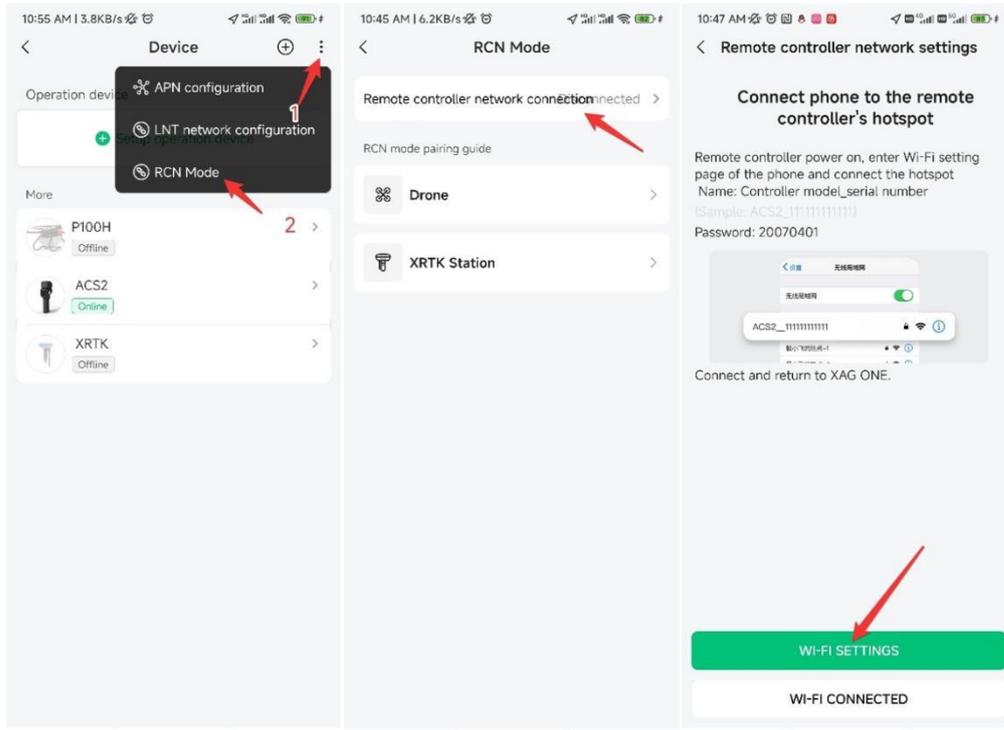
1. Remote controller (RC) has **no** SIM card inserted
2. UAV has **no** SIM card inserted.
3. XRTK4 has **no** SIM card inserted.

Operation requirement

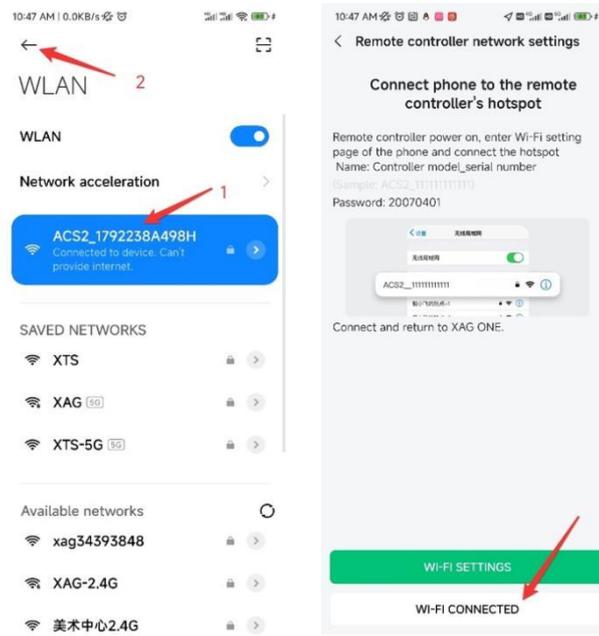
1. Remote controller (RC) has **no** SIM card inserted.
2. UAV has **no** SIM card inserted.
3. XRTK4 has **no** SIM card inserted.

Procedure: RCNWiFi pairing

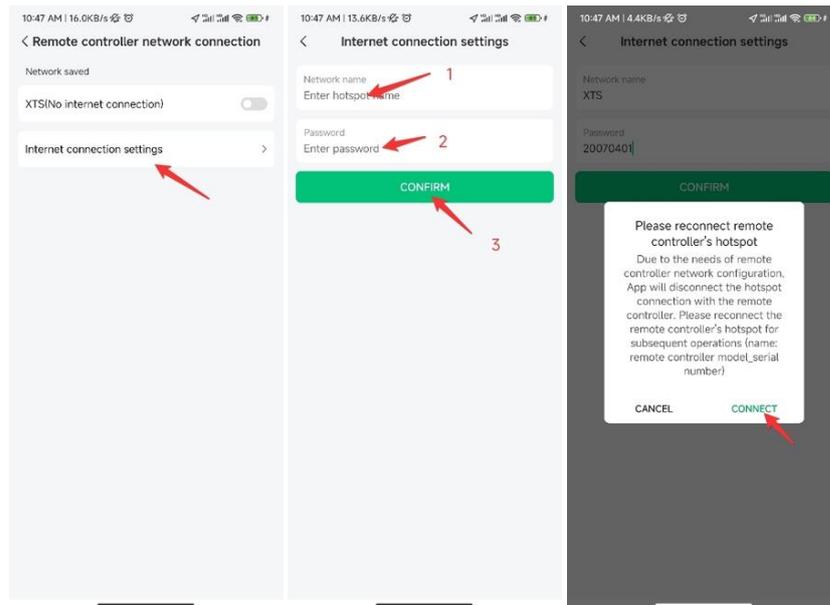
1. Connect RC to local WiFi.
 - a. Make sure the firmware versions are above wlink 3.2.1.55 / ACS2_RC 2.1.1.40 (ARC3 Pro main board: 1.0.1.42.) (Offline update method available, check Chapter 3 of this manual)
 - b. Turn on the remote controller, wait until the 3rd led of the RC turns off, indicating the RC is ready.
 - c. On XAG One App, open Me-Device page, click the 3-dot-button in the upper right corner, click RCN Mode, select Remote controller network connection, then click Wi-Fi SETTINGS.



- d. From smartphone WLAN setting, choose ACS2 hotspot, then return to XAG One App, click Wi-Fi CONNECTED.



Click Internet connection settings, fill in hotspot ID and credentials, then click CONFIRM and CONNECT. The third light indicator of the RC will then flash yellow indicating that it has started to search and connect to wifi.



3rd led Flashing yellow: pairing mode or connecting to local wifi

3rd led solid yellow: local wifi connected

2nd led off: IOT server not connected

2nd led on: IOT server connected

Wait approximately 2 minutes until ACS2 voice prompts “connected” and the 3rd led becomes solid yellow indicating successful connection to the hotspot. **Wait about 5 more minutes** until all the second led turns on solid green which indicates the RC is connected the IOT server. The ARC3 Pro reacts similar but without vice prompt.

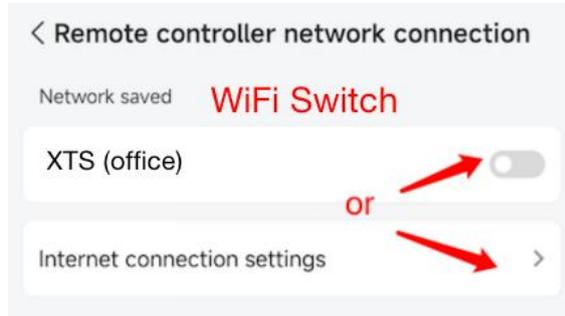
Note 1: At this moment, the smartphone will disconnect from the RC hotspot as the RC is re-configuring its wifi module. Please connect your phone to the RC hotspot again when the 3rd led becomes solid yellow.

Note 2: In case the RC prompts connection failed, or the 3rd led never stops flashing, press and hold the button “A” to terminate the connection, and perform from step a again. For ARC3 Pro, press and hold “Fn” button

Note 3: If the second led of the ACS2 never turn green, check the internet connection of the local wifi.

-
- e. Turn on/off local wifi:

Each time remote controller reboots, the local wifi connection will be disabled automatically. To manually enable RCNWiFi, connect the smartphone with the hotspot of the RC, open the app and go to the RCN Mode configuration, turn on the Wi-Fi switch, then the RC will connect to the local wifi that was configured previously again. Wait until the 3rd led becomes solid yellow.

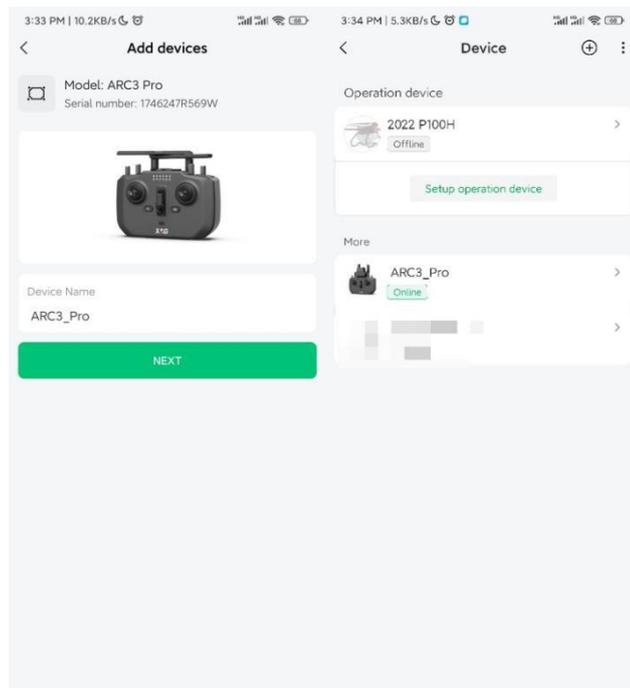
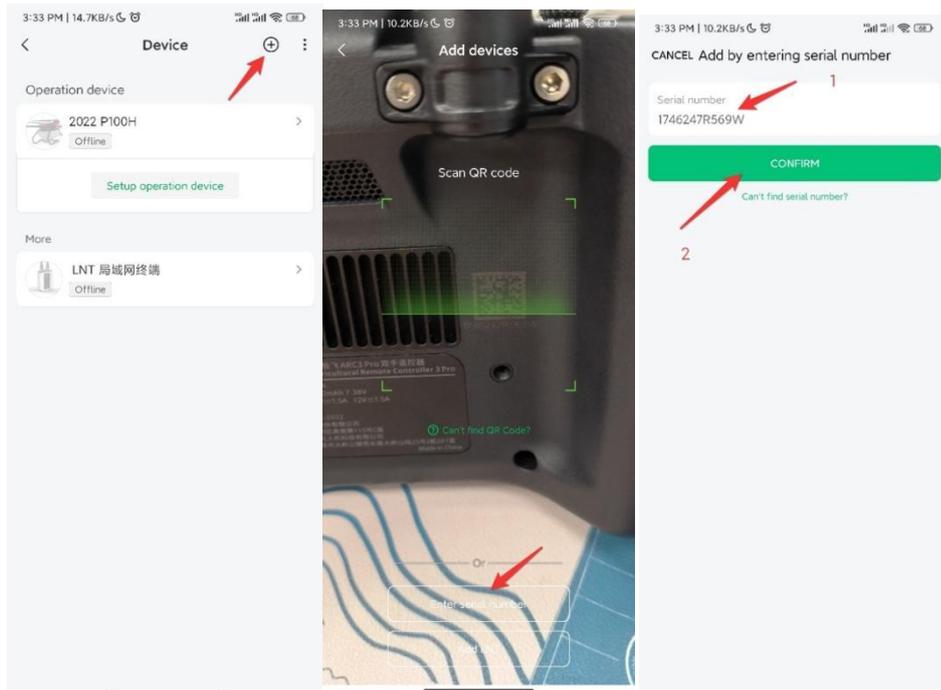


- 2. Add RC to user account. (Skip this step if the RC was added previously)

For **ARC3 Pro**, just turn on the device, make sure it is connected to the local wifi (3rd led solid yellow) and the IOT Server (2nd led solid green). Open the XAG One app, tap the “+” on the top right corner of the screen, select “add device”. Follow the guide to scan the QR code or enter the SN of the ARC3 Pro to add it to the account.



Make sure the first 3 leds of the ARC3 Pro are all on

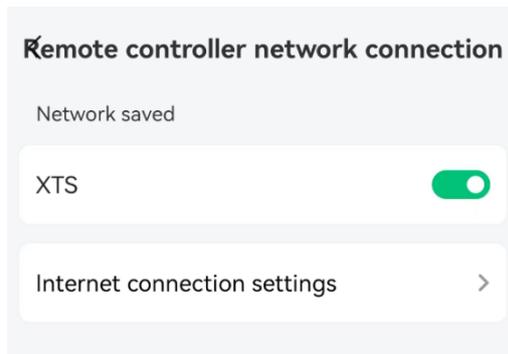


For ACS2, please follow the steps below:

- a. Turn off the RC, press and hold the power button until all the leds flashing red



- b. Open the app and go to Me-Device page, click the 3-dot sign on the top right corner of the page and go to the RCN Mode configuration. Switch on the Wi-Fi switch, then the RC will connect to the local wifi configured previously.



- c. Wait a while until the all leds flashing green indicating it has connected to the IOT server. Check internet status of the local wifi if it never turns green.



- d. Open the XAG One app, tap the "+" on the top right corner of the screen, select "add device". Follow the guide to scan the QR code on top of the ACS2 or enter the SN of the ACS2 Pro to add it to the account.
- e. When the ACS2 is successfully added to the account, all the leds will become normal.



3. Pair XRTK4 to Remote Controller (RC, including ACS2 or ARC3 Pro)

Important Notice: Please turn off the RC's wifi connection before pairing, as the pairing mode will not be disabled when the RC's wifi is connected. For ACS2, press and hold the button "A" to terminate the connection. For ARC3 Pro, press and hold "Fn" button

- a. Update the XRTK4 firmware to the latest version using offline method; Make sure that the firmware versions are above com.xa.app.wlink 3.2.1.52 / XRTK4_MCU 5.6.0.22 (offline update method available, check Chapter 3 of this manual);
- b. Turn on remote controller, wait until the third led turns off.
- c. Press and hold the remote controller power button until the third light indicator flashes yellow, which indicates it has entered pairing mode.



3rd led Flashing yellow, 2nd led shall be off

- d. Turn on XRTK4, wait until the F1 light stops flashing and illuminate red.
 - e. On XRTK4, short press (0.5 second) the F1 button (Note: Do NOT long press). you will soon hear it beeps twice, which indicates that it has entered the pairing mode.
 - f. Wait until you get the pairing success indication
 - i. ACS2 2021: voice prompt "connect success". Meanwhile, the third light becomes dim.
 - ii. ARC3 Pro: no voice prompt, but you will hear a beeping sound. Meanwhile, the third light becomes dim.
4. Add XRTK4 to XAG One account (Skip this step if the XRTK4 was added previously)
- a. Switch on RC's connection with local WiFi through XAG One app's RCN setting

- b. Restart XRTK4, wait until F2 light triple flashes. This means the XRTK4 has connected to Cloud IOT server through the remote controller.
- c. Open the XAG One app, tap the “+” on the top right corner of the screen, select “add device”.
- d. Follow the guide to scan the QR code of the XRTK or enter the SN.
- e. On XRTK4, long press (2~3 seconds) F3 button to enter adding mode, wait until F1/F2/F3 are flashing simultaneously. If it does not work, restart XRTK4 and wait for 2 minutes.



- f. Add XRTK4 into XAG one account

5. Pair UAV to Remote controller (RC)

Important Notice: Please turn off the RC's wifi connection before pairing, as the pairing mode will be disabled when the RC's wifi is connected. For ACS2, press and hold the button “A” to terminate the connection. For ARC3 Pro, press and hold “Fn” button

- a. On remote controller
 - i. Turn on remote controller (RC) , wait until the third led turns off..
 - ii. Press and hold the remote controller (RC)'s power button until the third led flashing yellow.

Turn on UAV, press and hold UAV battery power button until the WiFi indicator (the third light of the flight control) alternates between green and red; Arm light or tail light slowly flashes yellow., Place remote controller (RC) close to UAV, wait for 30 seconds,

- b.



Wifi led flashes between green and red, system led flashes in yellow

- c. pair success indication
 - i. ACS2 2021: voice prompt “connect success”, the RC third light turns off.
 - ii. ARC3 Pro: no voice but a beeping sound. the RC third light turns off.
 - iii. UAV: flight control third light indicator (WiFi) flashes in green, and system led

comes back normal. It means that the UAV has entered the RCN mode.

6. Add UAV to XAG One account

- a. Switch on RC's connection with local WiFi through XAG One app's RCN setting
- b. Place the drone in an open space, power on the drone, wait until the second led of the FC (cloud led) flashes in orange. This means the FC has connected to Cloud IOT server through the remote controller.



Cloud led flash in orange

- c. Open the XAG One app, tap the "+" on the top right corner of the screen, select "add device".
- d. Scan the QR or enter the SN of the drone, follow the guide to add UAV to XAG One account
- e. Bind UAV and remote controller

Mode switch (from RCNWiFi to Others)

1. RCNWiFi -> Direct RCN4G, insert 4G SIM card into RC and UAV
2. RCNWiFi -> Semi-Direct RCN4G, insert 4G SIM card into RC
3. RCNWiFi -> Local RCN, disconnect connect RC to home/office router

Chapter 6

LNT Networking mode

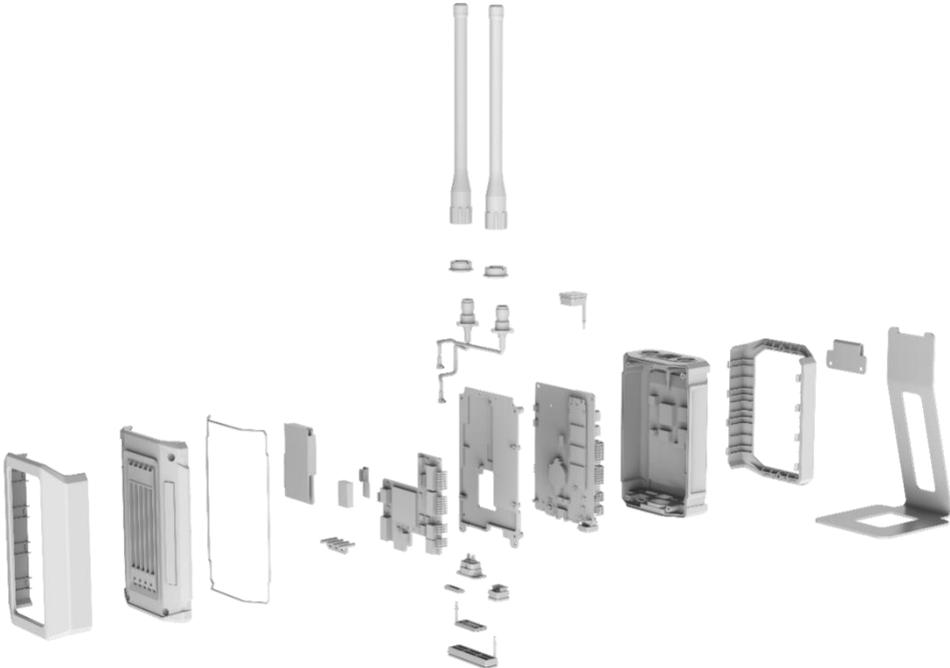
Introduction to the LNT

Overview



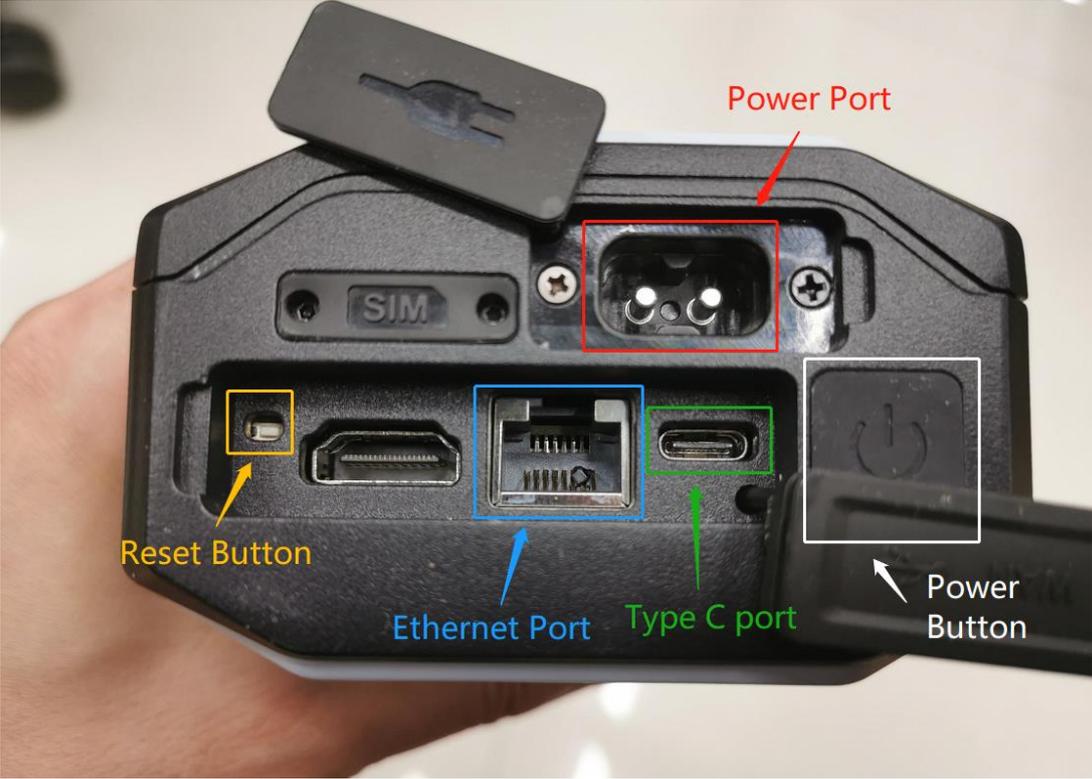
Local network terminal, abbr, LNT, works as a local IOT server that enables the wireless local area network. LNT can be the substitution of the cloud Server. It allows the communication among all the remote devices without the access of Internet, LNT and its IOT devices must be properly upgraded and configured before use.

The exploded view of LNT:



LNT port and button

- Reset Button: Use for setting recovery (forget password) and factory reset
- Power Button: turn on/off LNT
- Type C Port: use for firmware update
- Ethernet Port: use for data transmission
- Power Port: 12V/3A



LNT LED Light Indicator



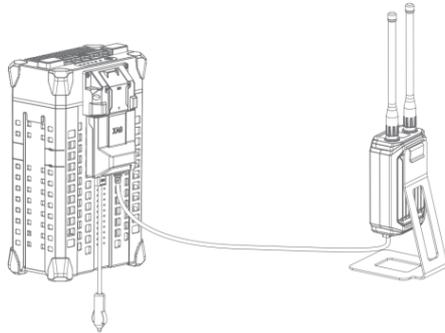
Indicators

	Power		WAN
	WLAN		System

Behaviour	Description
Power - On	Device On
Power - Off	Device Off/Error
WLAN - On	Wi-Fi networking function normal
WLAN - Flashing	Wi-Fi network is busy
WLAN - Off	Wi-Fi network error
WAN - On	Access to WAN for data synchronization
WAN - Flashing	Wi-Fi network is busy
WAN - Off	Wi-Fi network fails to access WAN
System - On	Device is normal
System - Flashing	Device is busy

Turn On/Off LNT

Connect LNT to power supply, either B13960S or wall charger.



Turn on LNT: Long press power button for 2 seconds, release the power button when the 1st light indicator (Power) illuminates in green. Wait for 1 minute. The LNT is under initialization when 2nd / 3rd / 4th light indicators (WAN/WLAN/System) are flashing. Once all the light stop flashing and illuminate in green, the LNT is ready to use.

Light No.	Indication	LED light		
		Flashing green	Illuminate in green	Become dim
2	WLAN	initializing	OK	malfunction
3	WAN	initializing	OK	malfunction
4	System	initializing	OK	malfunction

When LNT turn on successfully

Light indicators illuminate in green	Photo	Do LNT turn on successfully?
Power/WLAN/System		Yes

Turn off LNT: Long press power button for 2 seconds, release the power button until other three light indicators are flashing. Wait for 5~30 seconds until all the light indicators become dim. The LNT is turned off successfully.

LNT hotspot

Hotspot name: XAG-XXXX, where XXXX is the last four digit of MAC address.

MAC address can be found on outer case.



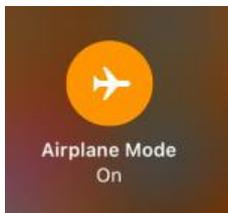
Hotspot password: 20070401

Configuration website: www.iotlogin.com

Website password: 20070401

Unless necessary, please do not change hotspot name and password.

Make sure your smartphone has the flight mode enabled.

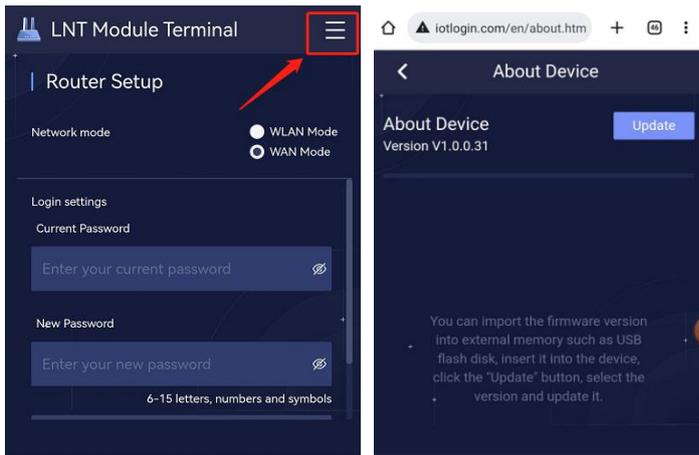


Firmware version

Go to “About Device” and check LNT firmware version.



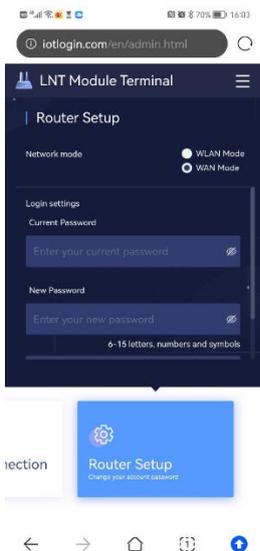
Due to the regular firmware update of LNT, please consult your XAG technical support staff for the latest firmware version.



LNT firmware version download link: please refer to Appendix I

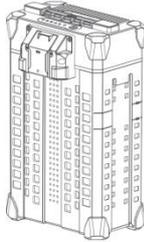
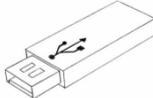


Please be aware of that the LNT firmware above V1.0.0.31 will automatically enable the WLAN mode when the LNT is turned on. To access to internet, users must manually turn on the WAN mode.



LNT Offline Update by USB Flash Drive (Recommended)

Preparation

No.	Item	Description
1	Local network terminal, abbreviation short form, LNT	
2	LNT to B13960S Power Cable	
3	B13960S Smart Battery, fully charge before use	
4	USB Flash Drive(memory > 4GB, FAT32 format)	
5	OTG Type-C Cable	

Operating Procedure:

1. Download firmware update file image.des.3;
2. copy the firmware file (image.des3) under the USB flash drive root directory.



**If the des file is misplaced or using zip format, the firmware update will fail to start.
Format or change the USB flash drive if necessary.**

3. Power up LNT device, wait until all the LED indicators illuminate and stop flashing; LNT is successfully initialized if the LED indicator of Power, WLAN, System illuminates while that of WAN

become dim.



三个指示灯亮(Three indicators are on)

4. Connect USB flash drive to LNT through OTG Type-C Cable/adaptor



5. Wait for approximately 10s until LNT firmware update begins; Meanwhile, the LED indicator of system is flashing; Please do not move the devices during the update process, otherwise cable connection may be loosened. If the system light become dim, it means the update process fail.
6. Wait for approximately 15 minutes, LNT firmware update is successfully completed if all the LED indicators stop flashing; Power, The LED of WLAN, System illuminate in green, but the LED of WAN become dim.



三个指示灯亮(Three indicators are on)

7. Unplug USB flash drive, restart LNT
8. To check your LNT firmware version. Connect your smartphone to LNT hotspot, open smartphone's browser, go to the local website of LNT configuration <http://www.iotlogin.com>. The factory password is 20070401. In the configuration page, you will find the firmware version.
9. Done

Get LNT firmware update log

If you are facing firmware update failure or LNT malfunction, you can get the LNT firmware update log from USB flash drive, where firmware file is put. The firmware update log is named as "ota_update.log".

Here is an example of update log.

```
[ERR] UPDATE
{"status":"OK","version":{"total":"1.0.0.29","host_update":"v1.0.19","xiot_os_api":"1.6.1","web-server":"V1.2.39","iot-dev":"1.0.4","wifi_firmware":"V3.22.1.36","rpe":"1.0.25","iot-server":"0.0.43","rtk-server":"1.0.20220926","app-server":"0.2.01.16","app-collect":"0.20220923.120000","ruitu":"overseas-0.2.02","firmware-center":"V2.3.2.1","firmware-center-config":"V1.1.0.0","upgrade-system":"0.1.0.7"}}
Sat Dec 3 14:05:11 CST 2022
```

You can forward XAG technical support the log for further analysis.

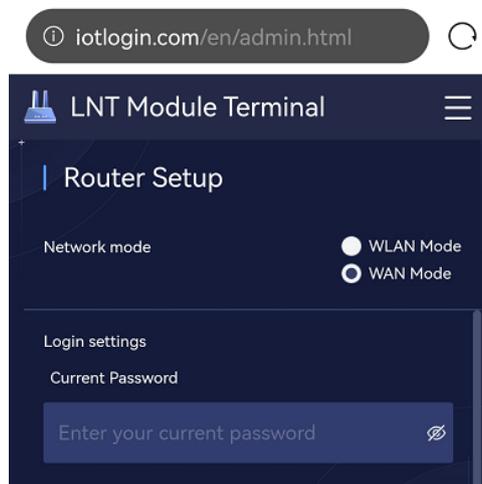
WLAN/WAN mode

WLAN mode = working mode, only use for flight missions.

WLAN is not allowed to access internet and is enabled after every LNT startup.

	Default setting: Enable after very startup	Internet Access	Usage	Network
WLAN mode	Yes	No	Flight mission	LNT local network
WAN mode	No	Yes	Data sync LNT network configuration and setup	LNT local network + internet

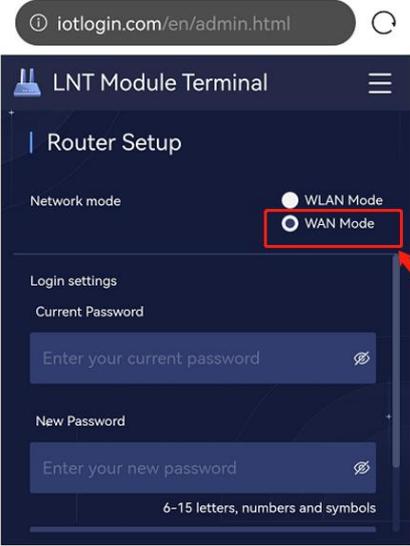
Thus, if you want to have LNT access to internet, you must enable the WAN mode manually every time your turn on LNT.



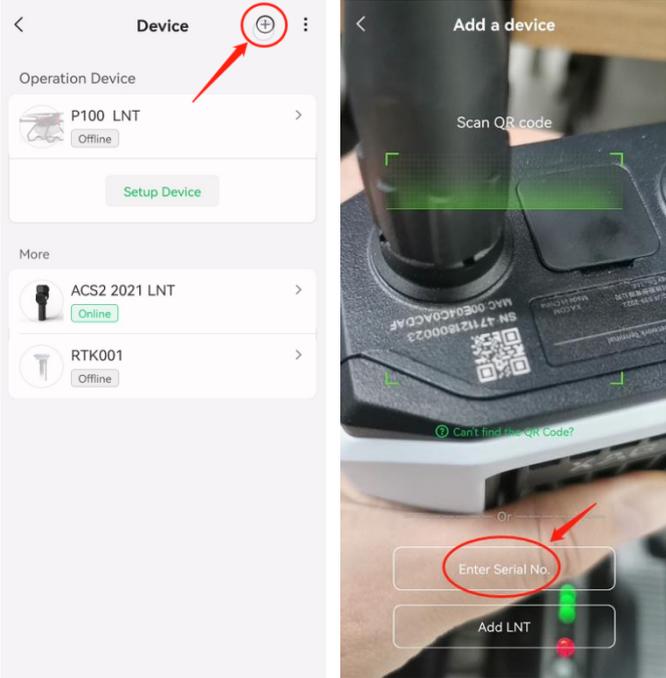
Data Sync (Auto)

LNT is required to sync with XAG cloud server regularly. Once LNT is connected to internet, data sync will happen automatically.

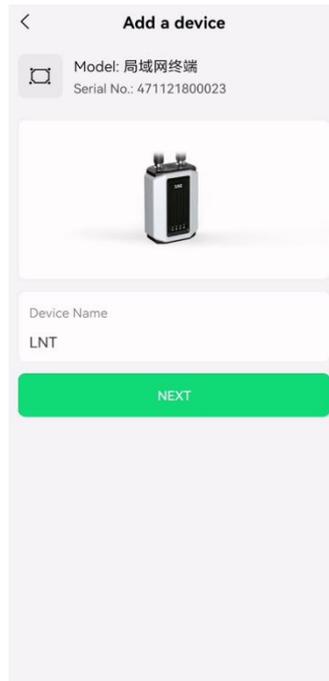
Make sure you select WAN mode and connect LNT to WIFI router



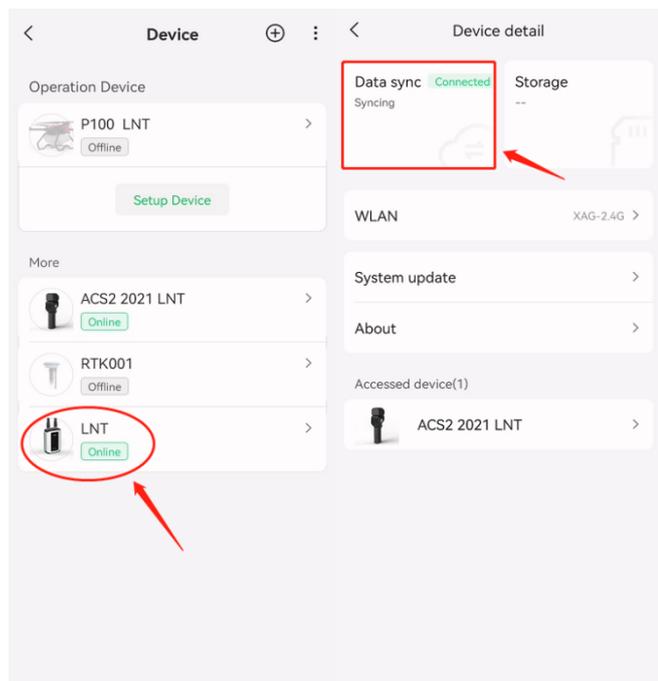
add the LNT in your device list



Name your LNT

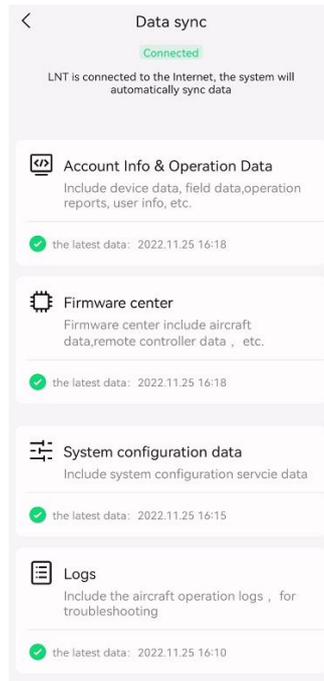


Go to Device → LNT → Data sync



Wait for a while until all the items are synchronized.

Make sure that firmware center completes sync before update devices firmware.



Q&A

i. **Question: What is LNT data synchronization?**

Answer: Once LNT connect to internet, LNT allows the data traffic with XAG cloud server. It automatically backups, or download the data of field, flight routes, devices information download if these data are uploaded previously.

ii. **Question: What data will not be downloaded in LNT data sync?**

Answer: Operation records is not allowed to download from cloud to LNT because the data may occupy a large amount of disk space and it may take for a long time to sync.

If you want to read the operation records, you can either

- directly connect your App to WIFI or 4G
- website <https://dservice.xa.com/>

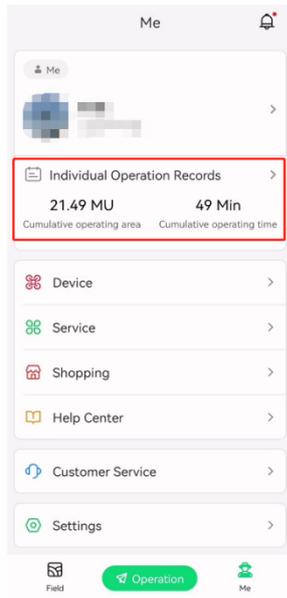
iii. **Question: Can we still read the operation records on APP when linked to LNT?**

Answer: Yes. Under LNT networking mode, the operations records will be generated in LNT after flight mission. These operation records will be stored in LNT permanently unless the space reaches it limit or being deleted manually. But if

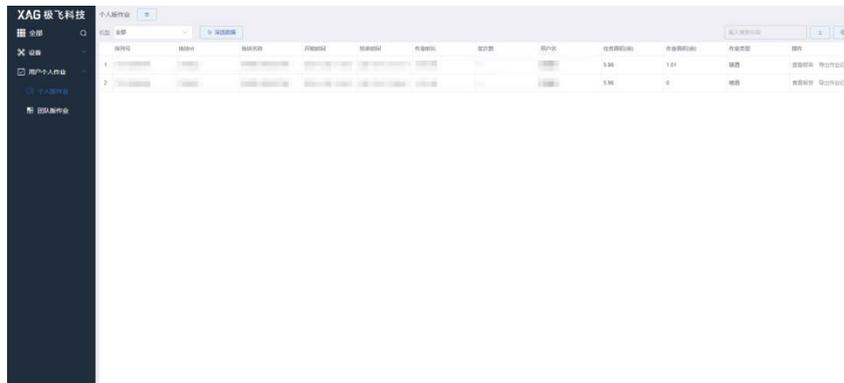
iv. **Question: where can I find my operation record?**

Answer:

- App -> Me – individual Personal Records



- website, <https://dservice.xa.com/>



v. Question: Can I still find my operation record after LNT factory reset?

Answer: If your operation records have been uploaded, you can find the operation data

- When your smartphone connects 4G network or office WIFI, you can view records on App
- go to website <https://dservice.xa.com/>

if your operation records did not upload to cloud server before factory reset, the records along with other data in LNT will be lost permanently.

vi. Question: How can we run LNT data synchronization?

Answer: Simply connect your LNT to internet. Make sure LNT's all four lights indicators are illuminated in green.



vii. Question: Should we sync LNT with APP?

Answer: Yes, you can do that. you can connect your smartphone to LNT and leave your App open for 2- 5 minutes.

viii. Question: When do we run LNT data synchronization?

Answer: LNT newly received or after daily operation.

ix. Question: synchronization happen while using fixed station?

Answer: Fixed station is used under 4G network. LNT only works with portable station.

x. Question: How often is LNT data synchronization?

Answers: it's suggested to sync after daily operation. or, depends on your habit, update once or twice a week.

xi. Question: Is there a way of monitoring the synchronization process?

Answers: Yes. Add LNT to your device list, then you are able to monitor the process.

xii. Question: Do I need to manually activate data synchronization?

Answers: No, you don't. It's fully automatic.

xiii. Question: Does LNT have wall charge? I don't want to use battery to sync my LNT in office.

Answers: Please feel free to ask your sales representative regarding to the LNT wall charger, PN 05-002-01648. This accessory is very useful when you work with LNT in office.



Setting Recovery (forget password)

Long press reset button for 3 seconds. Release the button soon after the 4th light indicator (system) is flashing. Wait for 60 seconds for setting recovery. Once the 4th light indicator illuminates in green, the setting recovery is completed.

UAV/XR4K4/ACS2 Firmware update under LNT Networking Mode

LNT can support the firmware update of ACS2 remote controller, XR4K4, and UAV (P40/V40/P100). Make sure sync LNT or connect LNT to internet before firmware update.

Factory Reset

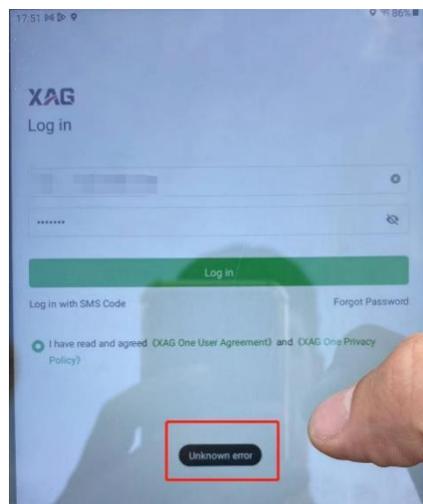
Turn on LNT. Long press the reset button, the 4th light indicator is flashing after three seconds, ignore it, and keep pressing the reset button for approximately 12 seconds until the 2nd time the 4th light indicator is flashing. Quickly release the reset button. The LNT will start to reset. This whole reset process will take approximately 30 minutes. During reset, the 4th light indicator remains flashing. Once completed, the 4th light indicator illuminates in solid green.



After factory reset, the LNT SSID and password will revert to the factory setting. If the LNT SSID and password are changed, it's necessary to do the LNT networking configuration again.

Factory reset will remove all the user data in LNT. Thus, after factory reset, please connect LNT to internet and login your account. Once account login, LNT will sync the user data from XAG cloud server.

Otherwise, you may receive unknown error when login account offline



LNT Communication Range Limitation

Local Network terminal (LNT) acts as a local IOT server that enables the wireless local area network. It allows the communication among all the remote devices without internet. The local network use 2.4GHz radio frequency to transfer data/commands wirelessly.



Pair	CE (max.20db)	FCC (max.30db)	Comments
LNT - UAV	400m	800m	
LNT - ACS2	400m	800m	
LNT - XRTK4	400m	800m	
LNT - Smartphone	100m	200m	use ACS2 as repeater, connect Smartphone to ACS2 for functioning distance enhancement

If your antenna is broken, please replace the LNT Antenna according to the requirements:

1. 2.4GHz
2. TNC-J male connector



3. More than 4DBI (obey the local laws or regulations)

Who can operate the configuration and setup process?

Due to the complexity, **only authorized distributors are allowed to configure and setup LNT networking mode.**



Important Notice: Be cautious of removing devices from LNT network

Sometimes the network delay issue may be causing trouble when removing devices under LNT networking mode, and next cause the failure of adding the device. This network delay is due to the long communication distance between user's location and XAG cloud server based in China. Thus, please do not remove devices unless you must.

LNT Network Configuration Method One – “Configure WIFI Before Join”

Step 1: Preparation

No.	Item	Photo
1	UAV (model 2021/2022)	
2	ACS2 2021 remote controller	
3	XRTK4 Portable Base Station	
4	Local Network Terminal (LNT)	
5	Android/harmonious OS Smartphone	
6	WIFI Router or Smartphone's hotspot that can access to internet	

Notice

1. All the devices' batteries must be fully charged

2. All the devices must be powered up normally

Device registries in App account requires the internet access to XAG Cloud Server, where device registry data will upload to cloud server. Thus, you shall complete the LNT setup in the places where it has good internet condition.

Step 2: Update LNT/ACS2/XR4K/UAV Firmware to the Latest Version

**Very important: Please update the UAV/XR4K/ACS2/LNT firmware to the latest version!
It's highly recommended to update UAV/XR4K/ACS2 firmware using either 4G or LNT.**

More than 50% of LNT configuration issue is due to the facts that the operators forget to update firmware.

- **Update LNT firmware**
- **Update ACS2 firmware.**
- **Update XR4K firmware.**
- **Update UAV firmware.**

If you don't know how to update firmware, please go to the section of "firmware update".

Since one device (ACS2, XR4K, UAV) can be only added by one account. Thus, it's suggested to remove the devices from account after online update.

Step 3: Connect LNT to internet through WIFI Router

Objective: Connect LNT to WIFI Router, allowing LNT to access internet



Procedures:

1. Obtain local WIFI Router's SSID and password

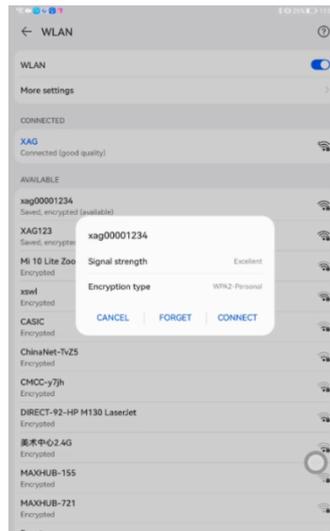


2. Power up LNT
3. Wait for a while until the Power, WLAN and system light indicator illuminate; Meanwhile, WAN light indicator becomes dim

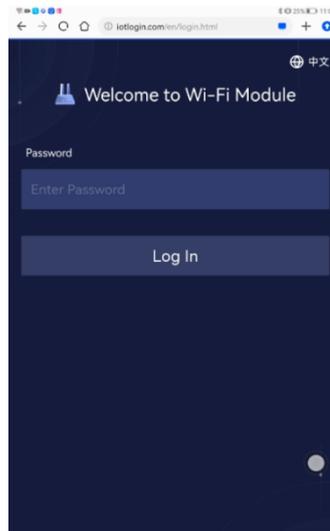


These three light must be in green

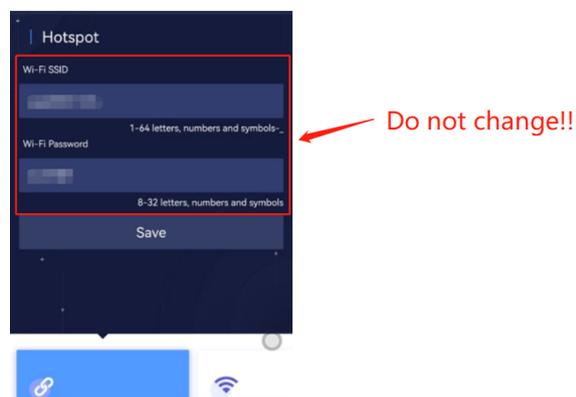
4. Connect your smartphone to LNT's hotspot



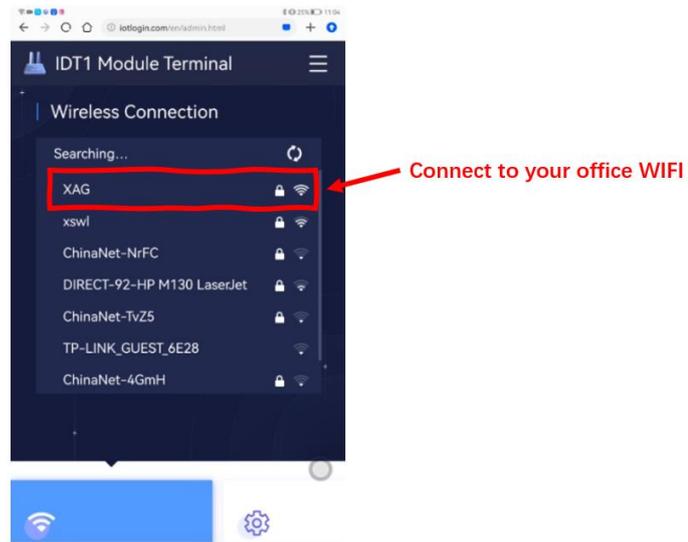
5. Open your smartphone's browser, input the LNT web address, <http://www.iotlogin.com>
Input password "20070401"



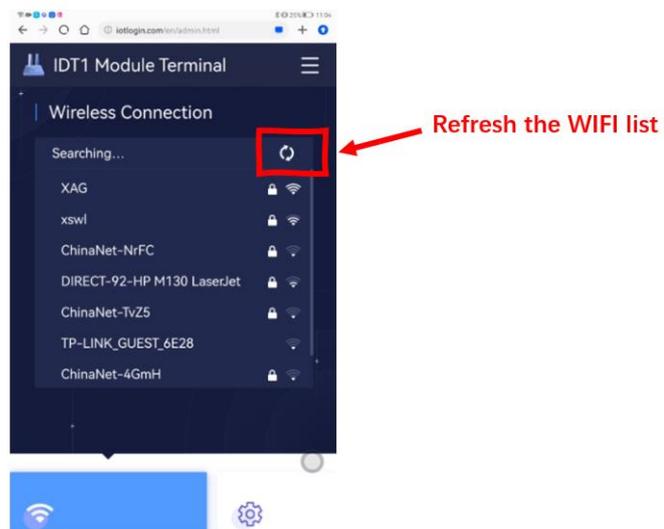
6. Remember the WIFI-SSID and password. Do not change them.



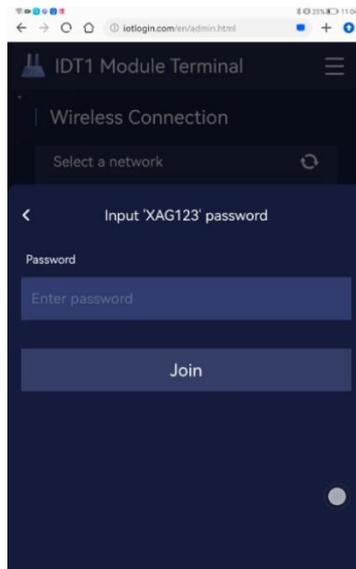
7. Go to Wireless Connection; Choose the SSID of local WIFI



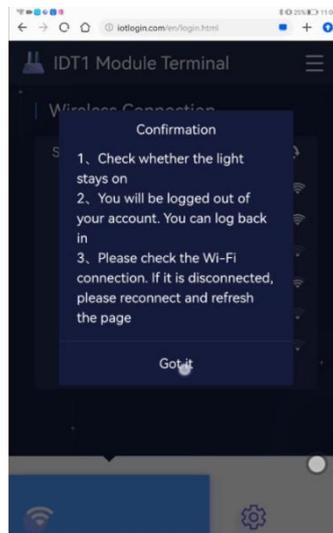
Notice: press  to refresh the list if your WIFI router SSID is not shown



8. Input WIFI router password and press "Join"

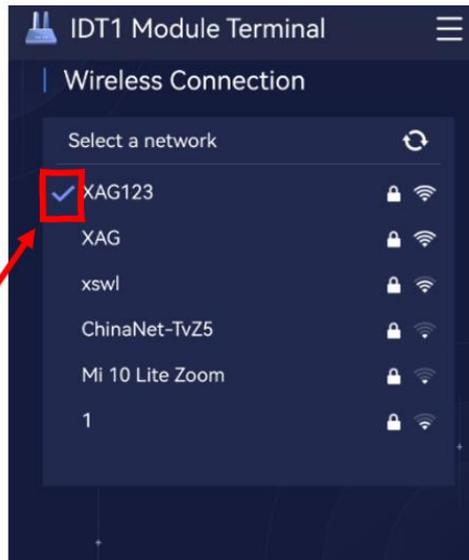


9. Press "Got it"

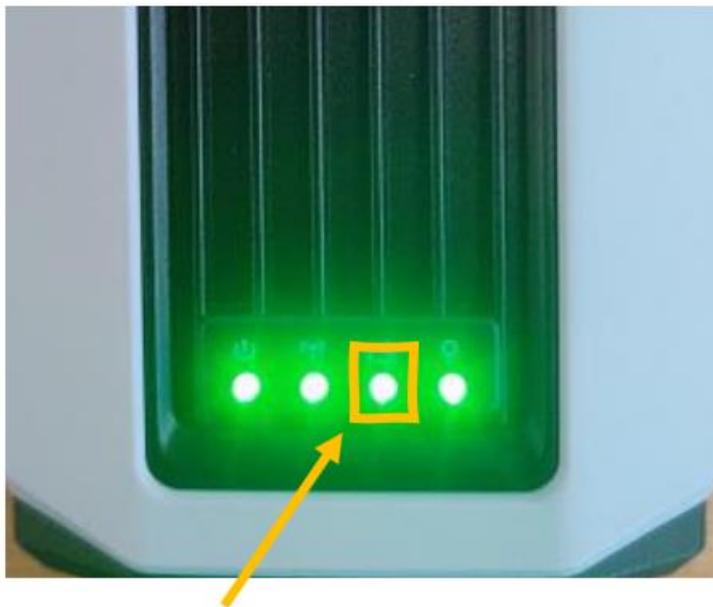


10. Check WLAN connectivity. Go to LNT web page → Wireless Connection, check if your LNT is connected to the office WIFI router.

Check if LNT is connected to the office WIFI router

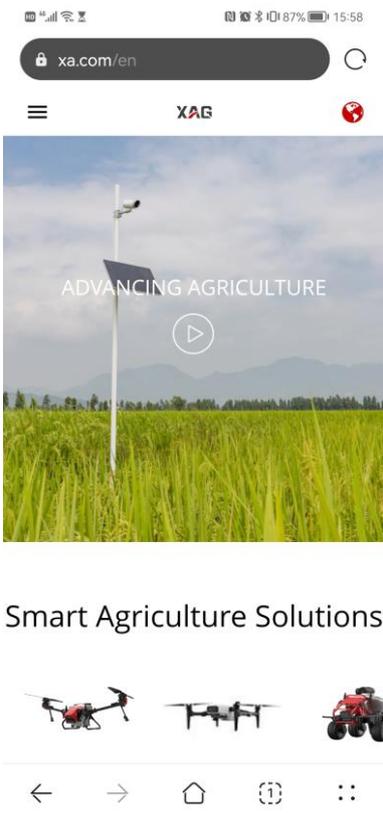


11. Check the LNT WAN light indicator.



Check if WAN light is in green.
If yes, the LNT is successfully connected to WIFI router.
If not, the LNT fails to connect WIFI router.

12. LNT now has internet access. Please test it by browsing any websites, for example XAG official, Google, Facebook, etc..



Step 4: Configure ACS2 WIFI Access

Objective: Configure ACS2 WIFI Access. Once configured, ACS 2021 will automatically connect to LNT hotspot.

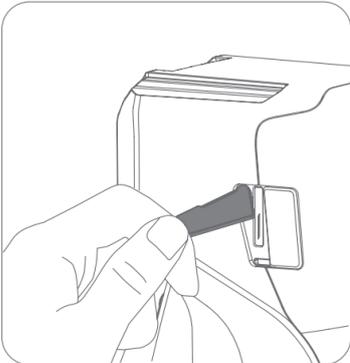


Procedure:

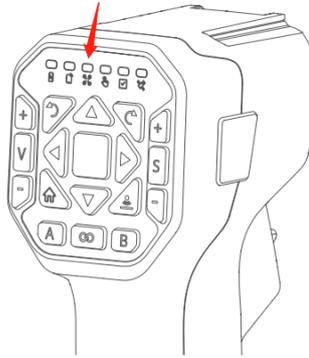
- 1. Power up ACS2



Optional: To eliminate the influence of 4G and make sure that ACS2 WIFI hotspot is enabled, we can **REMOVE** the SIM card



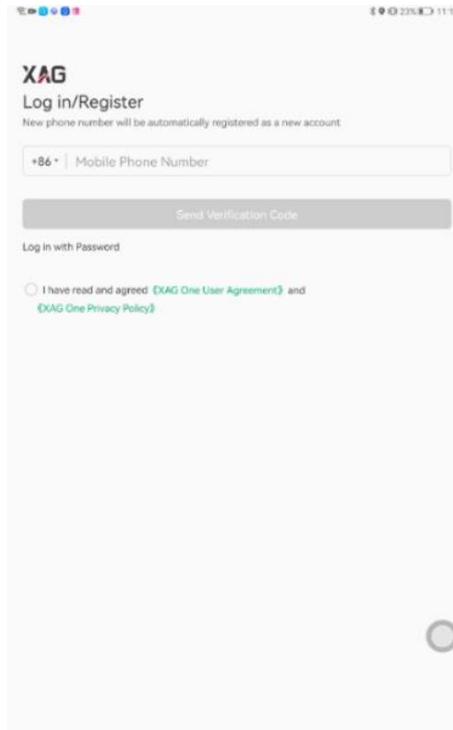
-
- Wait 60 seconds until the ACS2 2021 completes initialization. Once completed, the third light indicator  will stop flashing and becomes dim.



- Connect your smartphone to LNT hotspot. Make sure LNT is connected to internet.

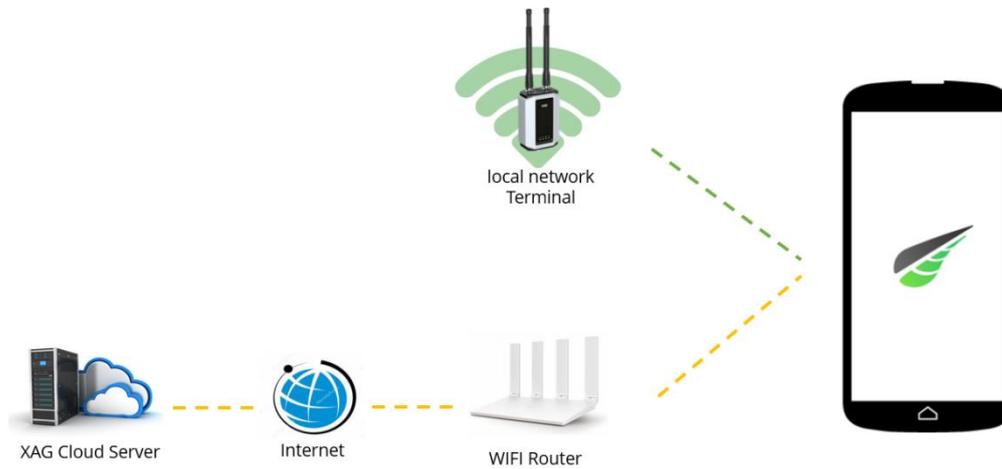


- Open XAG One App, and sign in your account.

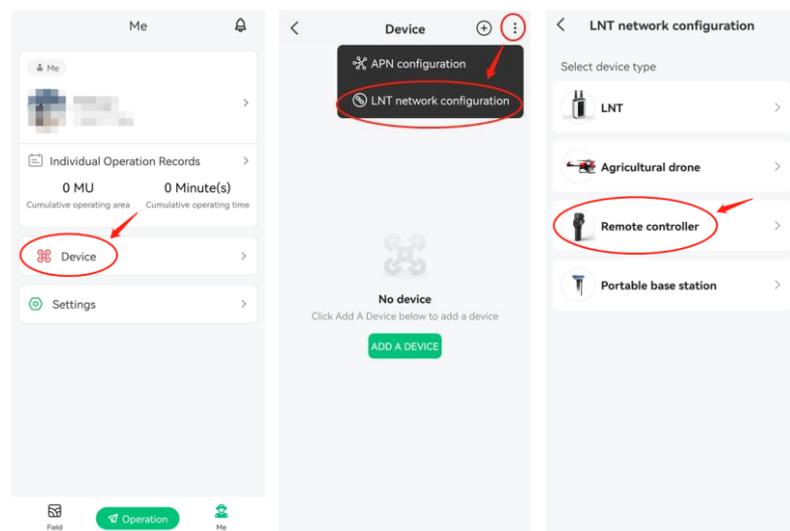


Attention: Local network terminal, LNT, is a fake cloud server. When the smartphone is connected to LNT, the App account will log in LNT-side server. If LNT has internet access, it will

automatically sync with XAG cloud-side server. Oppositely, when the smartphone is connected to 4G, the App account will directly log in Cloud-side server.



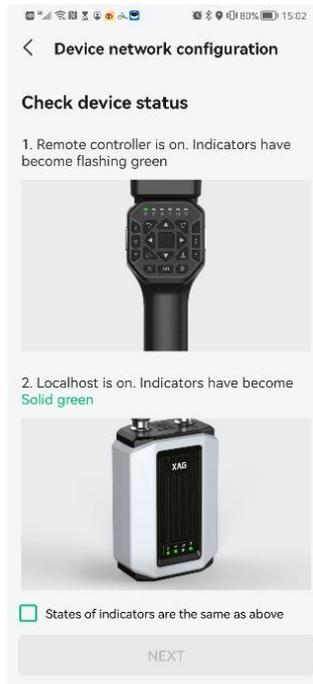
5. Go to Me → Device → LNT network configuration → Remote controller



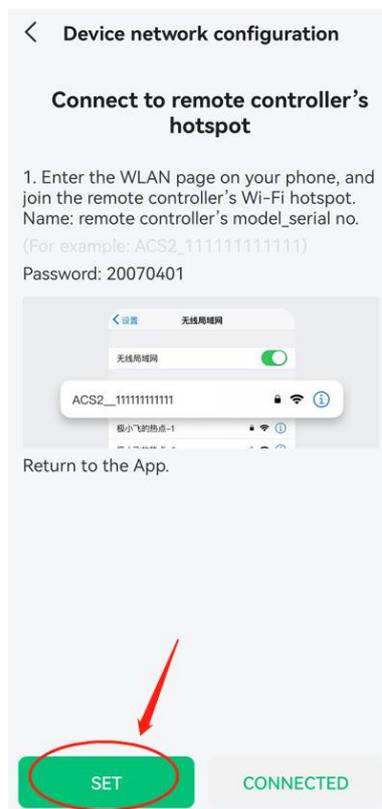
6. Check device status.

Make sure the 1st light indicator of ACS2 2021 is in green.

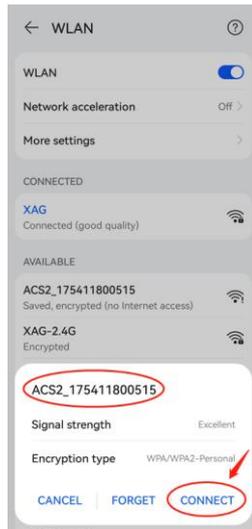
Make sure all four of LNT light indicators are in green.



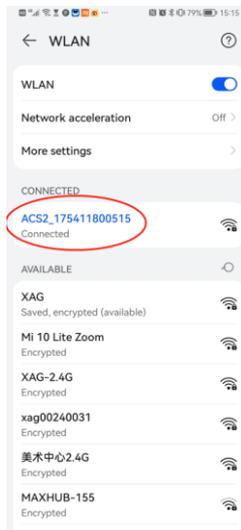
7. Press the green button “SET”



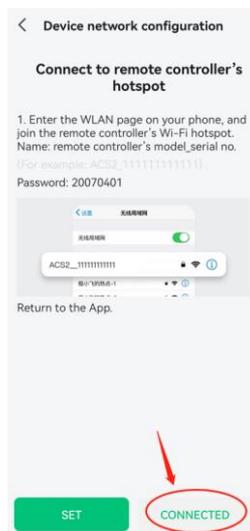
8. The App will navigate you to the WLAN setting page; Connect to ACS2 hotspot, whose WIFI SSID is ACS2 appended by its serial number. Input the password: 20070401, and press connect.



9. Make sure that your smartphone is connected to ACS2 hotspot successfully.

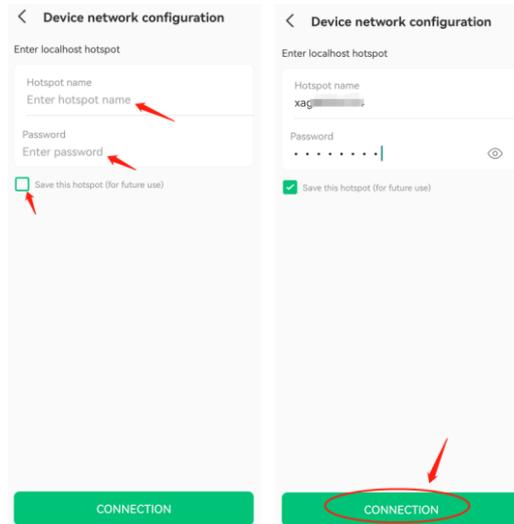


10. Return to the XAG One App. Press the grey button "CONNECTED "

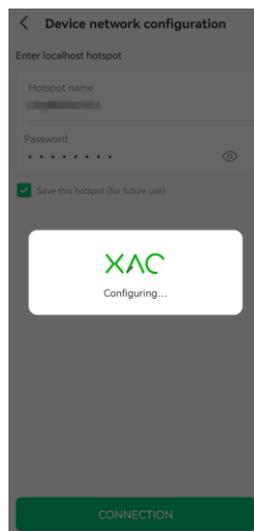


11. Input LNT hotspot SSID and password, click save this hotspot (for future use), press "CONNECTION".

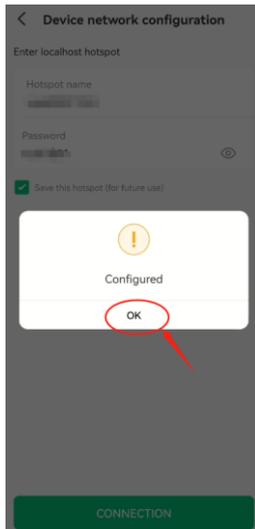
Attention: Make sure the LNT SSID and password is correct. This action gives ACS2 remote controller the LNT's SSID/password and allows ACS2 automatically connect LNT hotspot during start up.



12. It may require many attempts.



13. Configured. Press OK to quit. ACS2 is configured successfully.



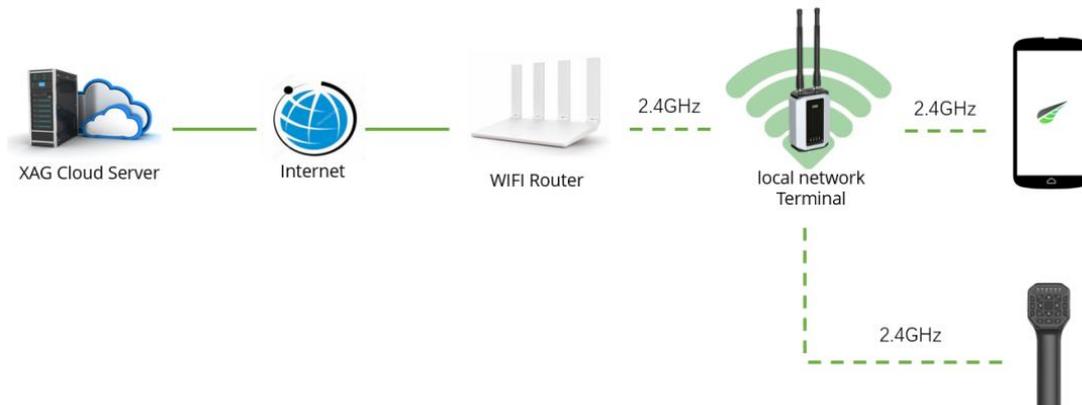
you may hear the prompt tone of “configuration successfully”

14. Optional: Recommended to Restart ACS2 2021.
15. Wait for a while. **Make sure the Power, Terminal, and Task Status light (the 1st, 2nd and 5th from the left) must be display in green.** ACS2 configuration is completed. If not, ACS2 configuration must fails and please redo the whole process or report to XAG technician.



Step 5: Join ACS2 2021 to LNT Network

Objective: Join ACS2 2021 to LNT network. This device will register on XAG cloud server through internet.



Procedure:

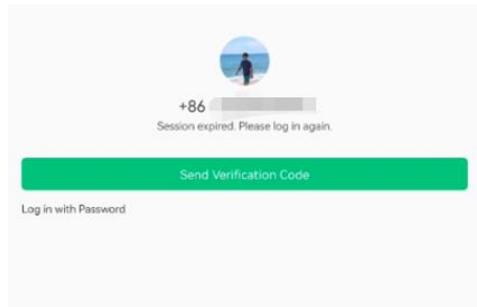
1. Make sure the ACS2 2021's Power, Terminal and Task Status light illuminate in green.
If not, please configure ACS2 again.



2. Connect smartphone to LNT hotspot
Attention: LNT must access internet.



3. Since LNT hotspot is reconnected, we need to sign in XAG One account again.



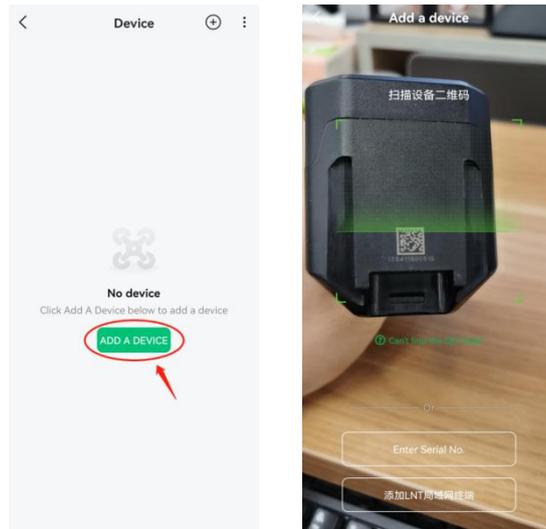
4. Put ACS2 2021 into pairing mode
 - i. Turn off ACS2 2021, wait for 20 seconds
 - ii. Long press the ACS2 2021 power button for more than 10 seconds until all the LED indicators are flashing red.



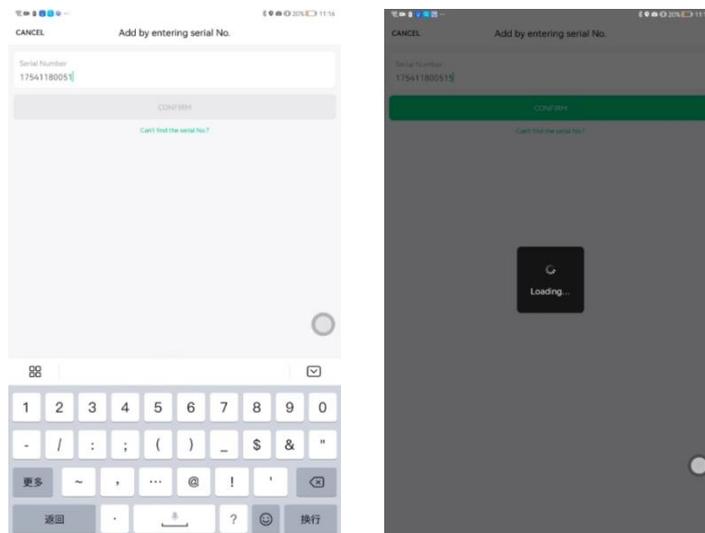
- iii. wait for a while, until you see all the light flashing green.



5. Press the green button "ADD A DEVICE"
You can either scan QR code or enter serial number
Make sure ACS2 2021 flashing green when adding

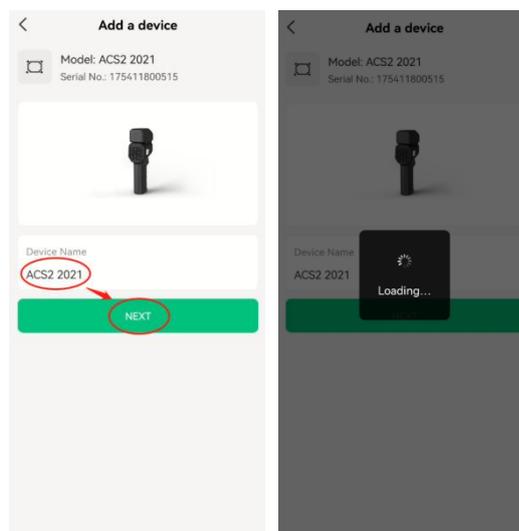


If you enter serial number, press confirm to continue

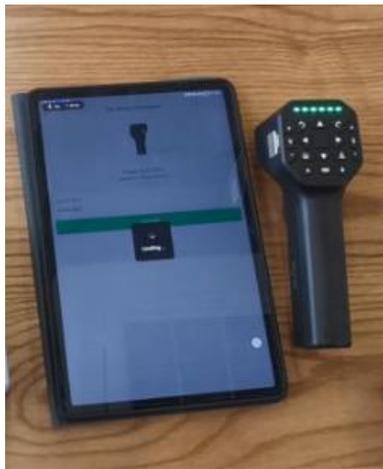


6. Set device information, input device name, and press confirm.

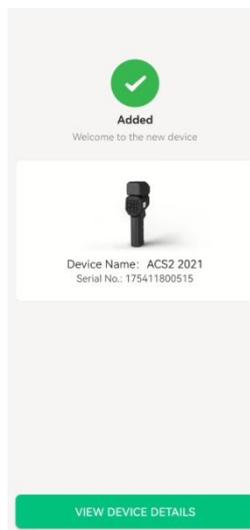
This process may take for a while.



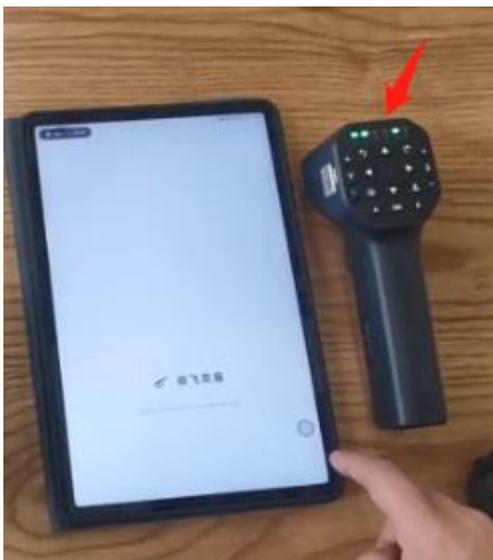
ACS2 shall be flashing green during the process.



7. ACS2 added successfully, press "COMPLETE"



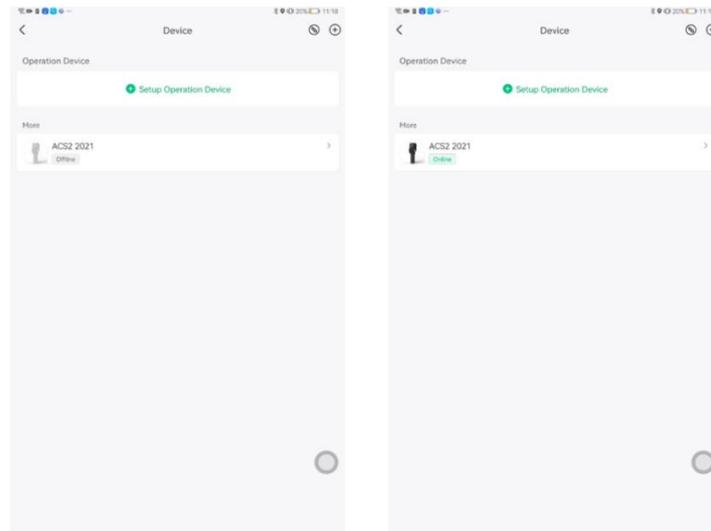
8. Restart ACS2. Make sure that the power, terminal and task status LED indicator remain green.



These three light must be in green

9. Go to "Device" and check if ACS2 2021 is online
Drag down to refresh.

Optional: please restart XAG One App if it takes too long to connect.



10. ACS2 2021 has been added to local network terminal (LNT) and registered its serial number in XAG cloud server database. Once completed, you can feel free to update the firmware through LNT. Make sure the LNT has internet access.

Step 6: Configure XRTK4 WIFI Access

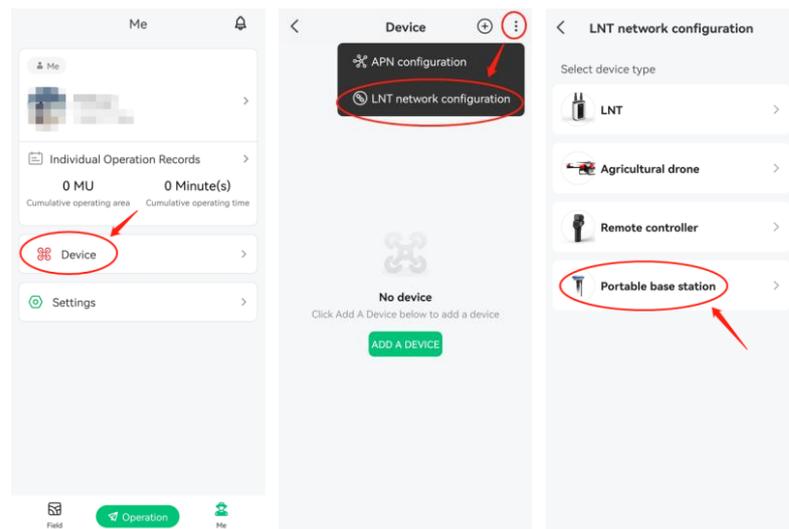
Objective: Configure XRTK4 WIFI Access. Once configured, XRTK4 will automatically connect to LNT hotspot.



Procedure:

1. Connect smartphone to LNT. Make sure LNT has internet connection. Login XAG One account.

2. Go to  My  Device  Portable base station

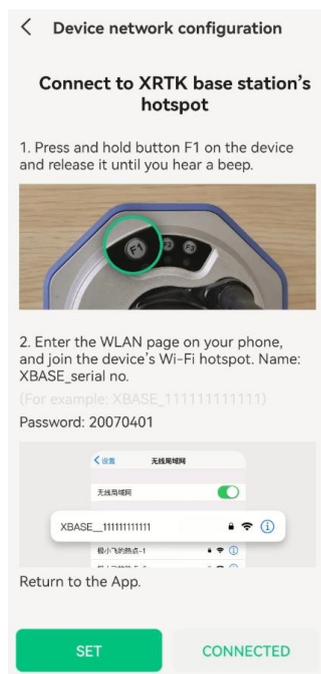


3. Check device status



4. Follow the guide on App. Connect to XRTK4 hotspot.

To enable the XRTK4 hotspot, long press the F1 button on XRTK4 until you hear a beep sound.



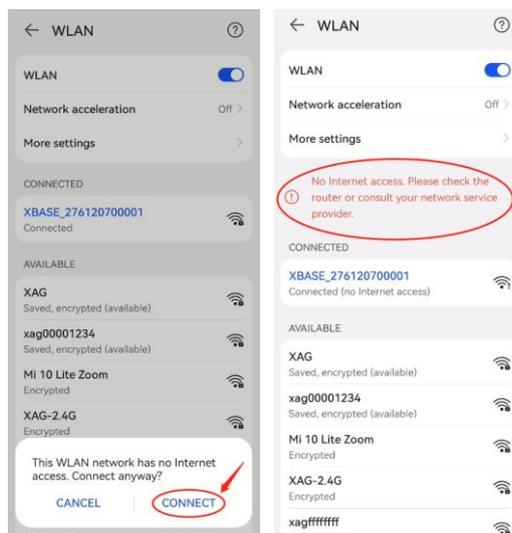
5. Press "SET". The app will direct you to the WLAN setting page.



6. Under smartphone WLAN setting, Connect XRTK4 hotspot. The XRTK4 hotspot SSID is XBASE_[serial number], and the password is 20070401. It will take approximately 20 seconds until the XRTK4 hotspot appears.

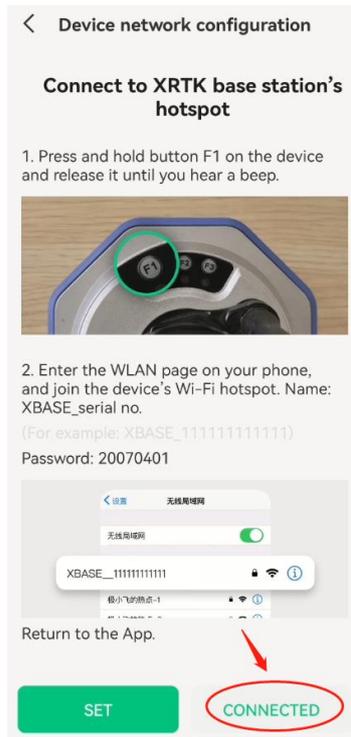


7. The XRTK4 hotspot has no internet access. Connect it anyway.

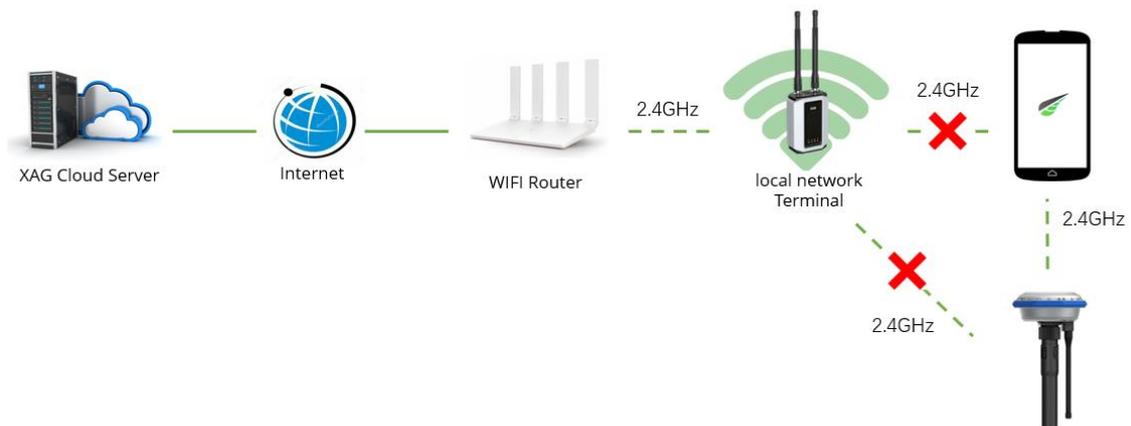


8. Return to the XAG One App.

Press the grey button "CONNECTED"

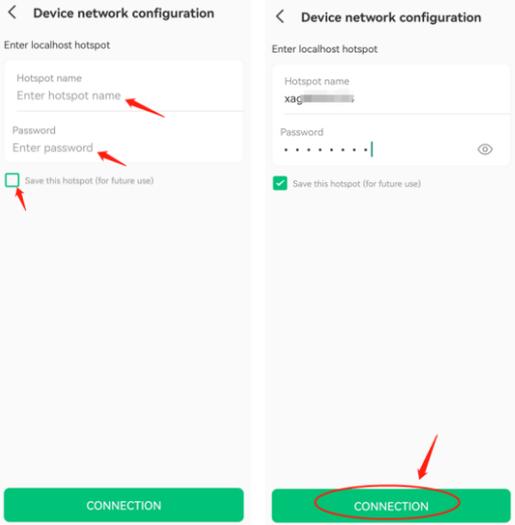


At this moment, the smartphone is directly connected to XRTK4 hotspot

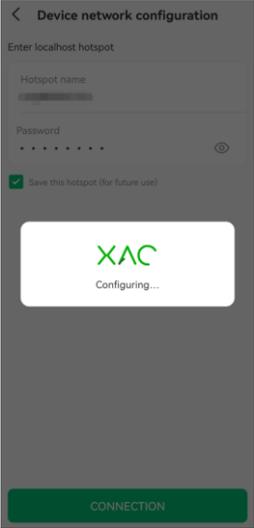


-
- 9. Input LNT hotspot SSID and password, click save this hotspot (for future use), press "CONNECTION".

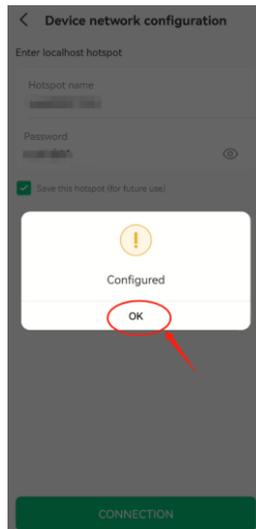
Attention: Make sure the LNT SSID and password is correct. This action gives XRTK4 portable base station the LNT's SSID/password and allows XRTK4 automatically connect LNT hotspot during start up.



- 10. It may require many attempts.



11. Configured. Press OK to quit. ACS2 is configured successfully.



the prompt “configured” means that the credentials are successfully set for XRTK4. But it’s not guarantee that the credentials are correct. This means that the XRTK4 may have the incorrect credentials even though the “configured” is prompted.

Thus, we must check if the XRTK F2 light has triple flashing. This means that the XRTK is connected to LNT.

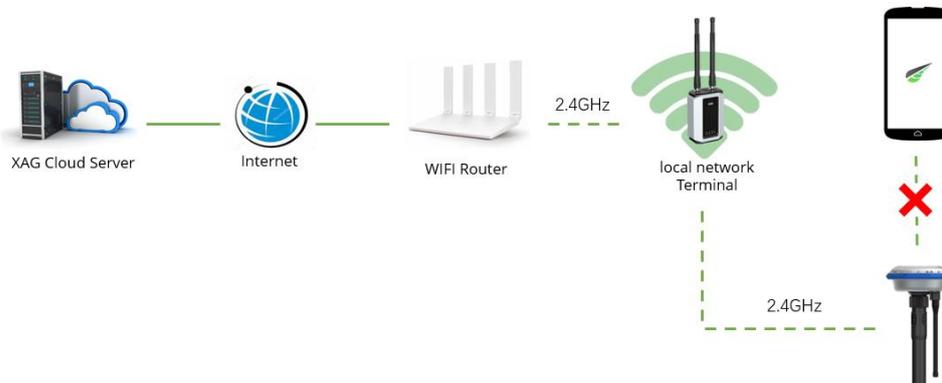
12. Wait until the F2 triple flashes. Meanwhile, F1 must flash in red.



You need to understand the meaning of F2. If F2 do not have triple flashing, please repeat this step.

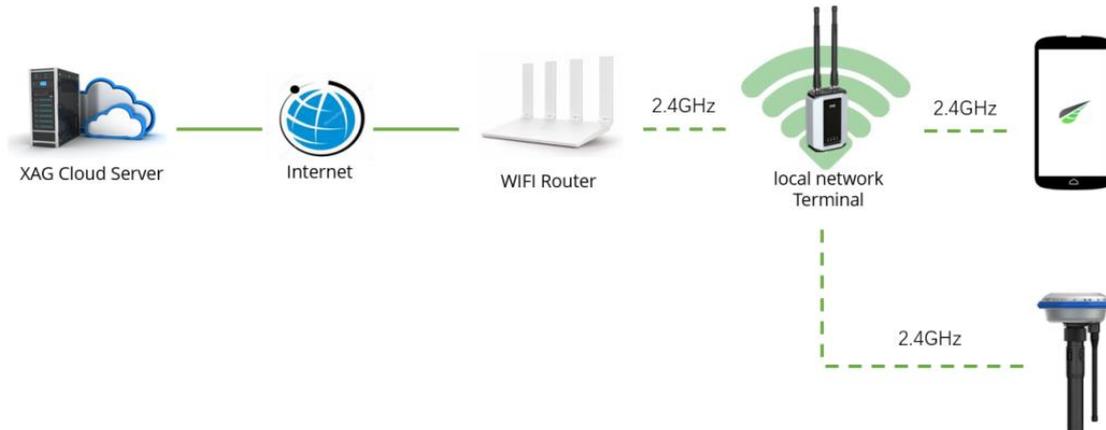
F2 flashing	XRTK4
Single	No connection
Double	connect to Internet
Triple	connect to LNT hotspot

You may need to restart XRTK4, so that XRTK4 can connect to LNT hotspot.



Step 7: Join XRTK4 to LNT Network

Objective: After the XRTK4 connects to LNT hotspot WIFI, it has not been added in both LNT and XAG cloud server. Thus, we need to join the XRTK4 in LNT network.



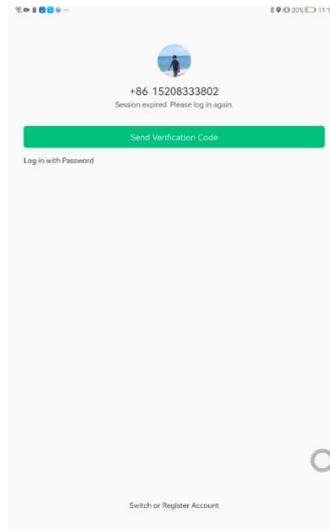
Please do not connect XRTK4 hotspot here. Because once XRTK4 WIFI access point configured, XRTK4 will automatically connect to LNT hotspot and XRTK hotspot will disappear.

Procedure:

1. Connect smartphone to **LNT hotspot**. Make sure that LNT has the access to internet.

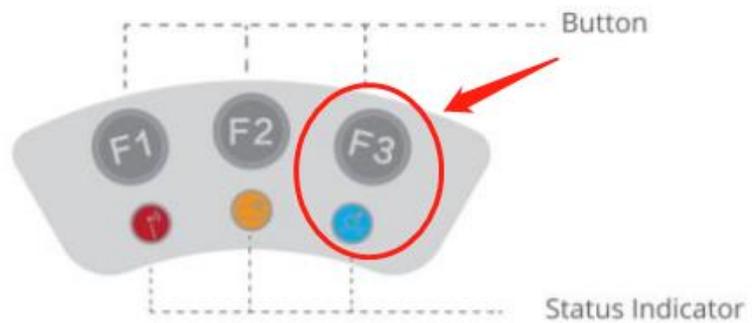


2. Since LNT hotspot is reconnected, you may need to sign in XAG One account again.



3. Optional: Restart XRTK4.

To enable the add mode, long press F3 on XRTK4 button panel until all the LED light indicators are flashing. When you see all three lights (F1/F2/F3) synchronized flashing, it means that XRTk4 is ready to be added.

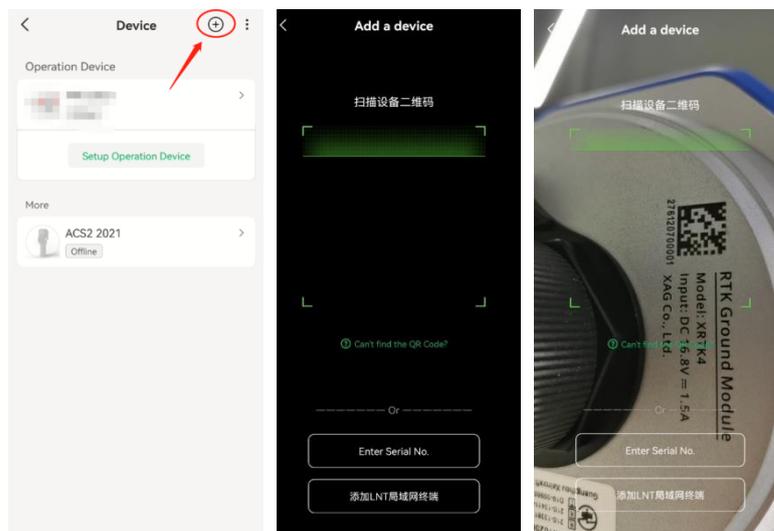


If the XRTK4 do not flash, it may be caused by

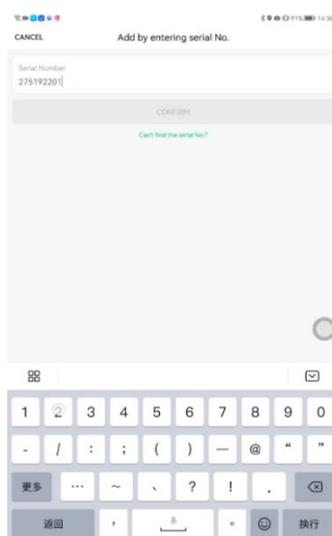
- **absence of SIM card, or**
- **XRTK is not connected to LNT (may be due to incorrect LNT SSID or password).**

4. Meanwhile, press  to add a device

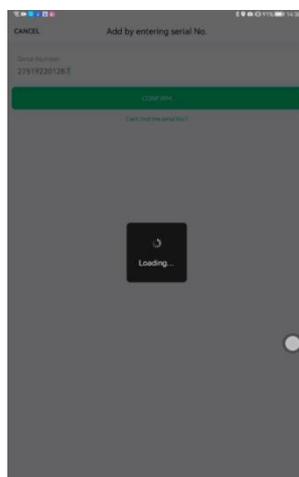
You can either scan QR code or enter serial number



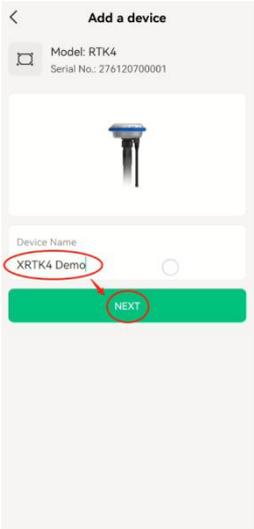
If you enter serial number, press confirm to continue



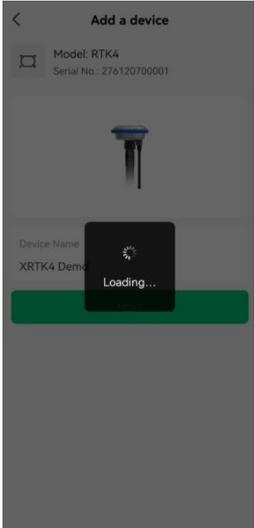
This loading process will take for 30 seconds



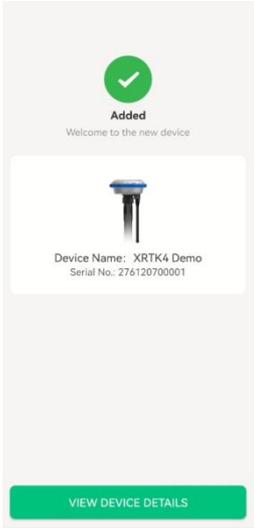
5. Set device information, input device name, and press confirm.



This loading process will take for approximately 60 seconds.



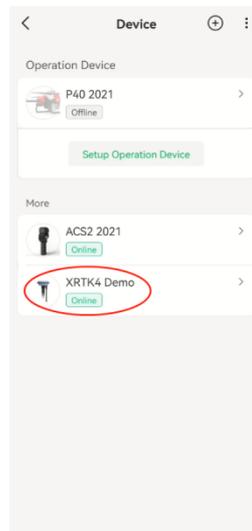
6. XRTK4 added successfully



-
7. Go to "Device" and check if XRTK4 is online

Drag down to refresh.

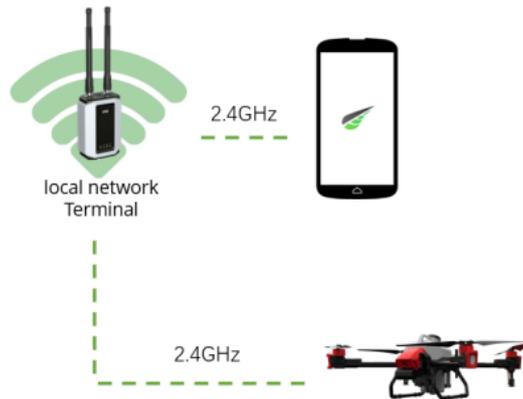
You can restart XAG One App if it takes too long to connect.



8. XRTK4 has been added to local network terminal (LNT) and registered its serial number in XAG cloud server database. Once completed, you can feel free to update the firmware through LNT. Make sure the LNT has internet access.

Step 8: Configure UAV WIFI Access

Objective: Configure UAV WIFI Access. Once configured, UAV will automatically connect to LNT hotspot.

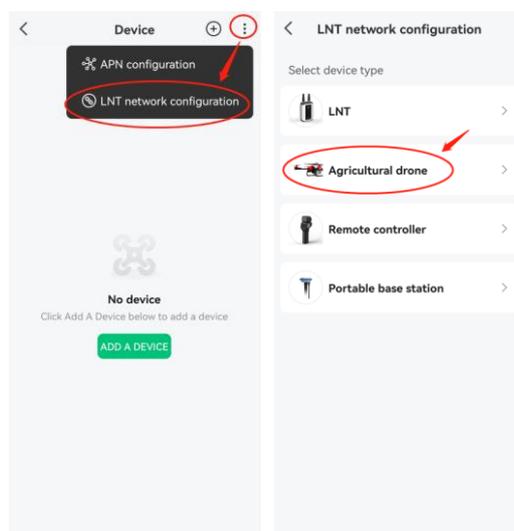


Procedure:

1. Power up UAV
2. Take off canopy



3. Go to  My  Device  Agriculture drone



4. Check device status



5. Follow the guide. Enable UAV's hotspot. Connect smartphone to UAV hotspot.



6. Double press the reset button on flight control



When the wireless communication LED indicator is flashing orange, it implicit that the flight control hotspot has been enabled.



7. Press the green button "SET"



Connect smartphone to UAV's hotspot

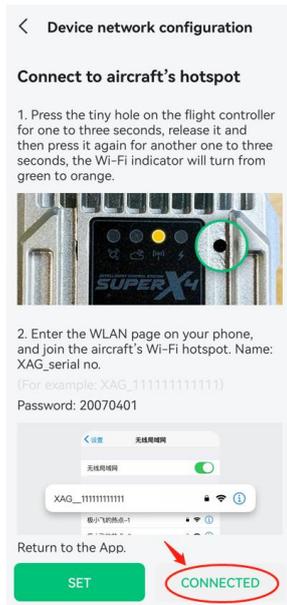
UAV SSID: XAG_[serial number]

Password: 20070401



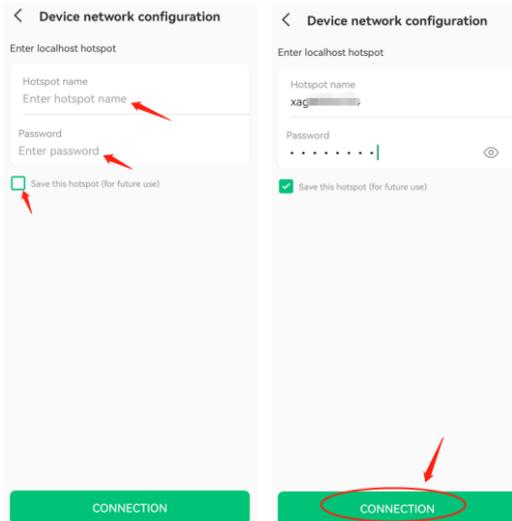
8. Return to the XAG One App.

Press the grey button "CONNECTED" to continue

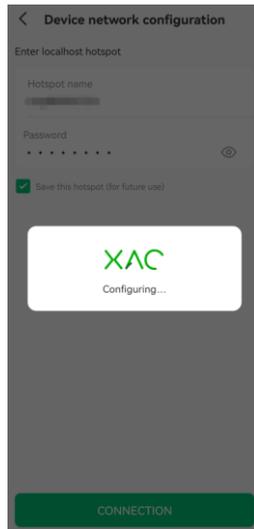


- Input LNT hotspot SSID and password, click save this hotspot (for future use), press "CONNECTION".

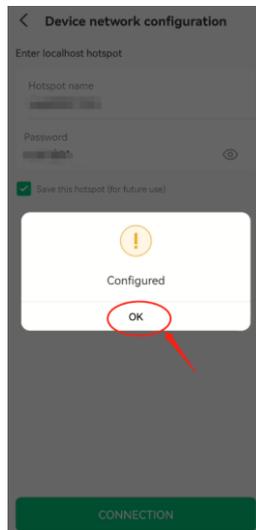
Attention: Make sure the LNT SSID and password is correct. This action gives UAV the LNT's SSID/password and allows UAV automatically to connect LNT hotspot during start up.



- It may require many attempts.



11. Configured. Press OK to quit. The UAV is configured successfully.

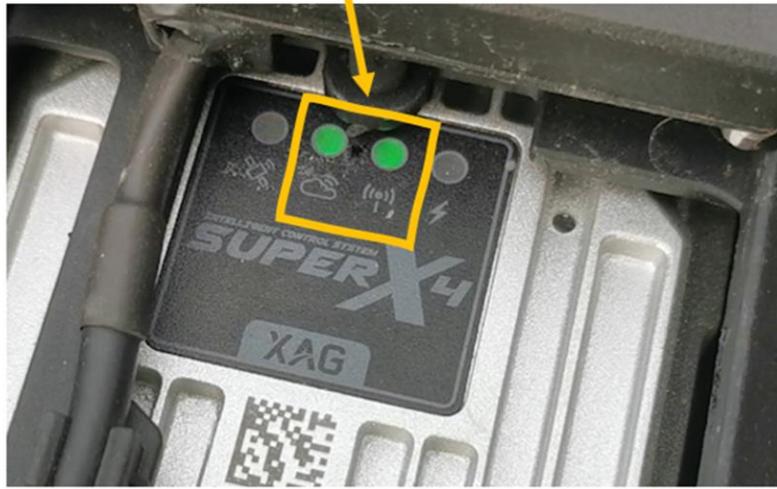


12. Restart UAV. The UAV will automatically connect to LNT's hotspot. Meanwhile, make sure your LNT turn on and have internet access. Please check both cloud and wireless communication LED indicator (the middle two lights) must illuminate in green. Otherwise, please contact XAG technical support.



Once FC's middle lights turn into green, the UAV has successfully entered LNT networking mode.

These two light indicators must be in green.

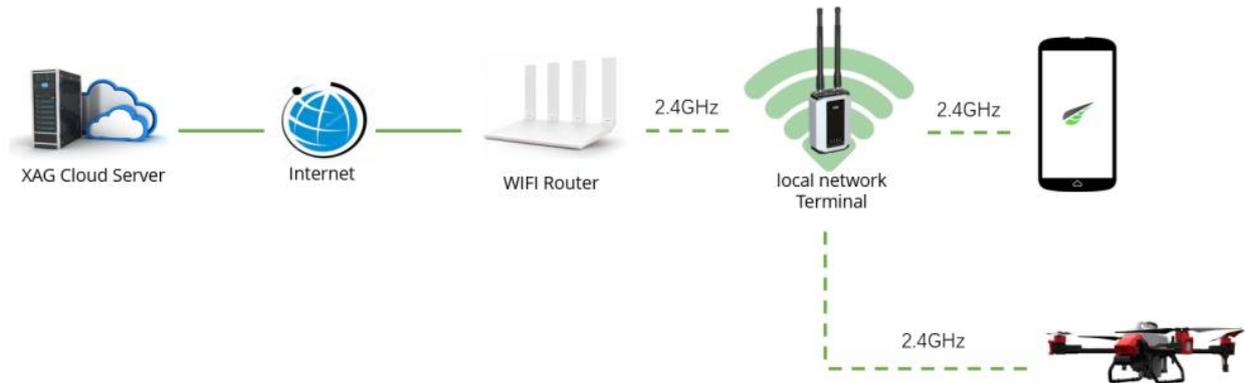


Please refer to the below table for the LED light indication.

LED INDICATOR	ICON	ILLSTRATION	IMPLICATION
Server Communication Indicator		whether device can communicate with remote server (cloud server or local network terminal)	<p>Flash Green: Cloud server/ Local network terminal connected</p> <p>Flash Red: Cloud server/ Local network terminal disconnected</p>
Wireless Communication Indicator		whether HDLS module can transmit and process data	<p>Flash Green (slow) : OK</p> <p>Flash Red (rapid): No data received</p> <p>Flash Red (slow): Initialization OK, serial port disconnected</p> <p>Flash Red (rapid): Connection fail</p> <p>Flash Red/Green: Attempts to pair</p> <p>Flash Orange: WIFI mode enable (Action required)</p>

Step 9: Join UAV to LNT network

Objective: Join UAV to LNT network



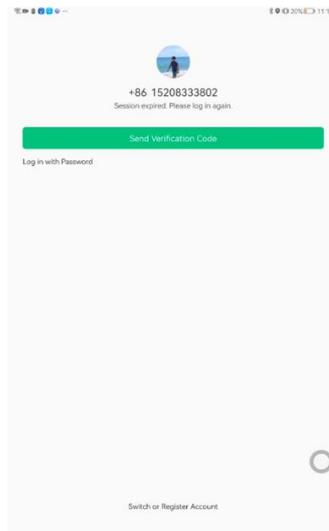
Procedure:

1. Connect smartphone to LNT hotspot

Attention: Make sure that LNT has the access to internet.



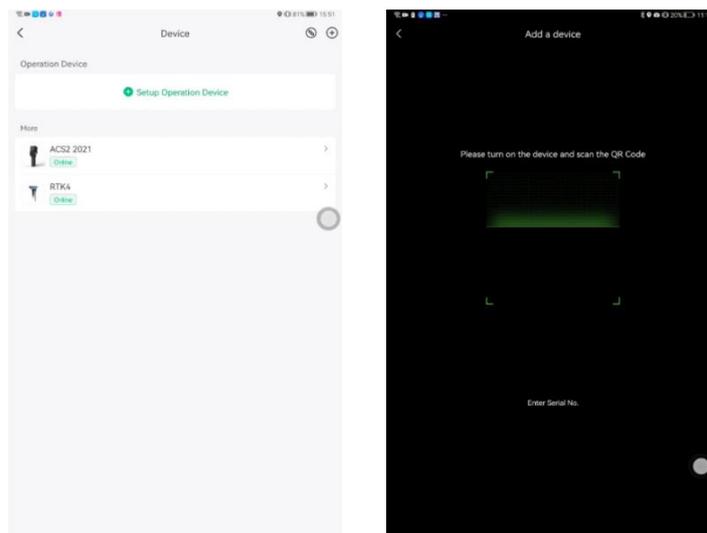
2. Since LNT hotspot is reconnected, we need to sign in XAG One account again.



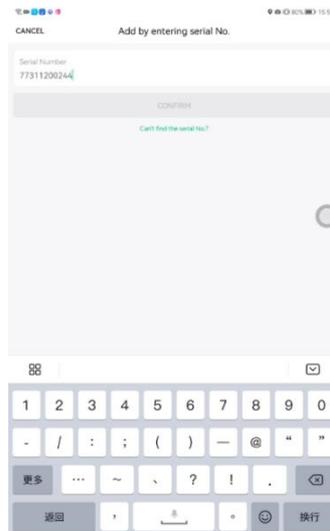
3. Restart UAV

4. Meanwhile, press  to add UAV

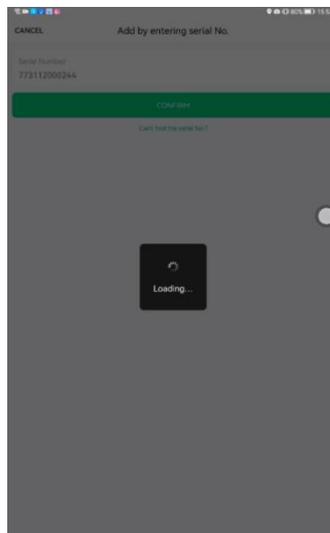
You can either scan QR code or enter serial number



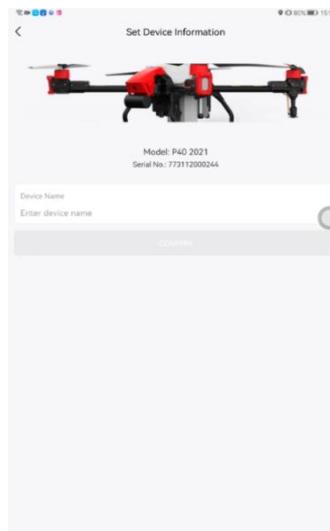
If you enter serial number, press confirm to continue



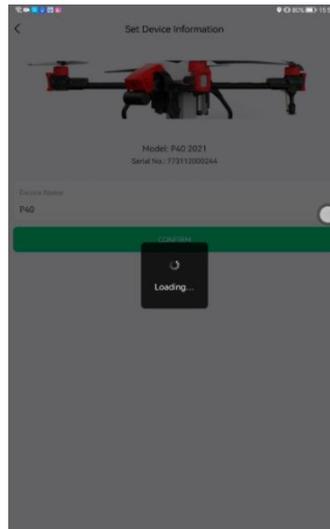
This loading process will take approximately 30 seconds



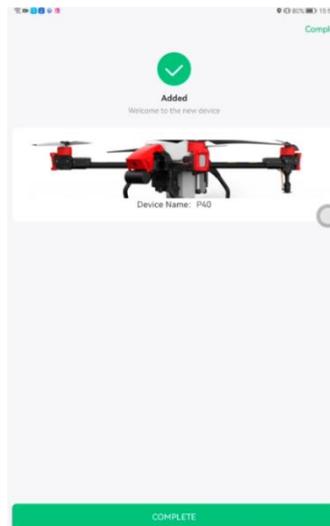
5. Set device information, input device name, and press confirm.



This loading process will take approximately 60 seconds.



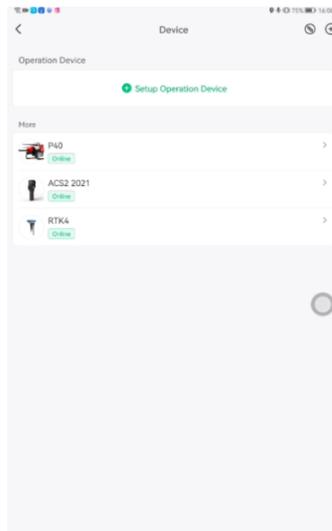
6. UAV added successfully, press "COMPLETE"



7. Go to "Device" and check if UAV is online

Drag down to refresh.

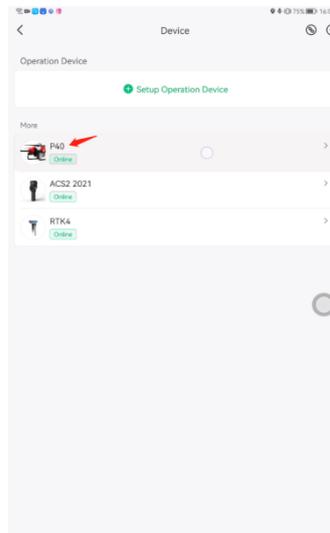
You can restart XAG One App if it takes too long to connect.



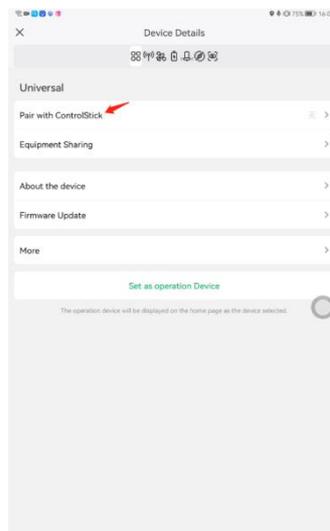
8. UAV has been added to local network terminal (LNT) and registered its serial number in XAG cloud server database. Once completed, you can feel free to update the firmware through LNT. Make sure the LNT has internet access.

Step 10: Bind UAV with ACS2 2021

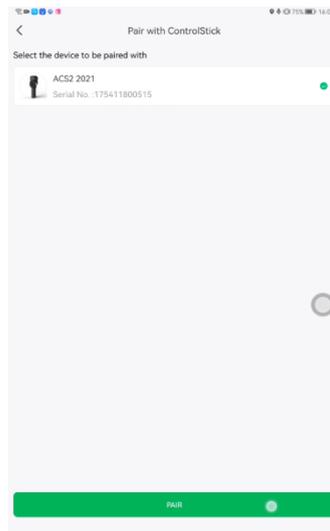
1. Go to UAV's setting



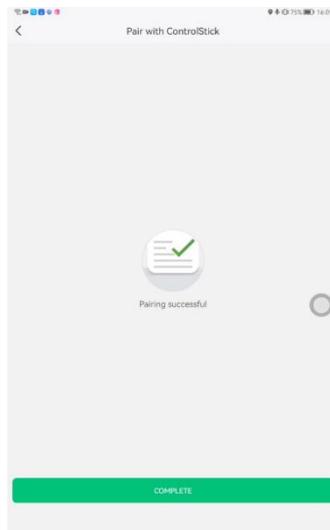
2. Select "Pair with Control stick"



3. Select the ACS2 2021, and press "PAIR"



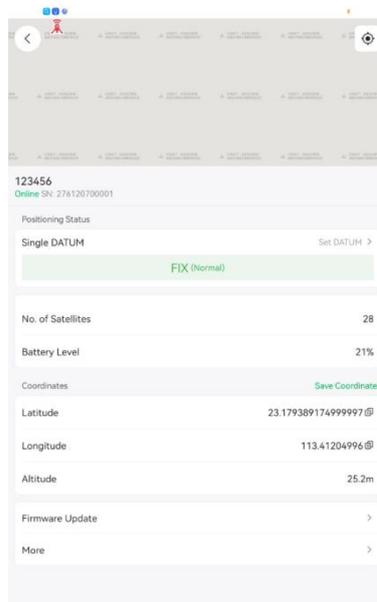
4. Pairing successful, press "COMPLETE"



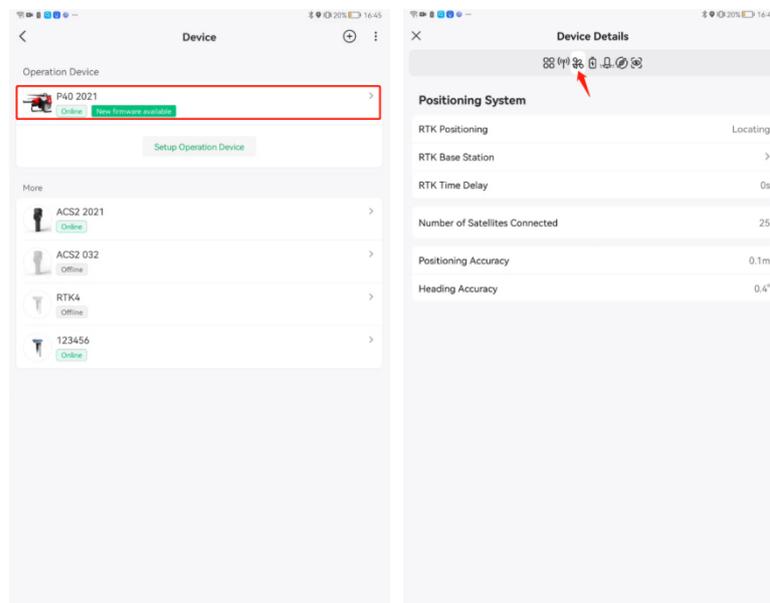
Step 11: Connect UAV to XRTK4 under LNT Network



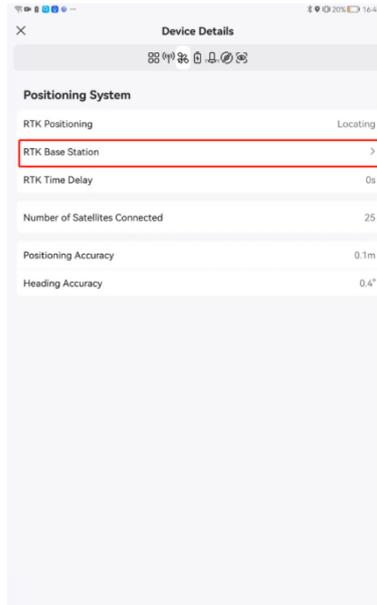
1. Make sure that smartphone is connected to LNT hotspot
2. Make sure the XRTK4 is in FIX status



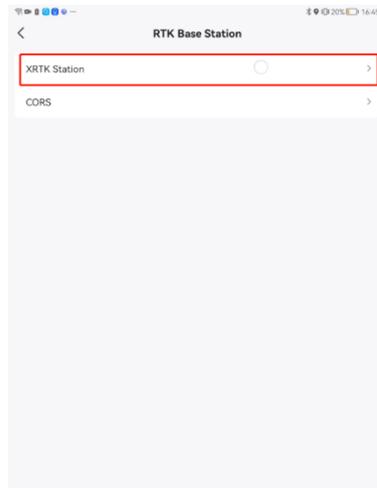
3. Go to UAV Positioning setting



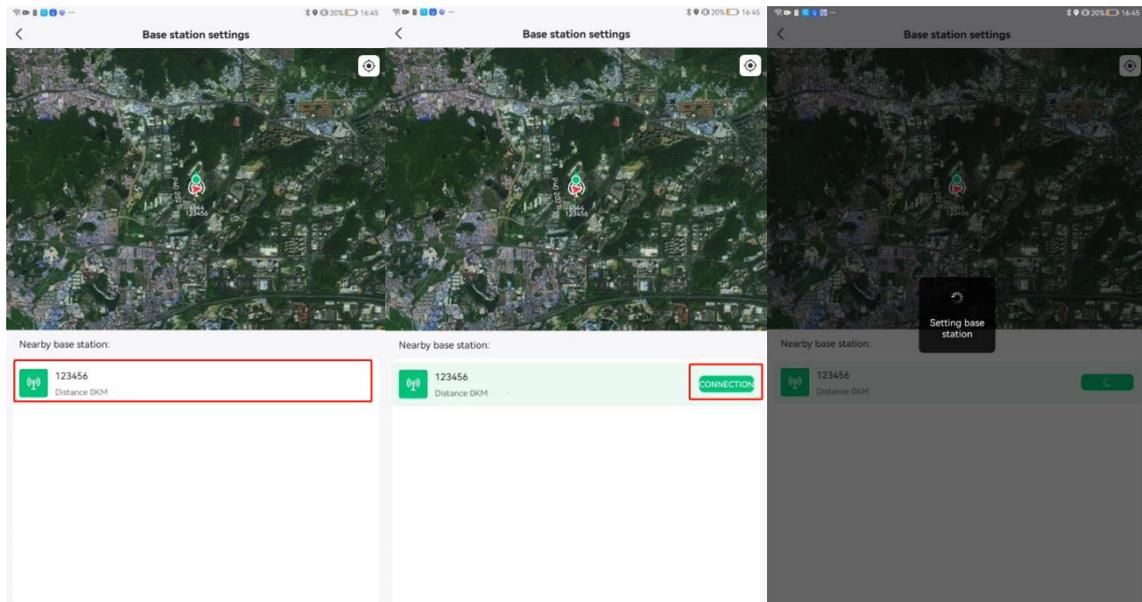
4. Go to RTK Base Station



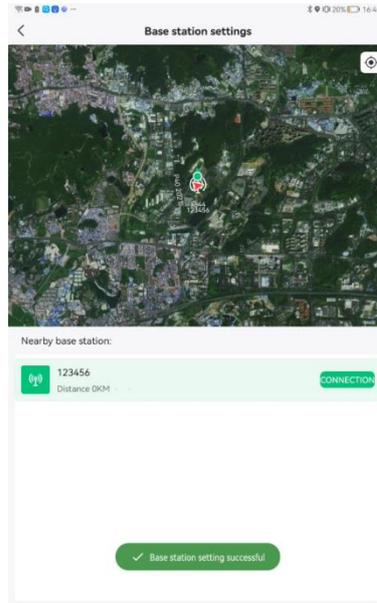
5. Choose "XRTK Station"



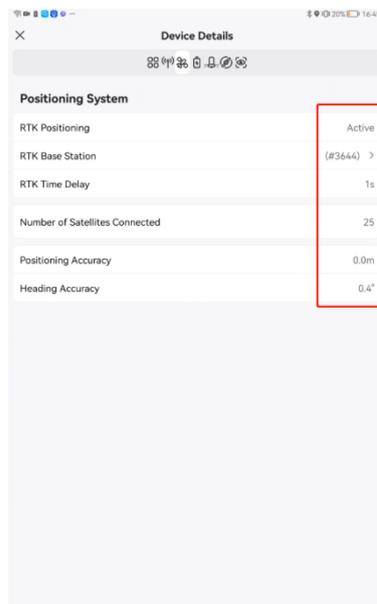
6. Connect your base station



7. Base station setting successful



8. RTK Positioning is active. If any error occurs, please restart the UAV/XRTK4 and try again.



9. Done

LNT Network Configuration Method Two – “Add before Configure WIFI ”

Step 1: Preparation

No.	Item	Photo
1	UAV (model 2021/2022)	
2	ACS2 2021 remote controller	
3	XRTK4 Portable Base Station	
4	Local Network Terminal (LNT)	
5	Android/harmonious OS Smartphone	
6	WIFI Router or Smartphone's hotspot that can access to internet	
7	4G SIM Card	

Notice

1. All the devices' batteries must be fully charged
2. All the devices must be powered up normally

Device registries in App account requires the internet access to XAG Cloud Server, where device registry data will upload to cloud server. Thus, you shall complete the LNT setup in the places where it has good internet condition.

Step 2: Update LNT Firmware to the latest version**Very important: Please update the LNT firmware to the latest version!**

More than 50% of LNT configuration issue is due to the facts that the operators forget to update firmware.

- **Update LNT firmware**

If you don't know how to update LNT firmware, please go the section "firmware update".

Please find out the method from the section of "firmware update"

Step 3: Connect LNT to internet through WIFI Router

Objective: Connect LNT to WIFI Router, allowing LNT to access internet



Procedures:

1. Obtain local WIFI Router's SSID and password

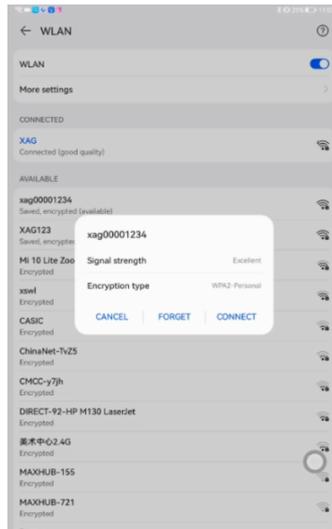


2. Power up LNT
3. Wait for a while until the Power, WLAN and system light indicator illuminate; Meanwhile, WAN light indicator becomes dim

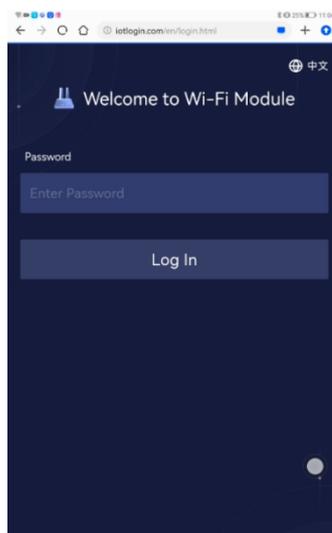


These three light must be in green

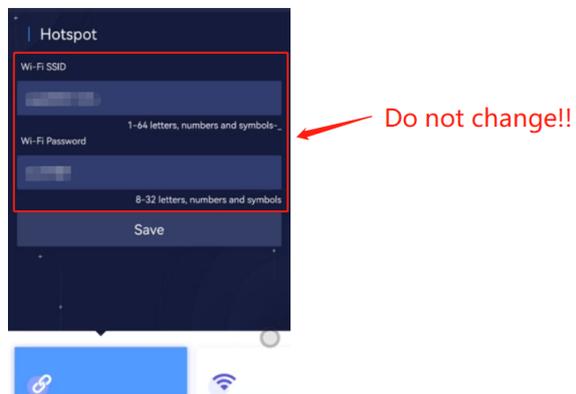
4. Connect your smartphone to LNT's hotspot



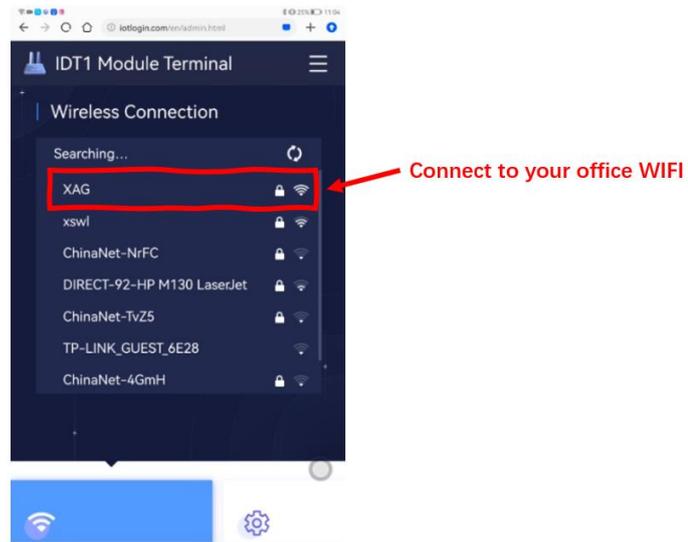
5. Open your smartphone's browser, input the LNT web address, <http://www.ilotlogin.com>
Input password "20070401"



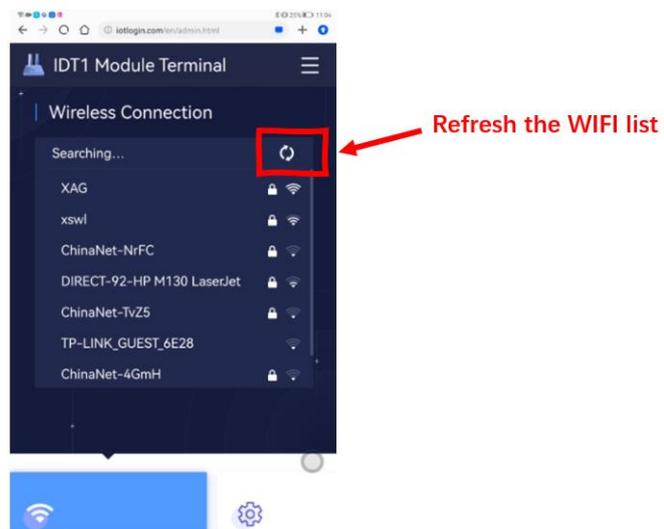
6. Remember the WIFI-SSID and password. Do not change them.



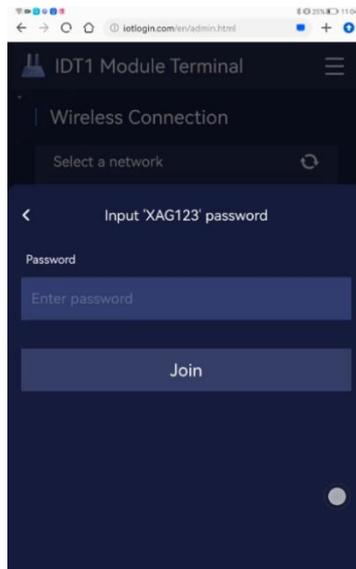
7. Go to Wireless Connection; Choose the SSID of local WIFI



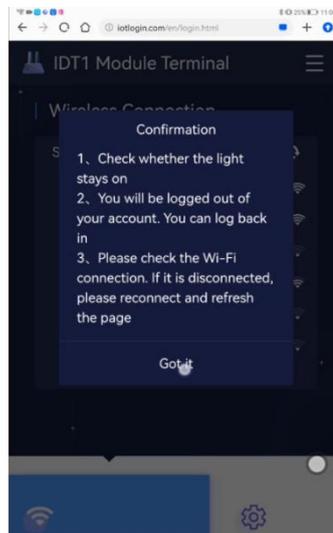
Notice: press  to refresh the list if your WIFI router SSID is not shown



8. Input WIFI router password and press "Join"

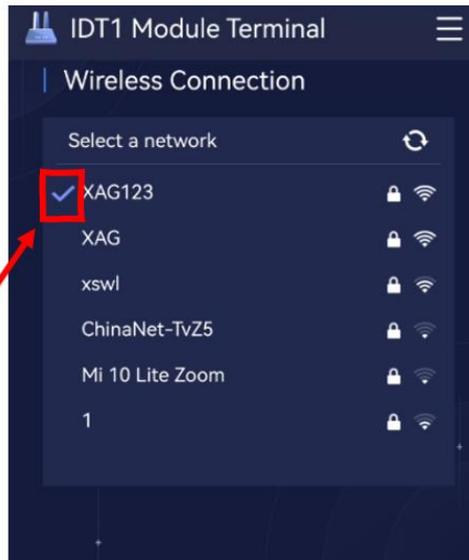


9. Press "Got it"

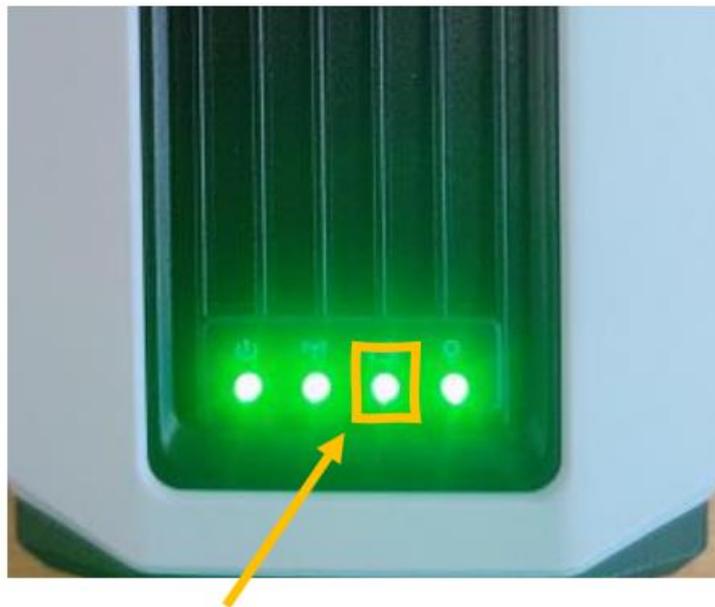


10. Check WLAN connectivity. Go to LNT web page → Wireless Connection, check if your LNT is connected to the office WIFI router.

Check if LNT is connected to the office WIFI router

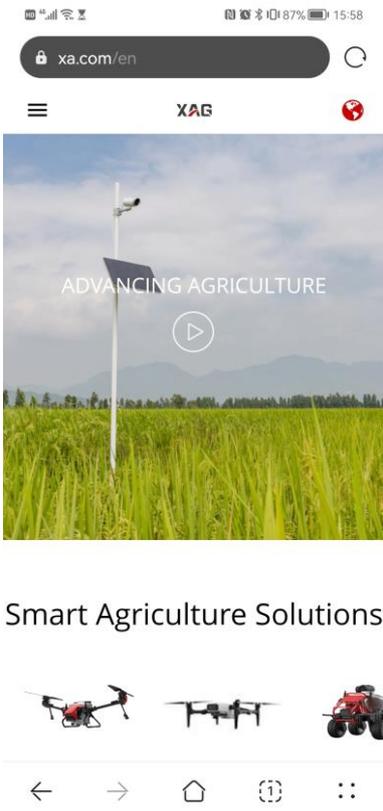


11. Check the LNT WAN light indicator.



Check if WAN light is in green.
If yes, the LNT is successfully connected to WIFI router.
If not, the LNT fails to connect WIFI router.

12. LNT now has internet access. Please test it by browsing any websites, for example XAG official, Google, Facebook, etc..



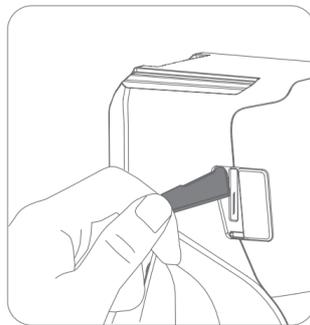
Step 4: Add ACS2 2021 to XAG One through 4G and Update Firmware

Objective: Add ACS2 2021 to XAG One Account through 4G, Update its Firmware



Procedure:

1. Insert SIM card into ACS2 2021



2. Power up, wait for 60 seconds, until the Power (1st) and Terminal LED (2nd) indicators are illuminated in green



- Power LED indicator illuminated in green. It implicit that the remaining battery is more than 30%
- Terminal LED indicator  illuminated in green. It implicit that the ACS2 2021 has been connected to the XAG cloud server through internet.

ACS2 remote controller is connecting to 4G internet

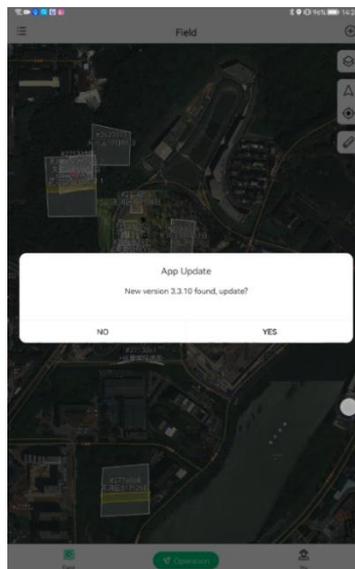


If the ACS2 2nd light is not illuminated in green, the ACS2 is failed to access internet. Please change another SIM card or contact Xcare immediately.

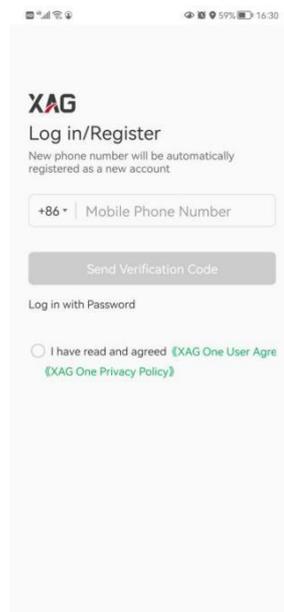
3. Make sure your smartphone can access to internet via 4G or WIFI router. Test it by browser website.
4. Download XAG One



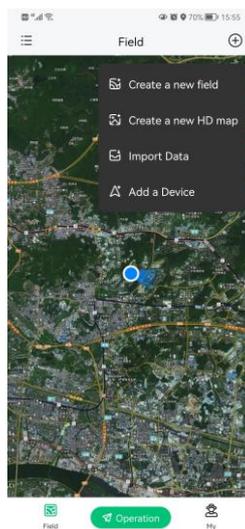
5. Update the App to the latest version



6. Sign in XAG One account



7. Click , press  Add a Device



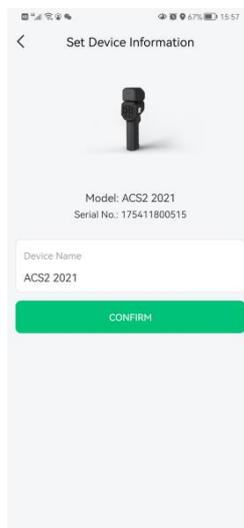
8. Input ACS2 2021 serial number manually or by scanning QR code



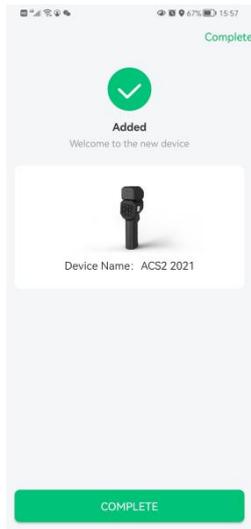
9. Follow the guide to reset ACS2 2021



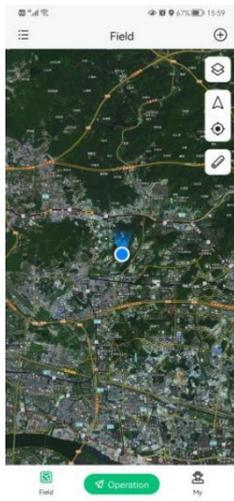
10. Input ACS2 2021's device name and press "COMFIRM"



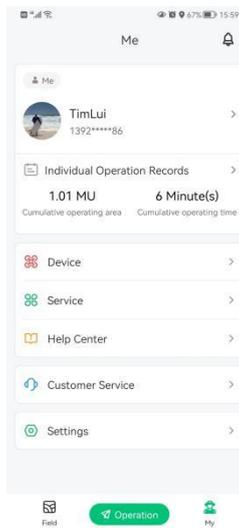
11. Device added successfully, press "COMPLETE" to return home page



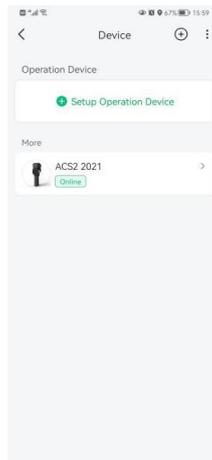
12. press  My



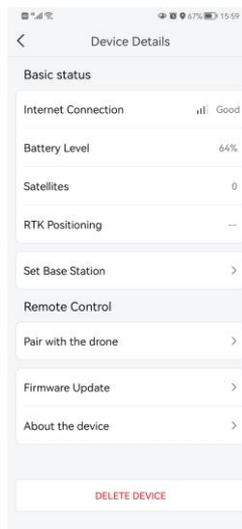
13. Press  Device



14. Press  ACS2 2021 Online



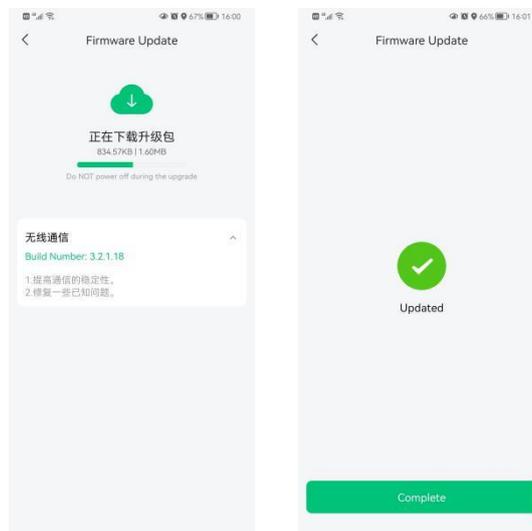
15. Press “Firmware Update”



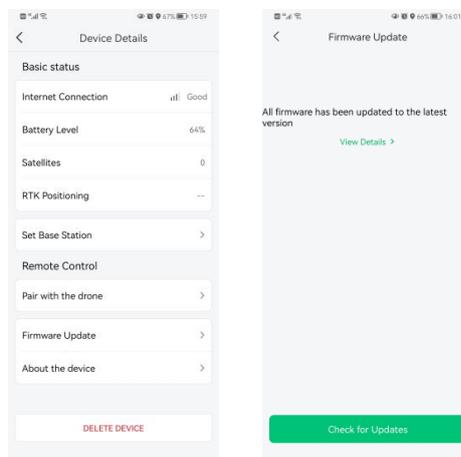
16. Press “Download and update”



17. Wait until the update process is completed
Press "Complete" to return the device details page



18. Press "Firmware Update" again, Press [View Details >](#)
Double check if the firmware has been updated to the latest version

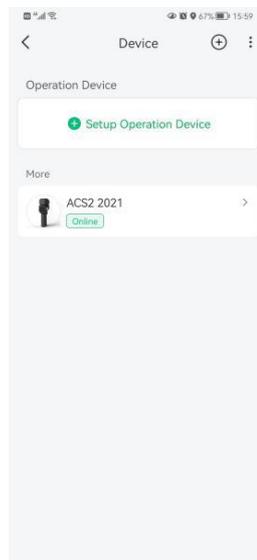


19. Capture the screenshot of this page for the record

The firmware version information is necessary for issue debug.



20. Keep ACS2 in your XAG One account

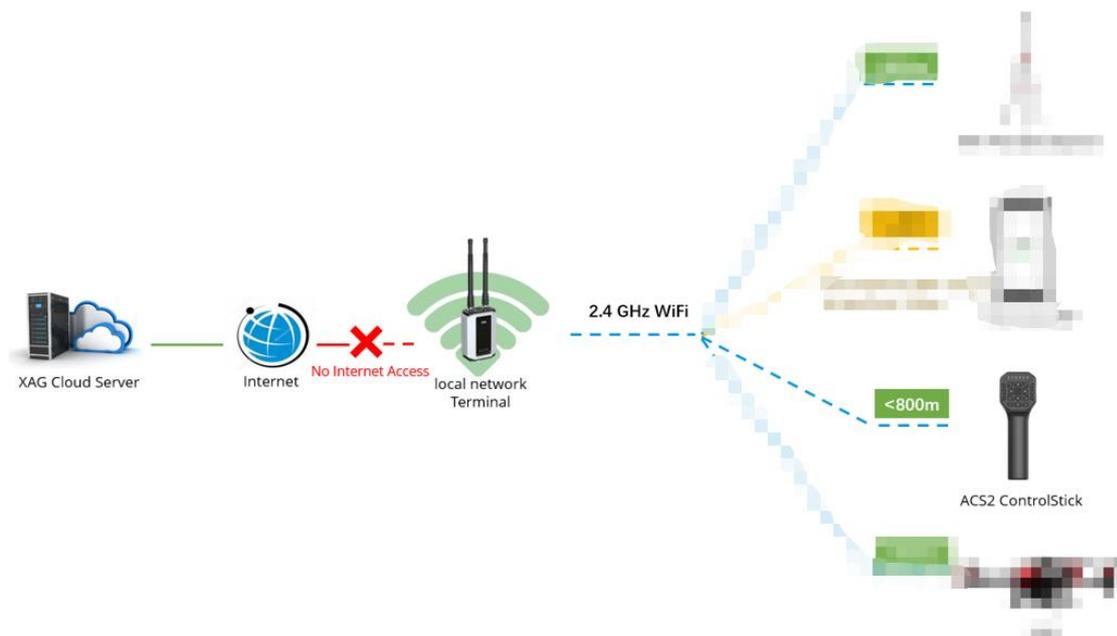


Step 5: Configure ACS2 WIFI Access

Objective: Configure ACS2 WIFI Access. Once configured, ACS 2021 will automatically connect to LNT hotspot.



Once configured, the ACS2 will automatically join the LNT Network.

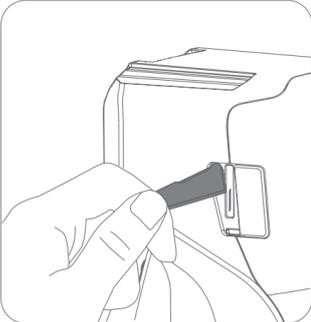


Procedure:

- 1. Connect smartphone to ACS2 2021 hotspot



Optional: To enable ACS2 WIFI mode, please **REMOVE** the SIM card



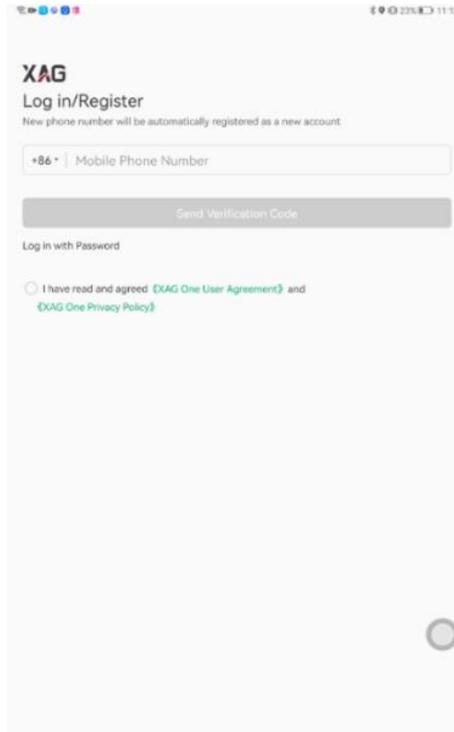
- 2. Power up ACS2



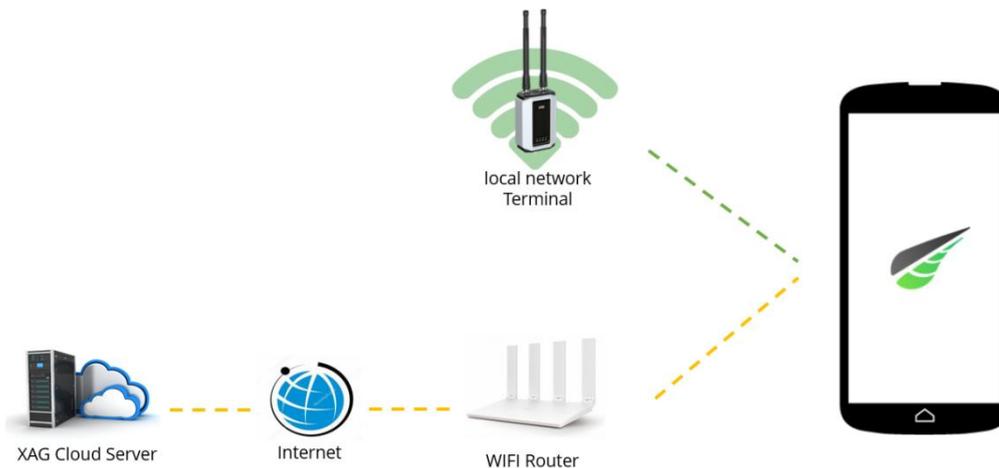
- 3. Wait 60 seconds until the ACS2 2021 completes initialization. Once completed, the third light indicator  will stop flashing and becomes dim.



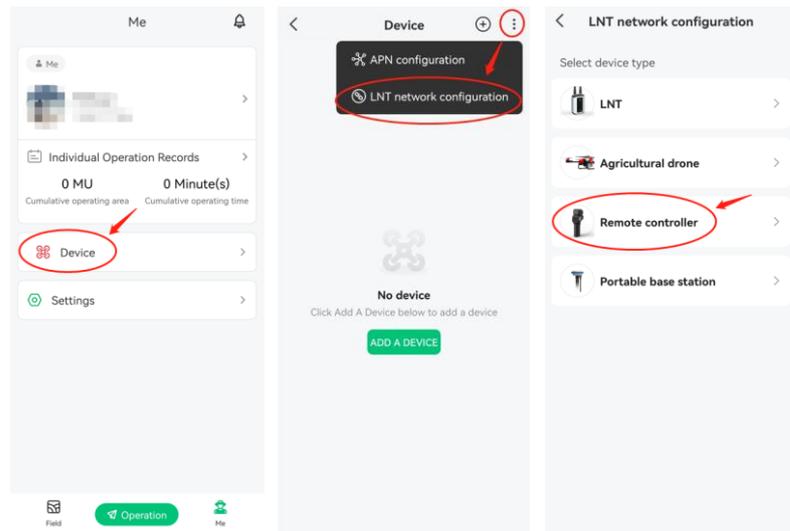
4. Connect your smartphone to LNT hotspot. Make sure LNT is connected to internet.
5. Open XAG One App, and sign in your account.



Attention: Local network terminal, LNT, is a fake cloud server. When the smartphone is connected to LNT, the App account will log in LNT-side server. When the LNT has the internet, the LNT will sync with XAG cloud-side server. Oppositely, when the smartphone is connected to 4G, the App account will directly log in Cloud-side server.



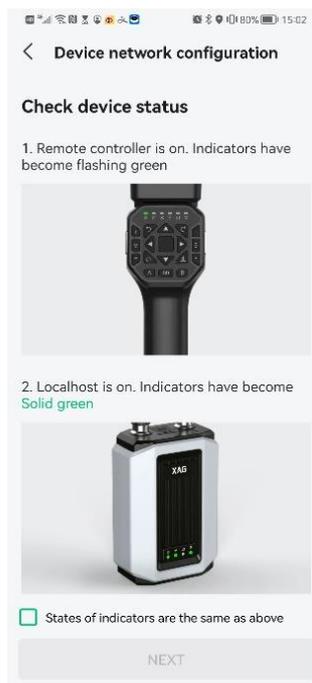
6. Go to  Me  Device   LNT network configuration  Remote controller



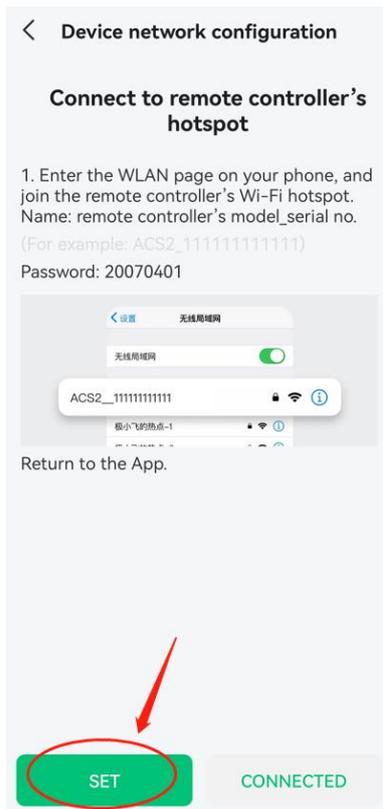
7. Check device status.

Make sure the 1st light indicator of ACS2 2021 is in green.

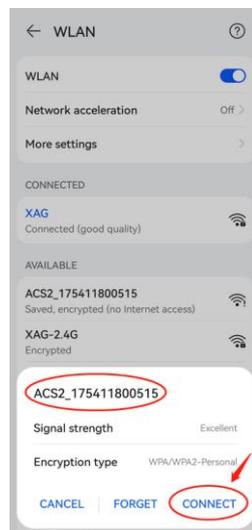
Make sure all four of LNT light indicators are in green.



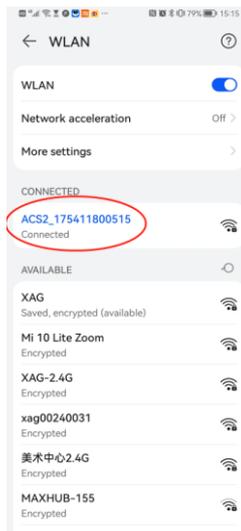
8. Press the green button “SET”



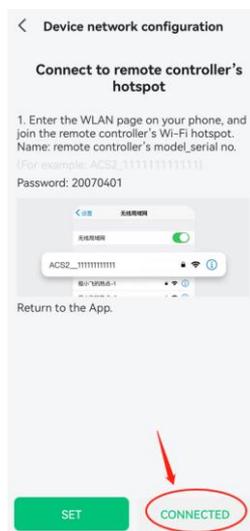
9. The App will navigate you to the WLAN setting page; Connect to ACS2 hotspot, whose WIFI SSID is ACS2 appended by its serial number. Input the password: 20070401, and press connect.



10. Make sure that your smartphone is connected to ACS2 hotspot successfully.

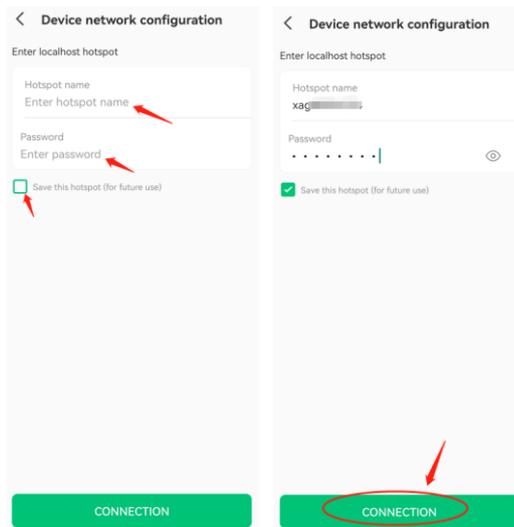


11. Return to the XAG One App. Press the grey button "CONNECTED "

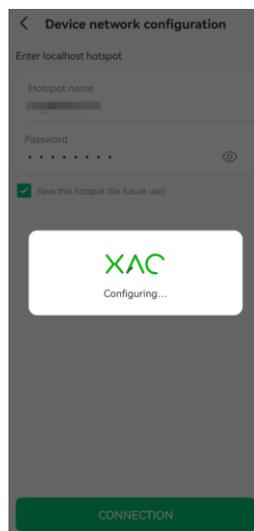


12. Input LNT hotspot SSID and password, click save this hotspot (for future use), press "CONNECTION".

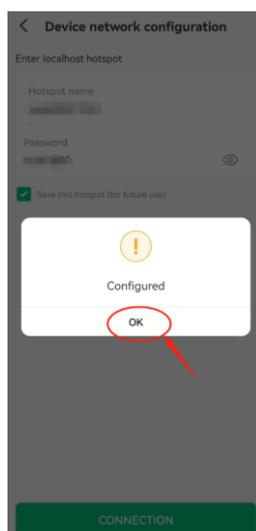
Attention: Make sure the LNT SSID and password is correct. This action gives ACS2 remote controller the LNT's SSID/password and allows ACS2 automatically connect LNT hotspot during start up.



13. It may require many attempts.



14. Configured. Press OK to quit. ACS2 is configured successfully.



you may hear the prompt tone of “configuration successfully”

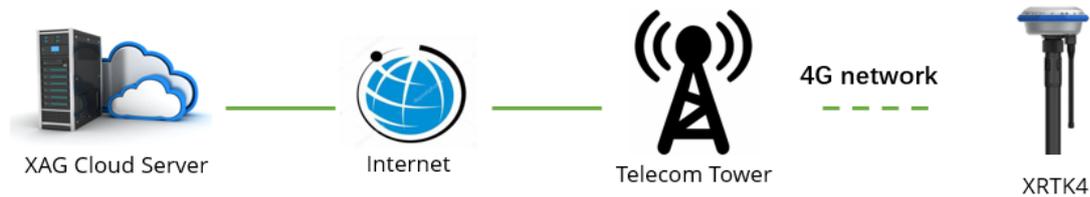
15. Optional: Recommended to Restart ACS2 2021.

16. Wait for a while. **Make sure the Power, Terminal, and Task Status light (the 1st, 2nd and 5th from the left) must be display in green.** ACS2 configuration is completed. If not, ACS2 configuration must fails and please redo the whole process or report to XAG technician.



Step 6: Add XRTK4 in XAG One App through 4G

Objective: Add XRTK4 in XAG One account through 4G



Preparation

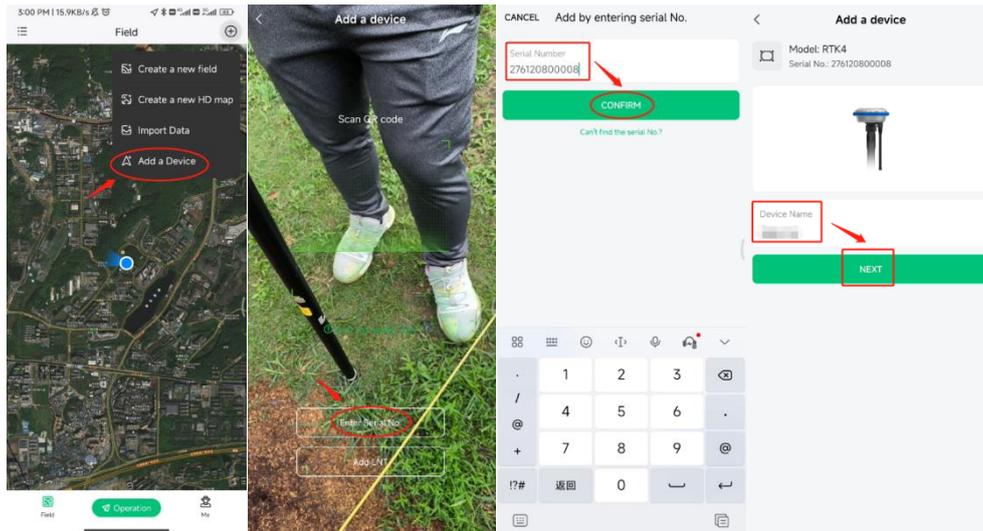
No.	Item	Description
1	Android Smartphone, Battery Fully Charged	
2	XRTK4	
3	SIM card, the frequency bandwidth must be compatible with your UAV version (Domestic/Global)	
4	XAG One account	

Attention

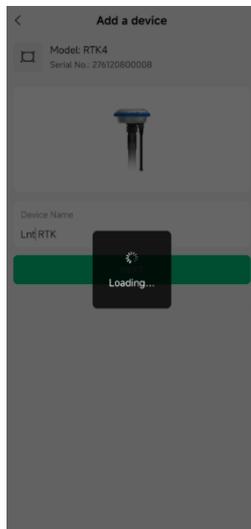
- i. Make sure your 4G SIM card bandwidth is compatible with XRTK4 4G module.
- ii. To know if XRTK4 4G is enabled, please check if F2 light has double flashing.
- iii. When XRTK4 is online under 4G networking mode, XRTK4 firmware can't be updated through App.

Procedure:

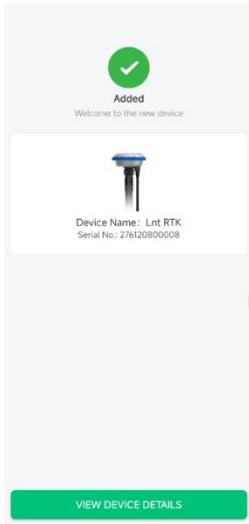
1. Make sure your XRTK4 firmware has updated to the latest version. Please refer to the chapter of firmware update
2. Insert 4G sim card into XRTK4
3. Turn on XRTK4 and wait until it's online. Once online, the F2 should have double flashing
4. Connect smartphone to internet
5. Long press F3 button until that all three LED lights are flashing
6. Add device -> enter XRTK4 serial number -> define device name



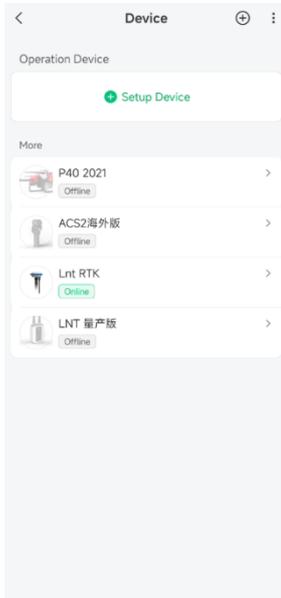
7. Wait for loading



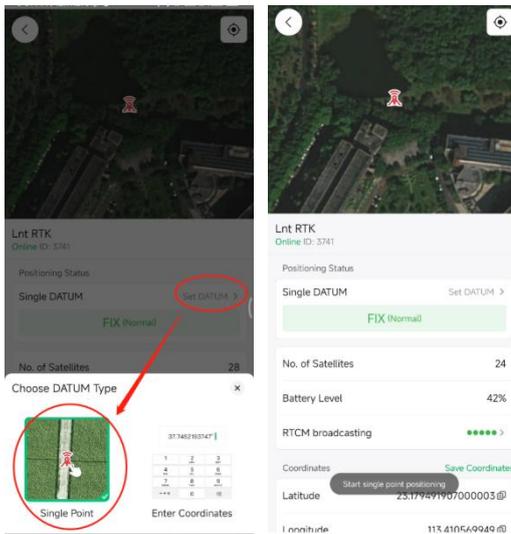
8. XRTK4 added



9. Check if XRTK4 is online



10. Quick test of XRTK4 single point



Step 7: Configure XRTK4 WIFI Access

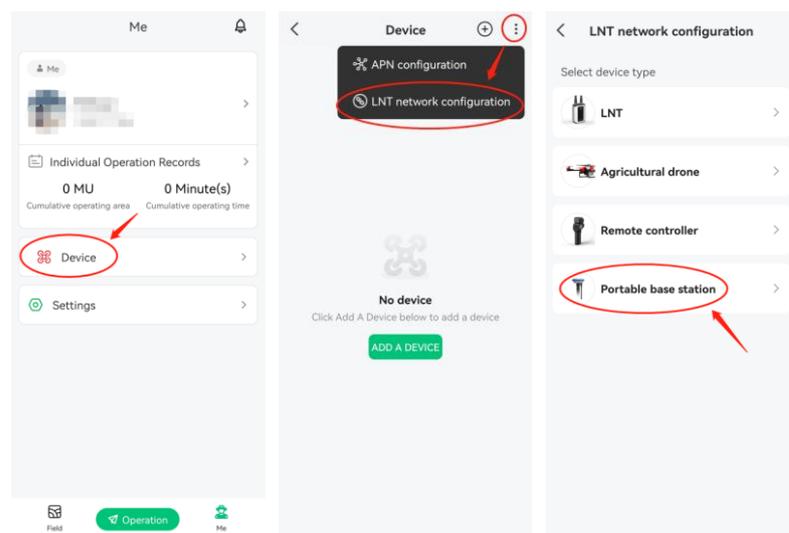
Objective: Configure XRTK4 WIFI Access. Once configured, XRTK4 will automatically connect to LNT hotspot.



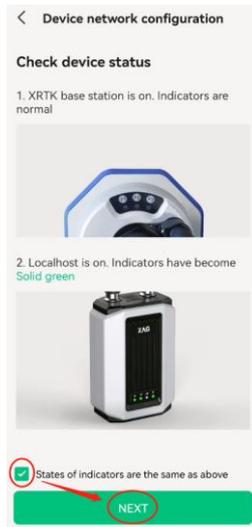
Procedure:

1. Remove the 4G SIM from XRTK4
2. Connect smartphone to LNT. Hotspot. Make sure LNT has internet access.
3. Login XAG One account on smartphone

4. Go to  My  Device  LNT network configuration  Portable base station

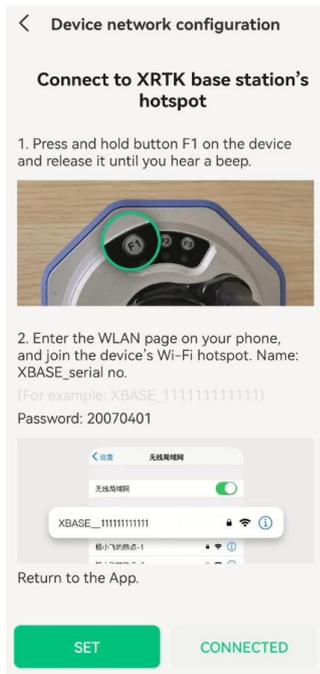


5. Check device status



6. Follow the guide on App. Connect to XRTK4 hotspot.

To enable the XRTK4 hotspot, long press the F1 button on XRTK4 until you hear a beep sound.



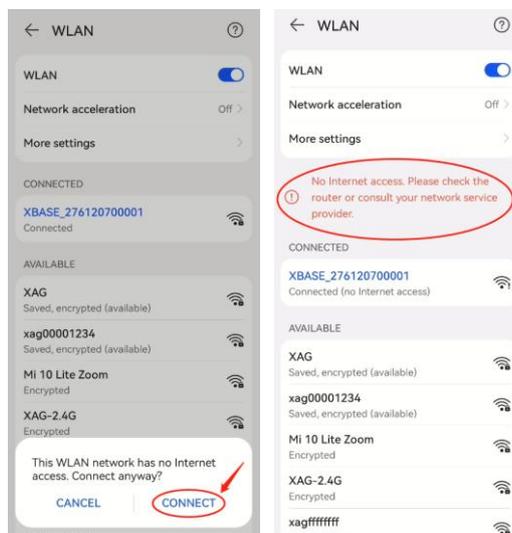
7. Press "SET". The app will direct you to the WLAN setting page.



8. Under smartphone WLAN setting, Connect XRTK4 hotspot. The XRTK4 hotspot SSID is XBASE_[serial number], and the password is 20070401. It will take approximately 20 seconds until the XRTK4 hotspot appears.

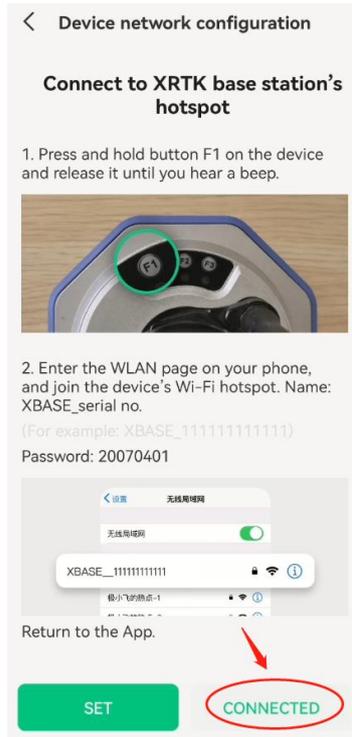


9. The XRTK4 hotspot has no internet access. Connect it anyway.

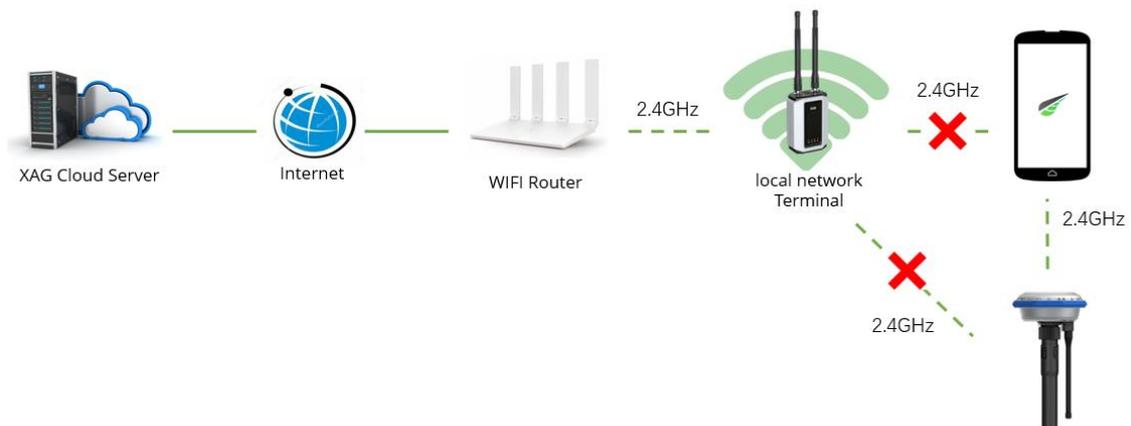


10. Return to the XAG One App.

Press the grey button "CONNECTED"

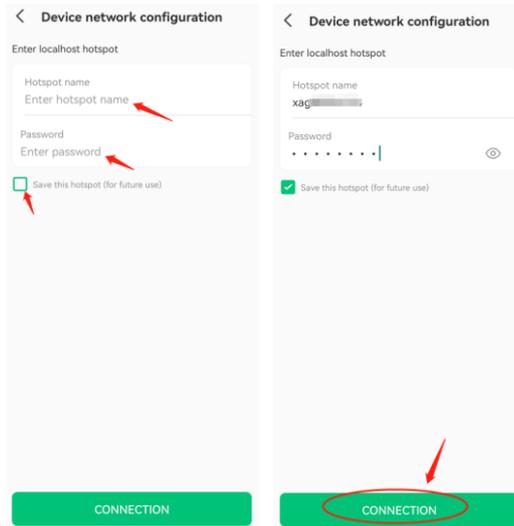


At this moment, the smartphone is directly connected to XRTK4 hotspot

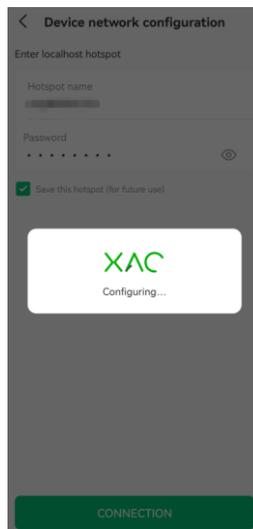


-
11. Input LNT hotspot SSID and password, click save this hotspot (for future use), press "CONNECTION".

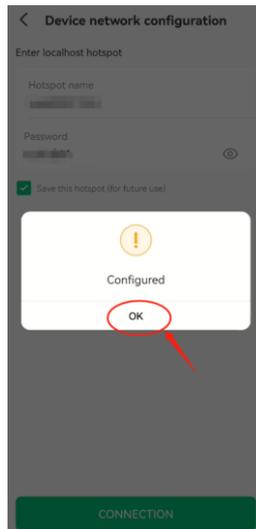
Attention: Make sure the LNT SSID and password is correct. This action gives XRTK4 portable base station the LNT's SSID/password and allows XRTK4 automatically connect LNT hotspot during start up.



12. It may require many attempts.



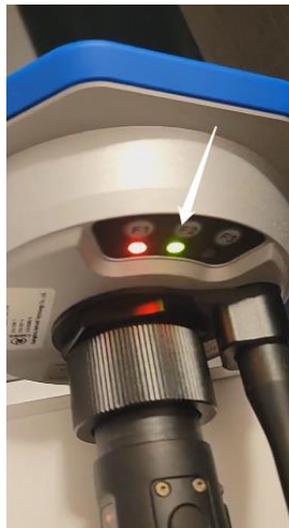
13. Configured. Press OK to quit. ACS2 is configured successfully.



the prompt “configured” means that the credentials are successfully set for XRTK4. But it’s not guarantee that the credentials are correct. This means that the XRTK4 may have the incorrect credentials even though the “configured” is prompted.

Thus, we must check if the XRTK F2 light has triple flashing. This means that the XRTK is connected to LNT.

14. Wait until the F2 triple flashes. Meanwhile, F1 must flash in red.



You need to understand the meaning of F2. If F2 do not have triple flashing, please repeat this step.

F2 flashing**XRTK4**

Single

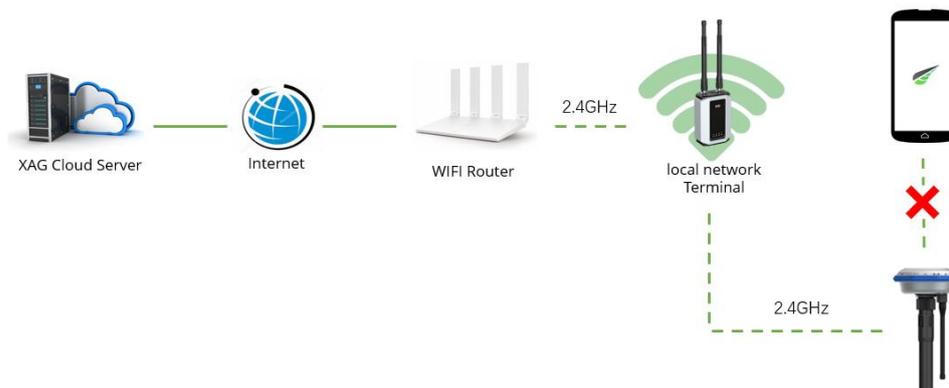
No connection

Double

connect to Internet

Triple**connect to LNT hotspot**

You may need to restart XRTK4, so that XRTK4 can connect to LNT hotspot.

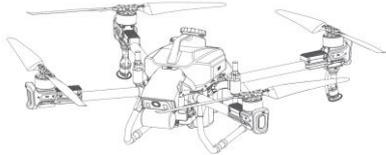


Step 8: Add UAV in XAG One through 4G and Update Firmware

Objective: Add UAV in XAG One account through 4G



Preparation

No.	Item	Description
1	Android Smartphone, Battery Fully Charged	
2	UAV (model 2021/2022)	
3	SIM card, the frequency bandwidth must be compatible with your UAV version (Domestic/Global)	
4	XAG One account	

Attention

- i. Cloud Communication LED indicator of FC must illuminate in green. It implicit the 4G connection is OK.
- ii. Taillight must flash in green. It implicit that the UAV's RTK module has found enough satellites and is able to compute its geographic position. Otherwise, the smartphone and UAV pairing may fail. This is due to the safety concerns that the XAG backend cloud server need measure the geographic position between smartphone and UAV within meters before

activating UAV.

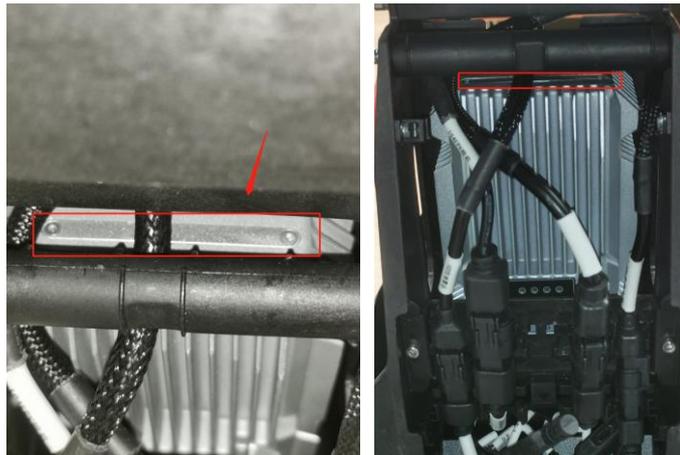
Procedure:

1. Insert SIM card into flight control

- SuperX4 (V40/P40)



- SuperX4 Pro (P100)



-
2. Power up UAV, wait for 60 seconds until SuperX4 connects 4G. To verify the 4G connection, check the 2nd light indicator (remote server) light indicator is flashing in green. The UAV should be placed outside, and the taillight should be green flashing.

Flight control is not connecting to internet through 4G as the 2nd light indicator (remote server) is in red.

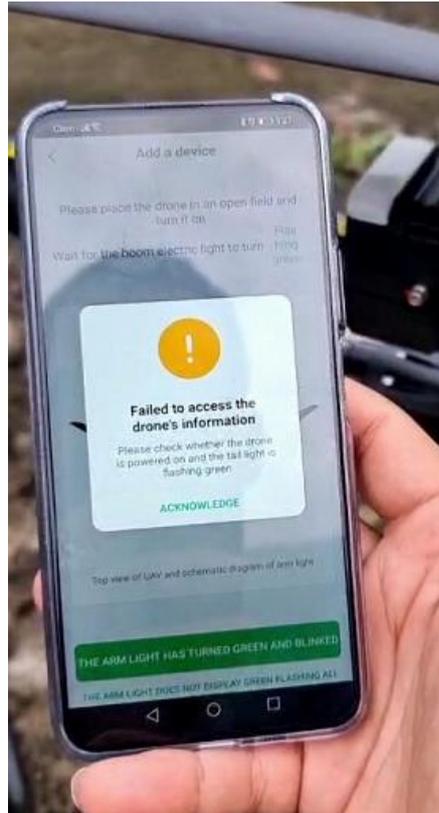


Flight control is connecting to internet through 4G as the 2nd light indicator (remote server) is in green.



3. Connect your Android smartphone to internet (4G/WIFI). Test it by browser website.





If the GNSS positioning signal is good, the 1st light indicator will be in green. If the 1st light indicator is in red, the GNSS positioning signal is bad.

Usually if it's the first time adding the drone, the drone needs to report its physical location to the remote cloud server for security check. Thus, the drone needs to have GNSS position, which means it need to be brought onto an open field, for getting better satellites broadcast signal.

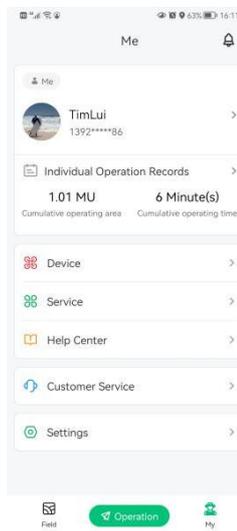
There is no GNSS position signal. Please bring your drone to an open field.



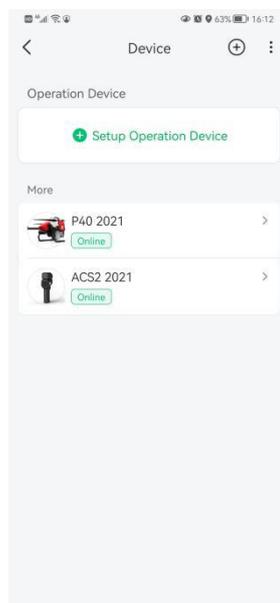
6. Set device name and press confirm
7. UAV added successfully, press complete to return



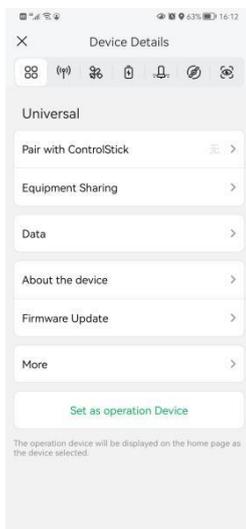
8. Go to My



9. Select your UAV, "P40 2021"



10. Press Firmware update



11. After checking for updates, the list of firmware is shown



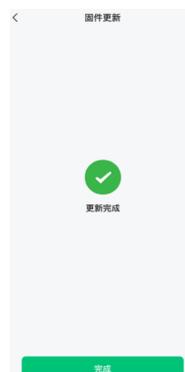
12. Download Firmware



13. Install Firmware



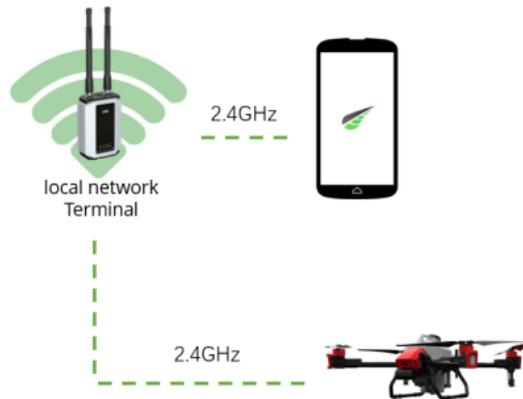
14. Firmware update completed



15. Keep the UAV in the XAG One Account

Step 9: Configure UAV WIFI Access

Objective: Configure UAV WIFI Access. Once configured, UAV will automatically connect to LNT hotspot.

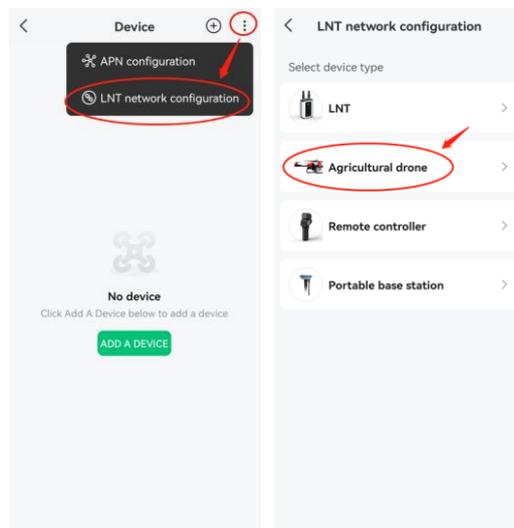


Procedure:

1. Power up UAV
2. Take off canopy



3. Go to  My  Device  Agriculture drone



4. Check device status



5. Follow the guide. Enable UAV's hotspot. Connect smartphone to UAV hotspot.



6. Double press the reset button on flight control



When the wireless communication LED indicator is flashing orange, it implicit that the flight control hotspot has been enabled.



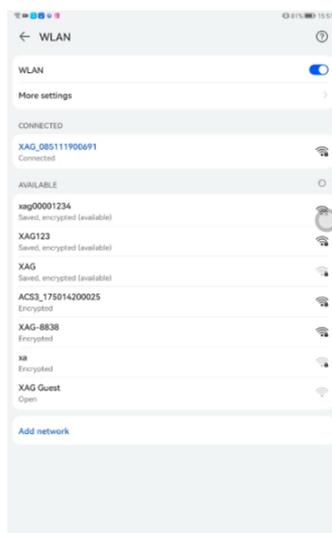
7. Press the green button "SET"



Connect smartphone to UAV's hotspot

UAV SSID: XAG_[serial number]

Password: 20070401



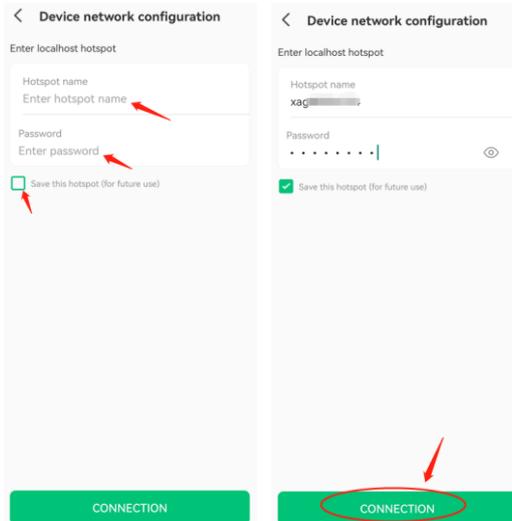
8. Return to the XAG One App.

Press the grey button "CONNECTED" to continue

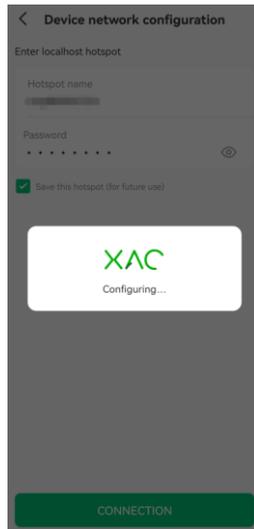


- Input LNT hotspot SSID and password, click save this hotspot (for future use), press "CONNECTION".

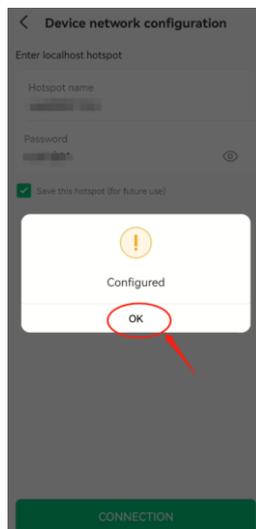
Attention: Make sure the LNT SSID and password is correct. This action gives UAV the LNT's SSID/password and allows UAV automatically to connect LNT hotspot during start up.



- It may require many attempts.



11. Configured. Press OK to quit. UAV is configured successfully.

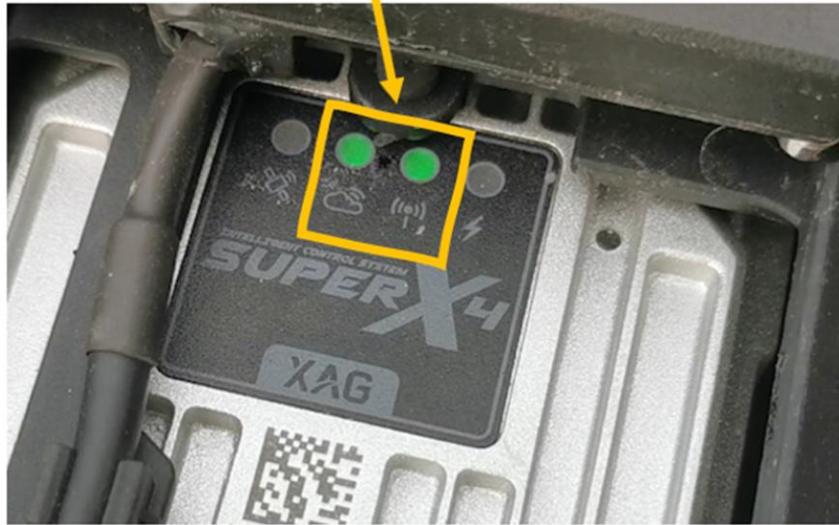


12. Restart UAV. The UAV will automatically connect to LNT's hotspot. Meanwhile, make sure your LNT turn on and have internet access. Please check both cloud and wireless communication LED indicator (the middle two lights) must illuminate in green. Otherwise, please contact XAG technical support.



Once FC's server and Wireless (middle two) lights turn into green, the UAV has successfully entered LNT networking mode.

These two light indicators must be in green.

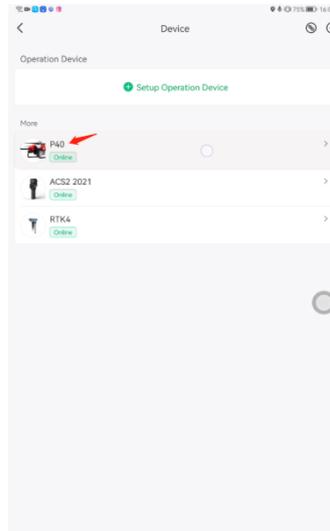


Please refer to the below table for LED light indication.

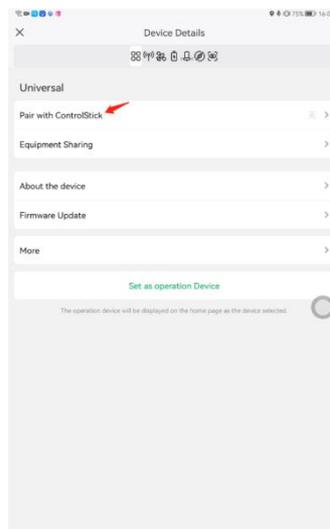
LED INDICATOR	ICON	ILLSTRATION	IMPLICATION
Server Communication Indicator		whether device can communicate with remote server (cloud server or local network terminal)	<p>Flash Green: Cloud server/ Local network terminal connected</p> <p>Flash Red: Cloud server/ Local network terminal disconnected</p>
Wireless Communication Indicator		whether HDLS module can transmit and process data	<p>Flash Green (slow) : OK</p> <p>Flash Red (rapid): No data received</p> <p>Flash Red (slow): Initialization OK, serial port disconnected</p> <p>Flash Red (rapid): Connection fail</p> <p>Flash Red/Green: Attempts to pair</p> <p>Flash Orange: WIFI mode enable (Action required)</p>

Step 10: Bind UAV with ACS2 2021

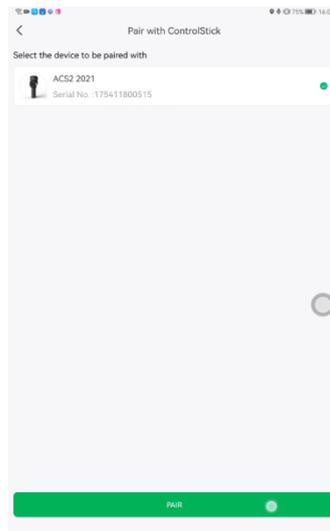
1. Go to UAV's setting



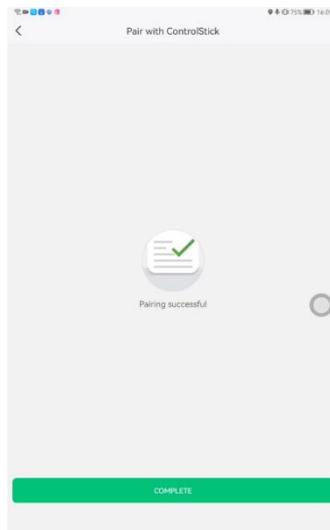
2. Select "Pair with Control stick"



3. Select the ACS2 2021, and press "PAIR"



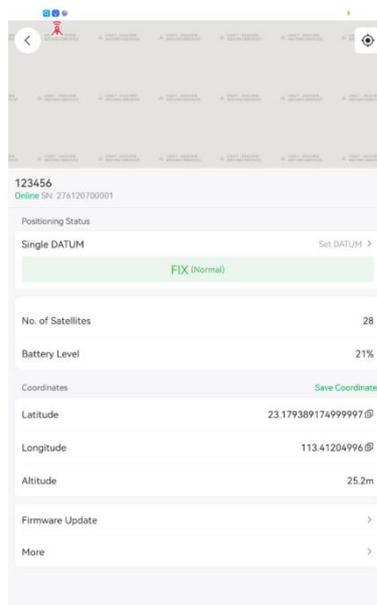
4. Pairing successful, press "COMPLETE"



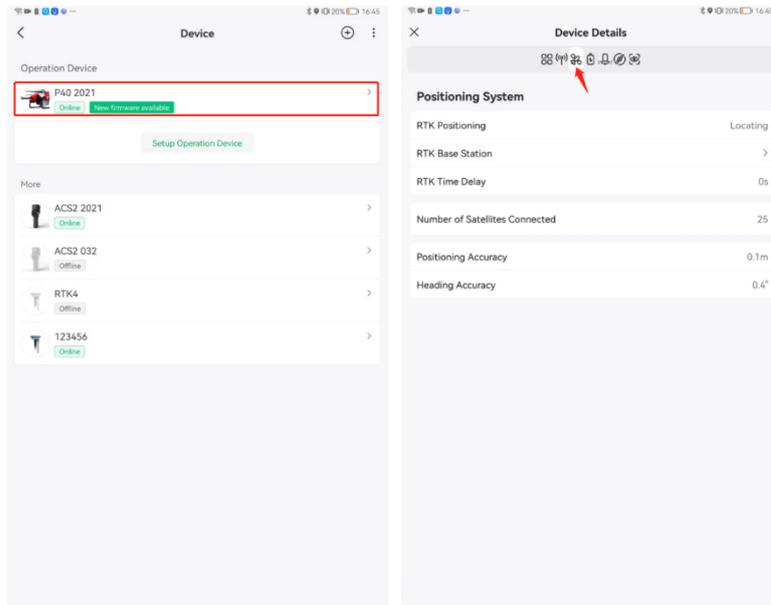
Step 11: Connect UAV to XRTK4 under LNT Network



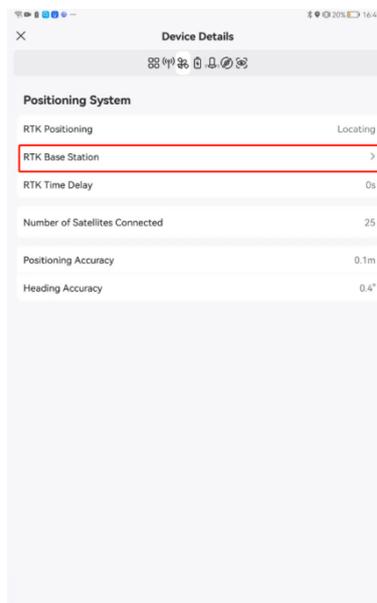
1. Make sure that smartphone is connected to LNT hotspot
2. Make sure the XRTK4 is in FIX status



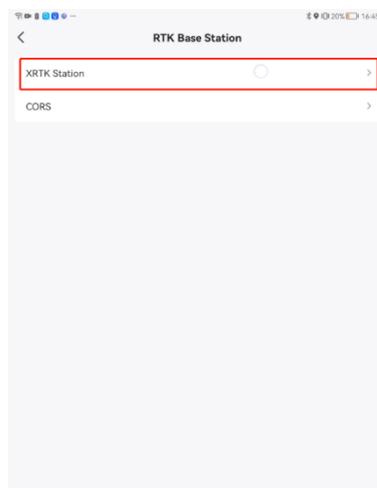
3. Go to UAV Positioning setting



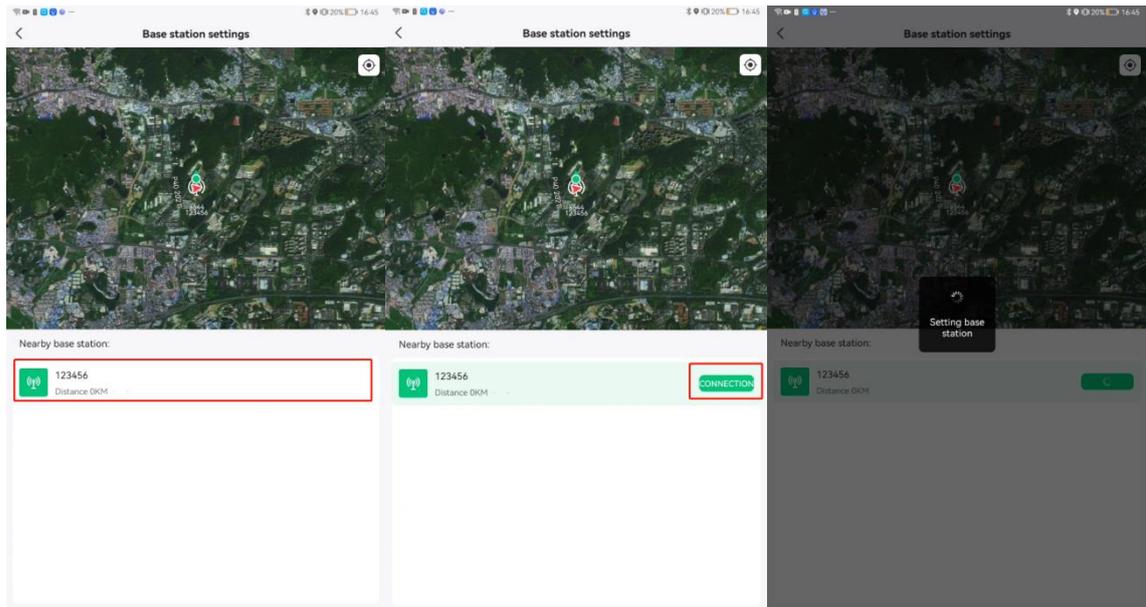
4. Go to RTK Base Station



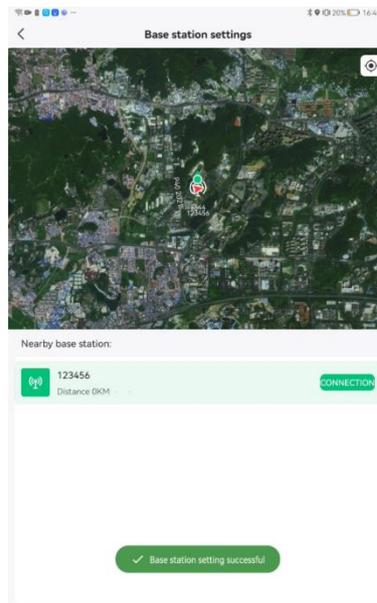
5. Choose "XRTK Station"



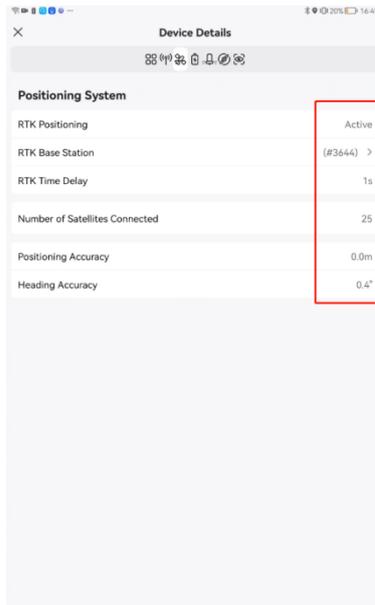
6. Connect your base station



7. Base station setting successful



8. RTK Positioning is active. If any error occurs, please restart the UAV/XRTK4 and try again.



9. Done

Quit LNT networking mode



Things you need to know before quitting LNT networking mode:

1. LNT networking mode does not allow devices (UAV/ACS2) to have 4G access. If you want to enable 4G access, please switch your devices from LNT networking mode to 4G networking mode.
2. Your devices will remain in your XAG ONE APP ACCOUNT
3. XRTK4 don't quit LNT networking mode as it don't need to.

UAV Quits LNT networking mode

To quit LNT networking mode, press the reset button on UAV for 6~9 seconds, release it for less than 3 seconds, then press the reset button for 6~9 seconds again.



WIFI and Cloud indicator turns into orange, shut down the UAV, wait for more than 5 minutes, start the UAV again. The UAV is supposed to quit LNT networking mode.

Once quitted, UAV will automatically switch to 4G networking mode. The UAV will automatically switch to 4G networking mode.



ACS2 2021 remote controller Quits LNT networking mode

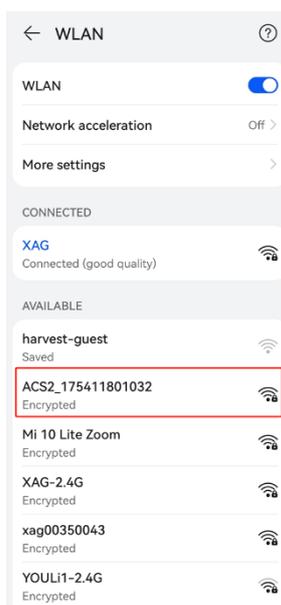
LNT networking mode does not allow ACS2 2021 remote controller to have 4G access. If you want to enable 4G access, please switch your flight control from LNT networking mode to 4G networking mode.

To quit LNT networking mode on ACS2 2021 remote controller, please long press button A until you hear a voice prompt as well as the 5th LED indicator light become dim.

After quitting, ACS2 2021 will be in 4G networking mode.



To test it, search the ACS2's WIFI hotspot under smartphone WLAN setting. If ACS2 hotspot can be found, it means that ACS2 remote controller has WIFI enabled and successfully switched from LNT networking mode to 4G.



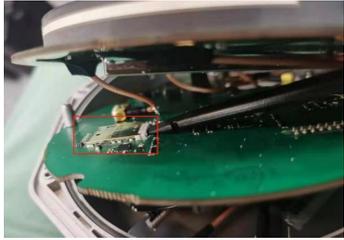
XRTK4 with LNT networking mode

It's not necessary to quit LNT networking mode of XRTK4 (change XRTK4 networking mode from LNT to 4G), as XRTK4 can support networking mode for both 4G and LNT.

There are **two options to have XRTK positioning used in 4G**, which are **XRTK4** or **CORS**.

a. Switch XRTK4 from LNT networking mode to 4G

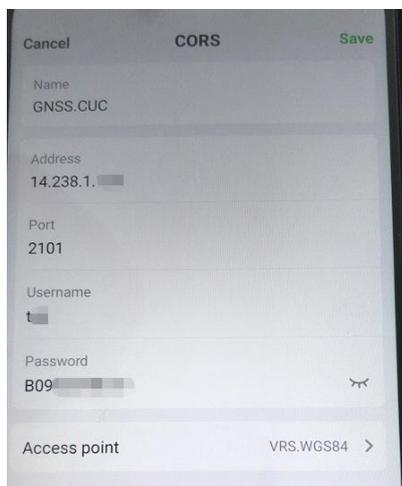
- i. Insert 4G SIM into XRTK4. You may need to disassembly the XRTK to insert the 4G SIM card. Make sure the SIM card is compatible with UAV.



- ii. Long press F3 button until that all three LED lights are flashing
- iii. As using the same account, the XRTK will automatically appear in your XAG One App account.
- iv. XRTK4 firmware cannot update through 4G. if you want to update in the future, please use the ACS2 2020 / XAG Agri 2 App method to update XRTK4 firmware. In most situation, the XRTK4 do not need to update its firmware.
- v. If you are ready to fly the UAV, then place your XRTK4 on open field and use single point positioning. Wait for the XRTK4 go into FIX mode.
- vi. Connect UAV and ACS2 2021 remote controller to XRTK4

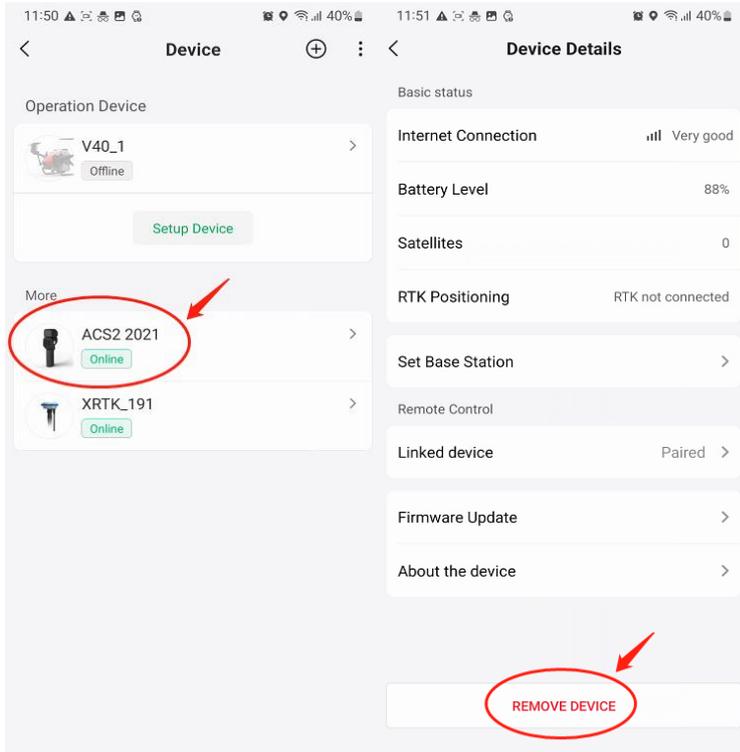
b. CORS setup

- i. You must have a valid CORS account
- ii. Make sure your UAV and ACS2 remote controller has internet access through 4G
- iii. On XAG One App setting, connect UAV and ACS2 2021 remote controller to CORS

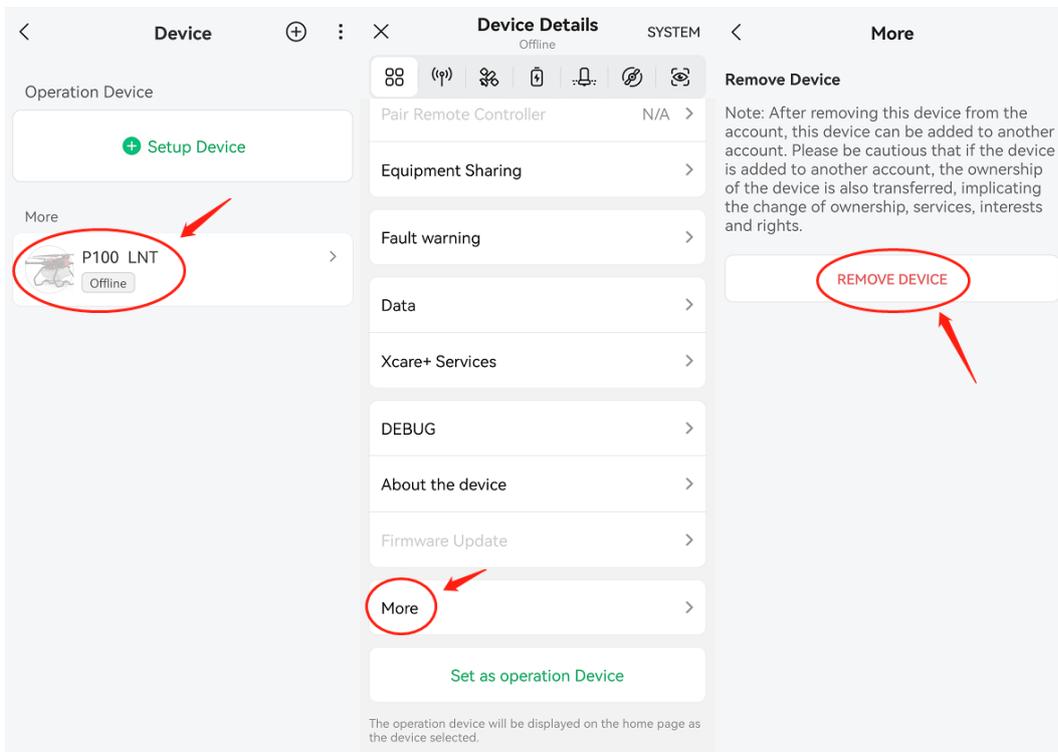


Remove devices under LNT networking mode

Click into the ACS2, go to “Device Details”, press “REMOVE DEVICE”



Click into UAV, go to “More”, click “Remove device”



LNT Troubleshooting

Check LNT light indicators

Indicators

	Power		WAN
	WLAN		System

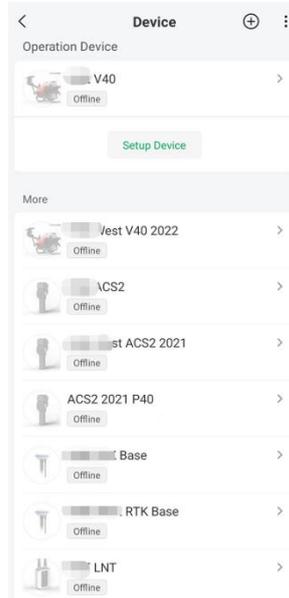


LNT	Description	Light On	Light off	Light flashing
Power	Related to battery	Device on	Device off	N/A
WLAN	Related to WIFI	WIFI OK	WIFI malfunction	Initializing, please wait
WAN	Related to internet	Connect to internet through WIFI router or mobile hotspot	Disconnected from internet	Initializing, please wait
System	Related to system programs	System OK	System frozen	Initializing/firmware updating/factory reset, please wait

Problem Solved: All Devices Show Offline under LNT Networking Mode



Users may find the issue that all devices are offline under LNT networking mode.



To solve this issue, please follow the below steps:

Step 1: Restart all devices

Restart all devices and make multiple attempts if it does not work. Make sure do a cold restart for UAV. Kill the XAG One App and restart the App multiples times.

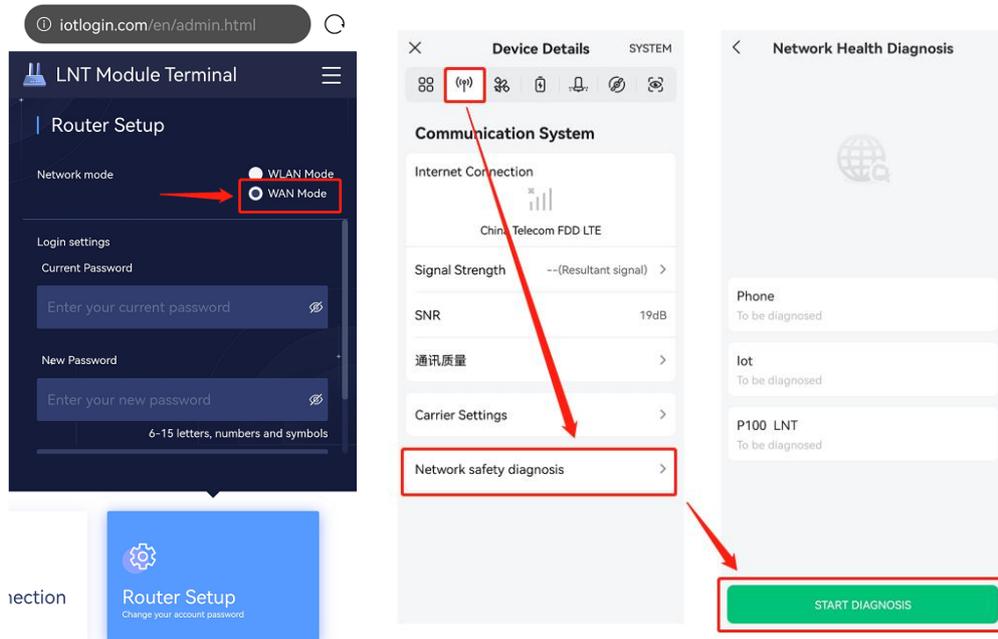
Step 2: Turn on your smartphone's flight mode and disable mobile data

Disconnect smartphone from mobile network. You can turn on the flight mode and enable the WLAN to block mobile data.

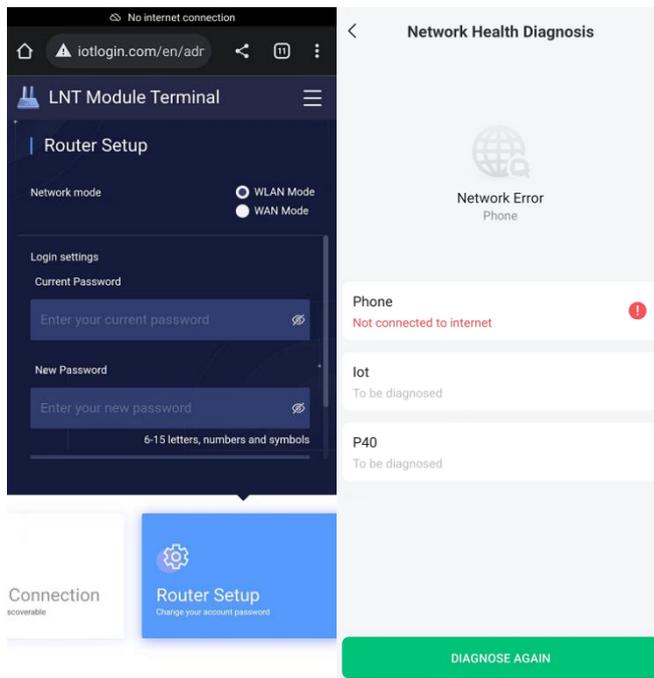


Step 3: Run Network Safety Diagnosis

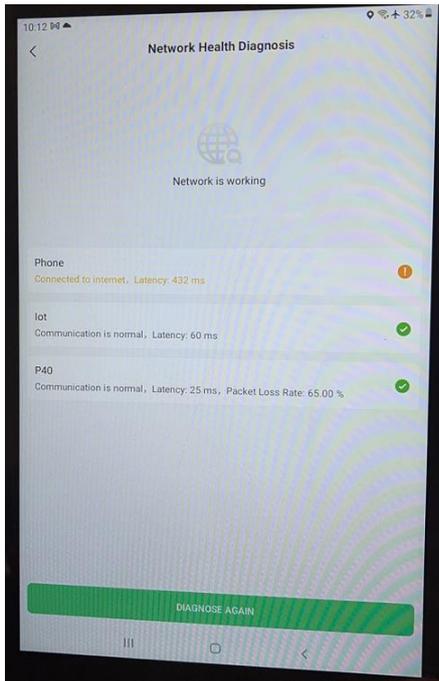
Before network safety diagnosis, please turn on WAN mode.



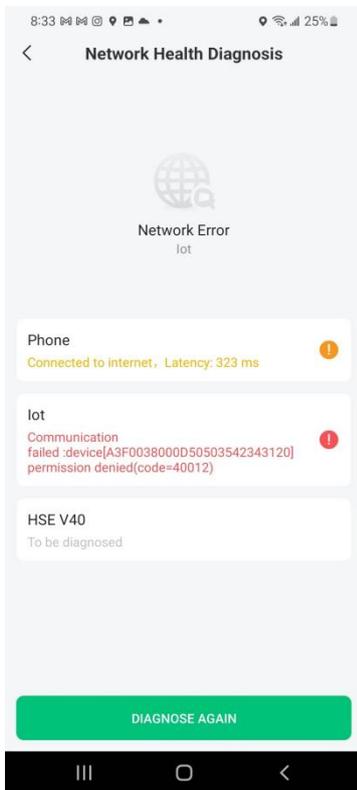
If you forgot to enable LNT WAN mode, you will see the below alarm.



If network diagnosis is OK, you will see the network delay or the green mark.

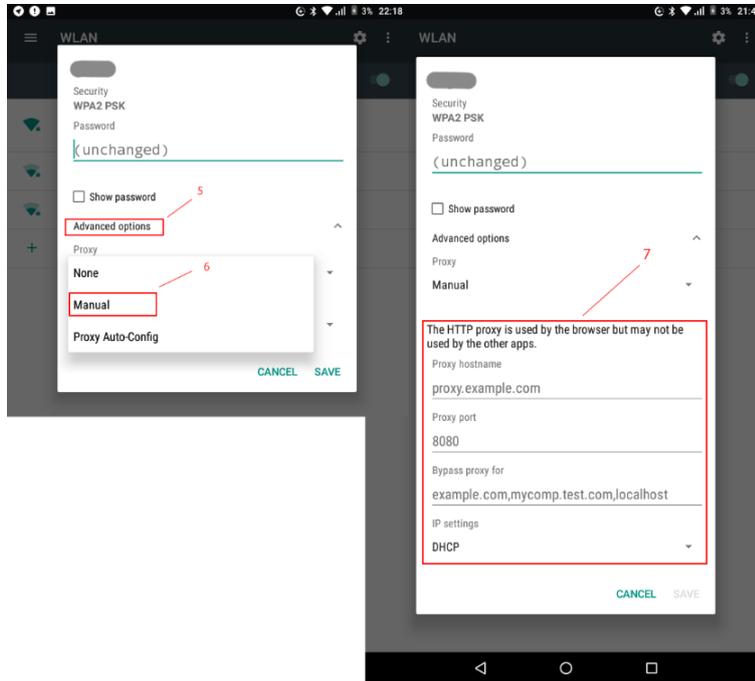


If network diagnosis fails, you will usually see the errors of IOT communication failures along with permission denied. In this case, you can remove all the devices from your account or consult with XAG technical support.



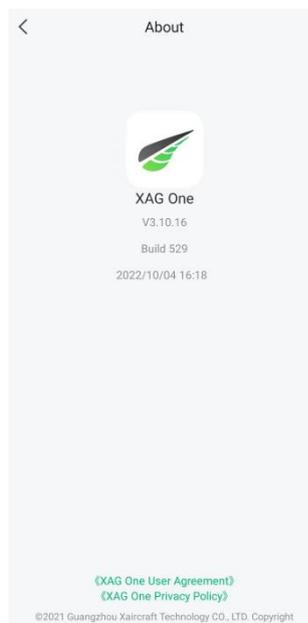
Step 4: Disable smartphone proxy

Check if the smartphone WLAN has proxy server setting. If yes, please do not use proxy server



Step 5: Update your XAG One App to the latest firmware version

App version shall be above V3.10.16.



Troubleshooting Cases

General

1. **Problem & Scenario:** 1st light indicator (Power) become dim

Analysis & Solution:

- i. Power supply abnormal, please check the condition of power supply
- ii. LNT hardware issue. Please ask for return- to-factory service

2. **Problem & Scenario:** 2nd light indicator (WLAN) become dim

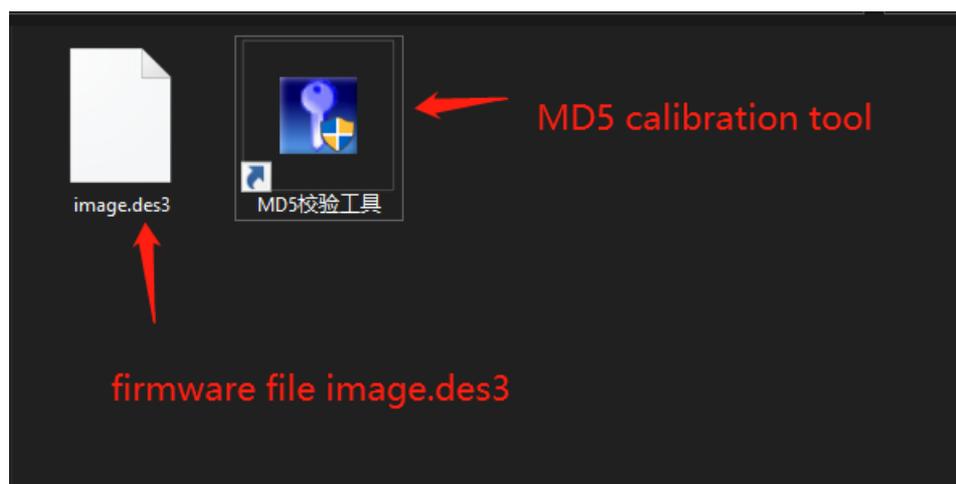
Analysis & Solution:

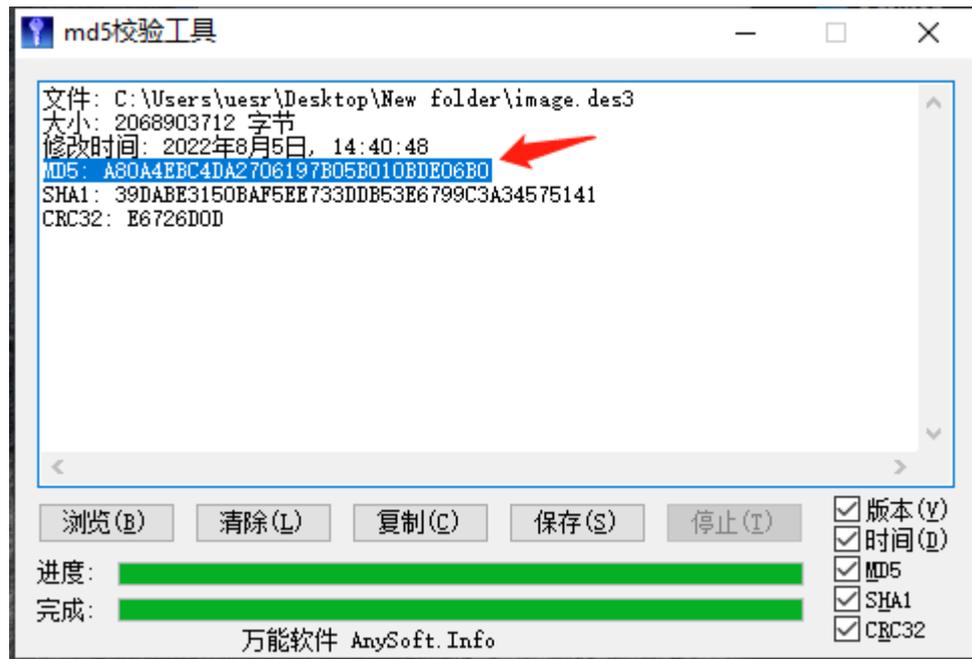
- i. Software malfunction. Please restart LNT
- ii. WIFI firmware corrupted. Please factory reset the LNT
- iii. WIFI hardware issue. Please ask for return- to-factory service

3. **Problem & Scenario:** 4th light indicator (System) become dim

Analysis & Solution:

- i. If it happens during LNT startup, the firmware may be corrupted. Please factory reset the LNT
- ii. If it happens during firmware update, the firmware file may be corrupted. Please use MD5 software to verify the firmware file. Use MD5 calibration tool to analyze the firmware file, report MD5 value to XAG technician. According to MD5 value, we can know if the firmware file is damaged or not. Please ask XAG technician for MD5 calibration tool.





MD5 tool Download Link: please refer to Appendix II

4. **Problem & Scenario:** the 1st light indicator illuminates in green, but other indicators become dim.

Analysis & Solution:

- i. Sometimes the LNT startup take longer than usual. Please wait.
- ii. Firmware issue. Please perform the firmware update or factory reset.

5. **Problem & Scenario:** LNT hotspot can't be found.

Analysis & Solution:

- i. During the LNT initializing, the 2nd light indicator is flashing in green. Please make sure the 2nd light indicator (WLAN) stops flashing and illuminate in green. Then, the LNT hotspot shall be found.
- ii. LNT hotspot is OK, but the smartphone has WLAN connection problem. Please restart the smartphone and refresh the WLAN list.
- iii. Firmware issue. Please restart LNT.
- iv. Firmware corrupted. Please perform factory reset.
- v. Hardware issue. Please ask for return-to-factory service.

6. **Problem & Scenario:** LNT hotspot can be found, but smartphone or computer can't connect to the LNT hotspot.

Analysis & Solution:

- i. Password is incorrect.
- ii. The WLAN is still initializing. Please wait until the 2nd light indicator illuminate in green.
- iii. Network busy. Please have more attempts.
- iv. Firmware issue. Please restart LNT.
- v. WIFI firmware corrupted. Please perform factory reset.

7. **Problem & Scenario:** cannot open configuration page (www.iotlogin.com)

Analysis & Solution:

- i. Please check the WIFI connection between smartphone and LNT
- ii. The WLAN is still initializing. Please wait until the 2nd light indicator illuminate in green.
- iii. Please check if the configuration page (www.iotlogin.com) is correct. You can also try 10.8.10.100 on your browser.
- iv. Firmware issue. Please restart LNT.
- v. Firmware update
- vi. Factory reset

8. **Problem & Scenario:** www.iotlogin.com configuration page can't find other WIFI routers or hotspot

Analysis & Solution:

- i. LNT only support 2.4GHz WIFI. Please make sure your WIFI routers or hotspots are broadcasting in 2.4GHz
- ii. WIFI network is busy. Please refresh and have more attempts

9. **Problem & Scenario:** LNT fail to connect internet (WIFI router, hotspot)

Analysis & Solution:

- i. When LNT is under work mode, it will not allow to connect internet.
- ii. The password is incorrect.
- iii. Parent devices (WIFI router and hotspot) may not quit
- iv. Parent devices (WIFI router and hotspot) do not have internet access
- v. Parent devices (WIFI router and hotspot) has very poor internet access

10. **Problem & Scenario:** There is no response after inserting USB flash drive

Analysis & Solution:

- i. The "image.des3" is missing in the USB flash drive
- ii. The USB flash drive is corrupt, damaged, or defective.
- iii. LNT system corrupted, please factory reset LNT

11. **Problem & Scenario:** Can't find any firmware files when using USB flash drive manual update

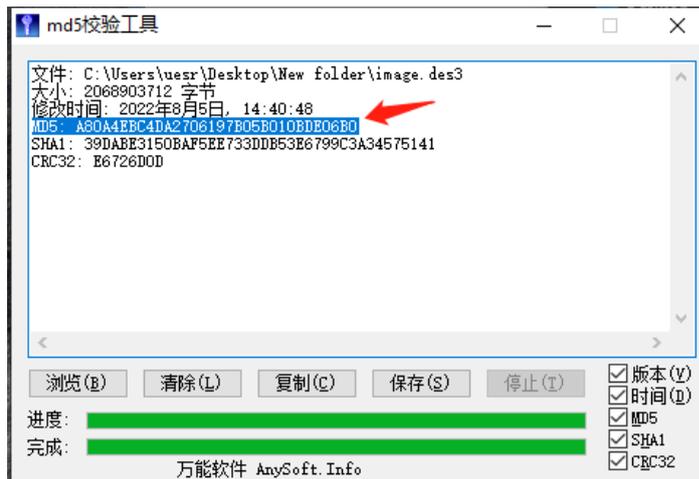
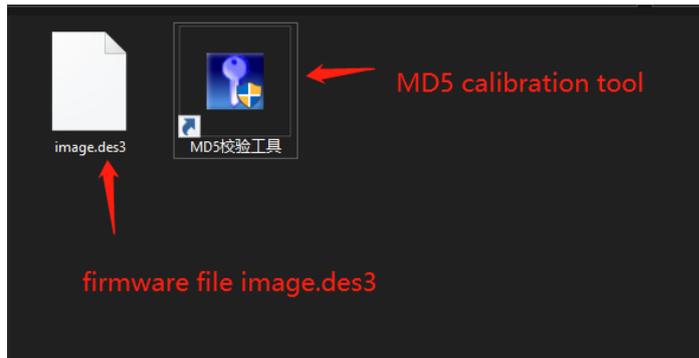
Analysis & Solution:

- i. Check if the USB flash drive is inserted properly
- ii. The ".des3" files are missing in the USB flash drive
- iii. The USB flash drive is corrupt, damaged, or defective.
- iv. LNT system corrupted, please factory reset LNT

12. **Problem & Scenario:** Fail to update LNT firmware when using USB flashing drive

Analysis & Solution:

- i. The firmware file may be corrupted. Please use MD5 software to verify the firmware file. Use MD5 calibration tool to analyze the firmware file, report MD5 value to XAG technician. According to MD5 value, we can know if the firmware file is damaged or not. Please ask XAG technician for MD5 calibration tool.



MD5 tool Download Link: please refer to Appendix II

- ii. The USB flash drive is corrupt, damaged, or defective.
- iii. The USB flash drive is loosened from LNT during the firmware update.
- iv. Firmware update is not completed. Please remove USB flash drive, restart LNT and plug in the USB flash drive again. Then firmware update will start automatically.
- v. LNT system corrupted, please factory reset LNT

13. **Problem & Scenario:** Factory reset failure

Analysis & Solution:

- i. Fail to follow the reset guide. Please release the reset button when the system light indicator is flashing at the 2nd time. The reset process will take for 30 minutes.
- ii. Restart LNT and have more attempts.
- iii. Hardware issue. Please ask for return-to-factory service.

14. **Problem & Scenario:** no response when pressing power button to turn on LNT

Analysis & Solution:

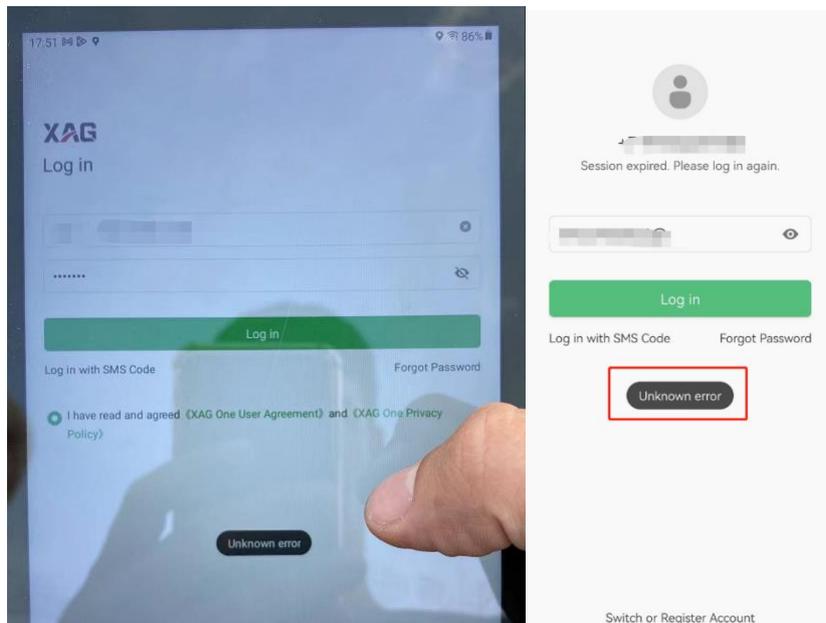
- i. BIOS malfunction. Please ask for return-to-factory service.
- ii. Hardware issue. Please ask for return-to-factory service.

15. **Problem & Scenario:** no response when pressing power button to turn off LNT

Analysis & Solution:

- i. Firmware issue. Please update the firmware to solve this problem.
- ii. Hardware issue. Please ask for return-to-factory service.

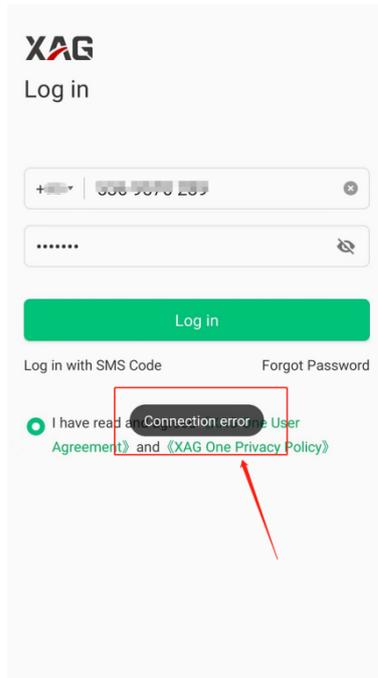
16. **Problem & Scenario:** fail to login account under LNT networking mode. The App returns “unknown error”.



Analysis: This is because the LNT don't have your account info. It usually happens after factory reset of LNT , which results in lost all user data.

Solution: To solve this issue, please connect your LNT to internet, then login your account, and wait for a while. This will allow the LNT sync the user data with XAG cloud server. Then disconnect the LNT from internet. login your account again.

-
17. **Problem & Scenario:** fail to login account due to the “connection error”



Analysis: This is because some LNT background processes crashed.

Solution: Please reboot the LNT. If this error occurs frequently, contact XAG technical support. It required remote debug.

18. **Problem & Scenario:** fail to login the www.iotlogin.com after turning on LNT working mode

Analysis & Solution: This could be the smartphone issue. Delete the LNT SSID from WLAN, restart WLAN, connect the LNT SSID again. You are supposed to login again.

ACS2 2021 Related

Most ACS2 2021 problem is due to the issue of firmware update, please update your firmware to the latest version. Once the ACS2 2021 is successfully configured, the power, terminal, task status (the 1st, 2nd, 5th from the left) should illuminate in green.



LED indicator	Indication
Power indicator	Yellow: Battery is low Green: Battery is OK
Terminal indicator	Dim: No server communication Green: server communication OK, either cloud server or LNT (local server)
Task Status indicator	Yellow: Able to search LNT hotspot SSID but the password is wrong Green: Connect to LNT hotspot Red: Fail to search LNT SSID, possible causes are LNT lost power, wrong SSID, wrong firmware Dim: not working, perhaps firmware is wrong

1. **Problem:** Fail to configure

Scenario: Terminal light (the 2nd from the left) become dim.

Task Status (the 5th from the left) light illuminates in orange



Analysis: Wrong WIFI Credentials.

The dim Terminal light (the 2nd from the left) implicit that ACS2 fail to connect neither Cloud server or LNT (Fake local server).

The orange task status (the 5th from the left) light implicit that ACS2 is trying to connect one's WIFI but the credentials is wrong. This WIFI may not be necessarily a LNT hotspot. It can be any WIFI that is discovered nearby.

Solution: Long press button A to quit LNT mode. Input WIFI correct credentials again.

2. **Problem:** Fail to configure

Scenario: Terminal light (the 2nd from the left) illuminates in green

Task Status (the 5th from the left) light illuminates in red



Analysis: There may be two problems happening concurrently.

The red task status (the 5th from the left) light implicit that ACS2 fail to search LNT hotspot. Most likely the LNT is off.

The green Terminal light (the 2nd from the left) implicit that ACS2 is connecting to a remote server. Since LNT (fake server) is off, ACS2 must be connecting to cloud server

using 4G network. Thus, the 4G Sim card is inserted into ACS2.

Solution: Remove 4G sim card from ACS2, and then restart ACS2. Turn on or restart LNT device.

3. **Problem:** Fail to configure

Scenario: Terminal light (the 2nd from the left) become dim.

Task Status (the 5th from the left) light illuminates in red



Analysis: Wrong credentials of LNT hotspot SSID / LNT is disconnected from power source.

The red task status (the 5th from the left) light implicit that ACS2 fail to search the given credential SSID. This SSID does not quit nearby. It may be resulted from either wrong credential of LNT hotspot SSID or LNT disconnected from power source.

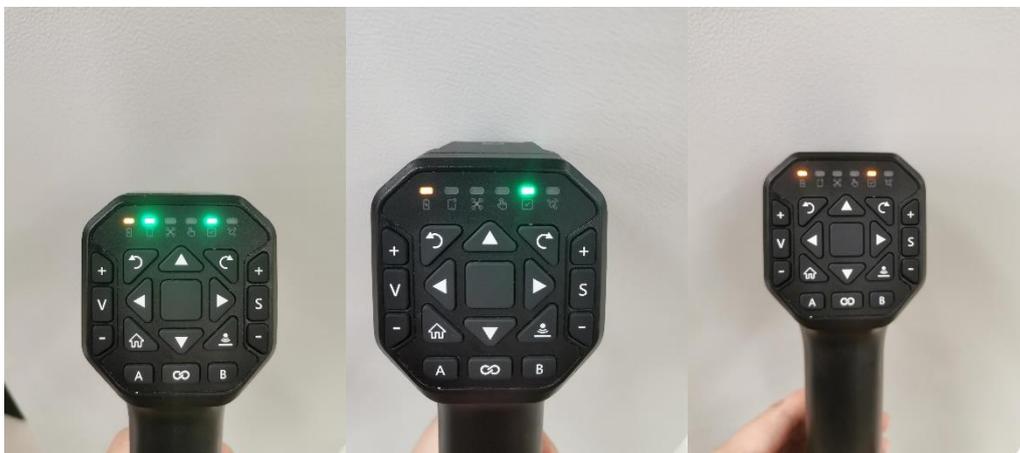
The dim Terminal light (the 2nd from the left) implicit that ACS2 is not connecting to a remote server (LNT) because ACS2 don't connect to LNT hotspot.

Solution: Enter the correct credentials of LNT / Turn on or restart LNT device.

4. **Problem:** Fail to configure

Scenario: the terminal light changes from green to dim.

the task status light changes from green to orange.



Analysis: LNT may be turned off or frozen.

The task status (the 5th from the left) light changes from green to orange, which implicit that ACS2 used to access LNT, but for now it can only find the LNT hotspot, but the LNT gives no response.

The Terminal light (the 2nd from the left) change from green to dim. It implicit that ACS2 lost the communication to the LNT.

Solution: Restart LNT

5. **Problem:** Fail to configure

Scenario: The terminal light changes to green to dim, while the status light stays at green.



Analysis: LNT may be turned off or frozen.

The Terminal light (the 2nd from the left) change from green to dim. It implicit that ACS2 lost the communication to the LNT.

The task status (the 5th from the left) light stays at green. Because the terminal light become dim, the ACS2 has no access to LNT hotspot. The green task status light may lose shortly. This can be caused by the delay in computation or long response time. If you wait long enough, approximately > 2 minutes. The ACS2 should change from green to orange.

Solution: Restart LNT

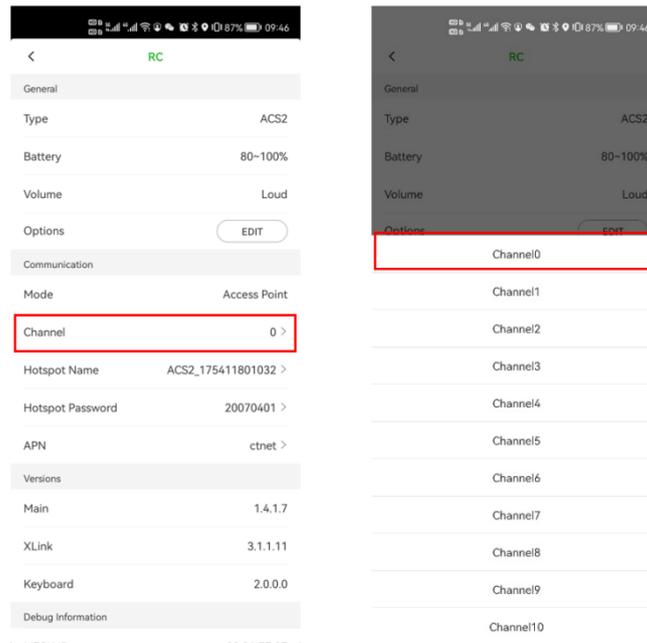
XRTK4 related

1. **Problem:** XAG Agri 2 App searches for a long time but can't find XRTK4

Scenario: N/A

Analysis & Solution:

- i. Communication channel setting problem. Please change ACS2 2020 channel to 0, and then pair again



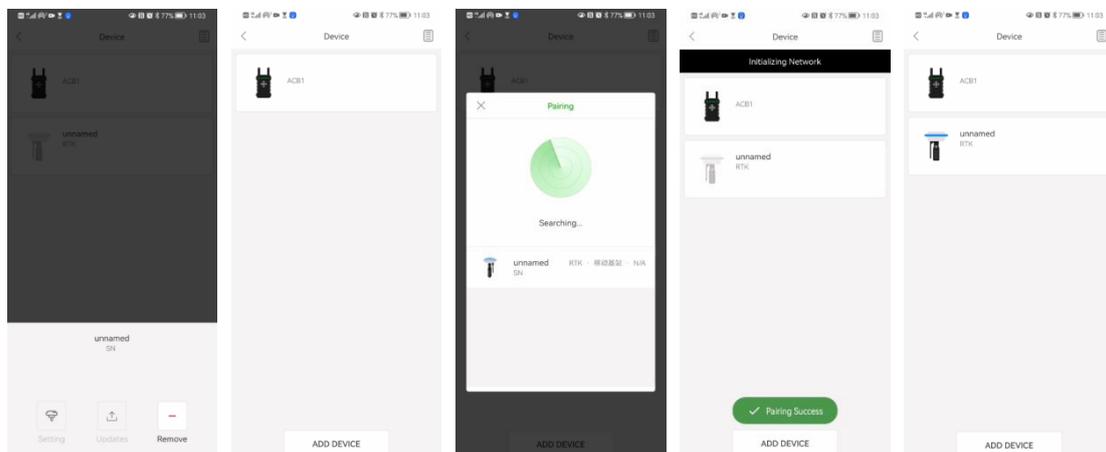
- ii. WIFI signal interference problem. There are too many WIFI nearby. Please bring the XRTK module to an open field with few WIFI devices, and pair again.

2. **Problem:** XRTK4 module constantly offline

Scenario: N/A

Analysis: Unknown

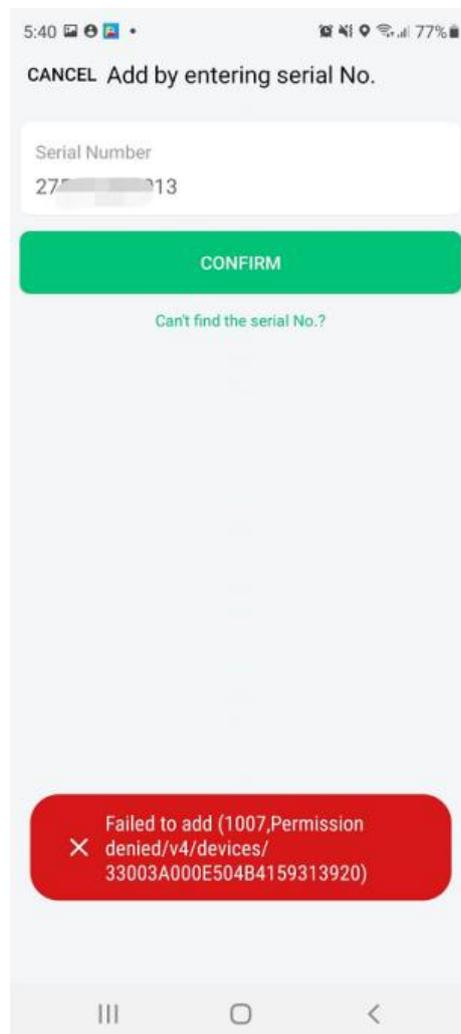
Solution: remove XRTK4 and add again



-
3. **Problem:** Firmware download failure
Scenario: The App shows “time out” error
Analysis: significant network latency
Solution: have more attempts
4. **Problem:** ACB1 is not working well with the App
Scenario: N/A
Analysis: Android phone compatibility problem
Solution: change another android phone
5. **Problem:** Fail to enable XRTK4 hotspot
Scenario: No response when pressing F1 button
Analysis: Wrong firmware version. Probably it is due to firmware update failure.
- Hints:*
- F1 – WIFI, F2 – remote server, F3 – RTK*
- F2 double flash – cloud server online*
- F3 triple flash – LNT (local server) online*
- Solution:** update XRTK4 firmware again

6. **Problem:** Fail to add XRTK4 upon LNT

Scenario: consistently receiving the error “Fail to add 1007”



Analysis & Solution:

- i. Check if XRTK4 F2 light has triple flash. If not, the XRTK is not connected to LNT.
- ii. update the XRTK4 firmware (offline update, online update using ACS2 2020)
- iii. It could be the hardware issue of XRTK4. Please try another XRTK4.

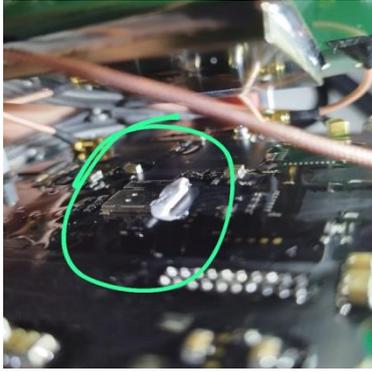
7. **Problem:** XRTK4 and LNT fail to connect

Scenario: XRTK4 F2 single flash

Analysis & Solution: “XRTK4 F2 single” flash implicit that XRTK4 fails to connect LNT hotspot.

This could be due to the following reasons:

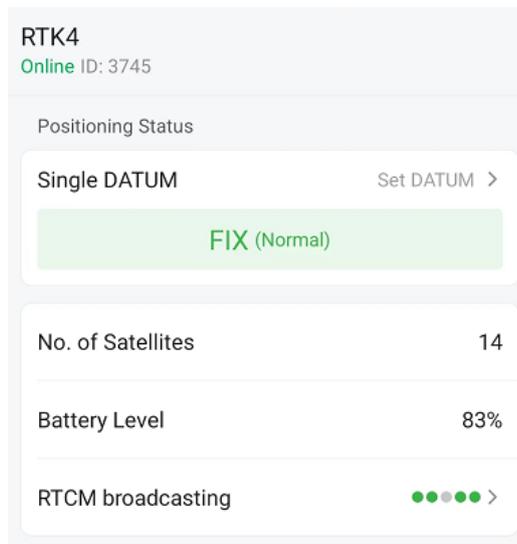
- i. XRTK4 don't have 4G SIM card inserted. Please Make sure XRTK4 has 4G SIM card inserted.



- ii. Check if LNT firmware is the latest version, higher than V1.0.0.18
- iii. Check if APP version is the latest version, higher than V3.10.16
- iv. Wrong LNT credential; Please reenter the LNT credential. Please check if your LNT credentials has spaces or unrecognized characters (#,_, *, etc.)
- v. XRTK/LNT WIFI physical single has been interrupted.
 - The distance between XRTK4 and LNT is too far away. XRTK4 lost connection.
 - There are some barriers blocking the WIFI singles.

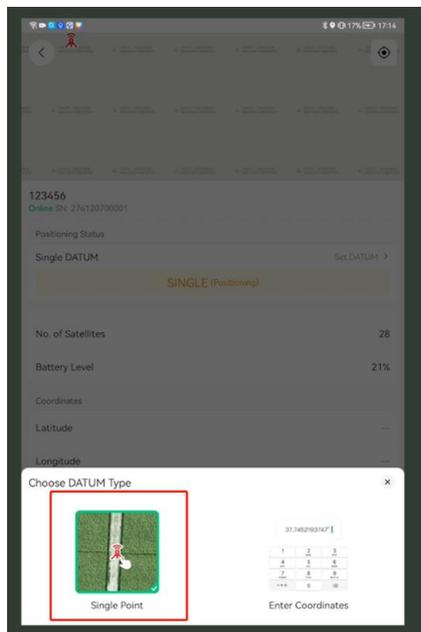
8. **Problem:** LNT network takes approximately 10~30 minutes for ACS2 remote controller and UAV to be RTK active. Sometimes it fails to connect.

Scenario: the number of satellites is less than 16 but still able to go into FIX mode.



Analysis & Solution:

- i. Keep ACS2 remote controller and UAV close to RTK station. All the devices must be placed in the open field to avoid single block or interference.
- ii. ACS2 remote controller, UAV and RTK station should update to the latest version.
- iii. The RTK station is physically moved. Please use single points, wait until the RTK go into FIX mode.



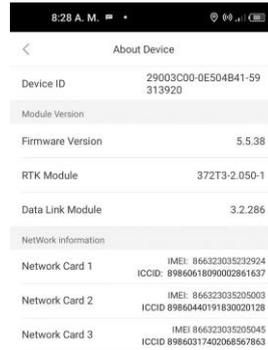
- iv. The RTK station is the old model. **Please change and use the latest model of RTK station.** The reason is that the old RTK station is not capable to search Beidou satellites. Look at the RTCM broadcasting, the five dots represent for the satellites provider, gps、 glonass、 beidou、 stationinfo, receiverinfo. According to the

scenario, the third dot become dim. This means that the old RTK model do not support Beidou satellites.

RTCM broadcasting

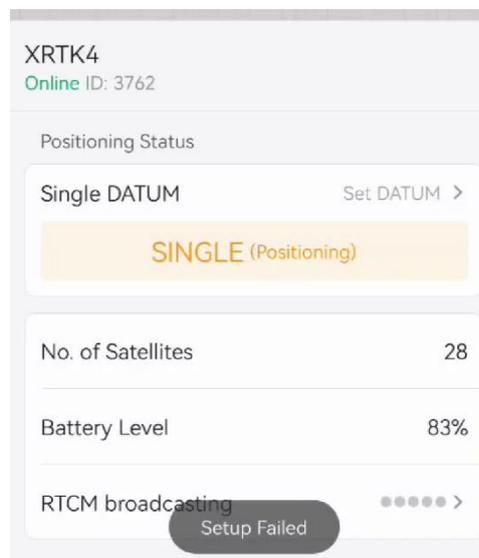


- v. Restart all the devices and make more attempts.
- vi. Ask help from XAG technical support, please record the app screen when putting the RTK into fix mode. If the video is too long, please only takes the first 5 minute. Also, please provide the RTK device information, and firmware version of LNT, ACS2, UAV.



9. Problem & Scenario:

Put the RTK station into single positioning, but the device report setup failed. Number of satellites is greater than 16. XRTK4 station ID is valid and display on screen. LNT is put into working mode and disconnected from internet.



Analysis: This is due to device list in the App account is not updated properly. For example, there may

be a device that removed from the list when the LNT is offline. As the LNT is offline, the device list does not sync with XAG server. This will result in messy consequence that other devices may not able to get online.

Solution:

- i. Restart everything
- ii. connect your LNT to internet. login your account that allows the device list sync with XAG cloud server

UAV Flight Control Related

1. **Problem:** Fail to turn on UAV's hotspot



Scenario: double press reset button; the wireless communication light does not change to orange.

Analysis & Solution:

- i. Unrecognized press pattern. Please do the following. Press the reset button for 1~3 seconds, release for 1~2 seconds, then press the reset button for 1~3 seconds again. if not, please do a cold restart. shut down the UAV and wait for 5 mins, then turn it on.
- ii. Wrong UAV firmware. The old firmware doesn't have the UAV hotspot feature. If you did the online update, but it fails, please check the update status. If you did the offline update, but it fails, please redo the firmware update of mainboard, WIFI and DLS.

2. **Problem:** Fail to configure UAV

Scenario: The cloud communication light is not green after configured



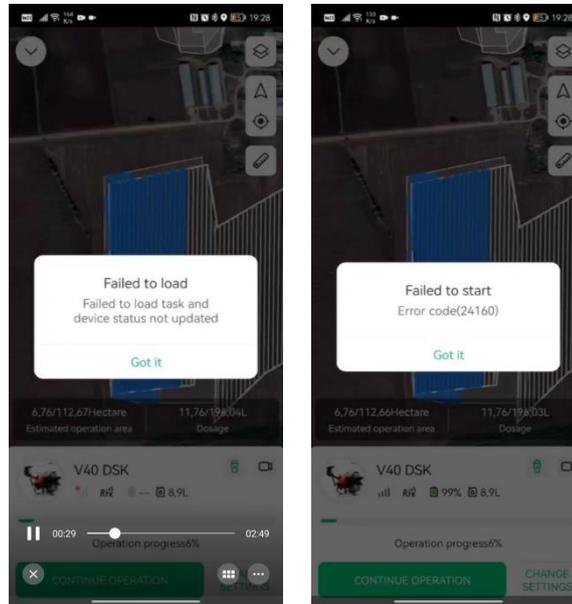
Analysis & Solution:

- i. Wrong LNT credential; Please reenter the LNT credential
- ii. Forget to do a cold restart on UAV; Please turn off UAV, wait for 5 minutes and turn it on
- iii. LNT has no access to internet; Check LNT internet accessibility, make sure LNT has

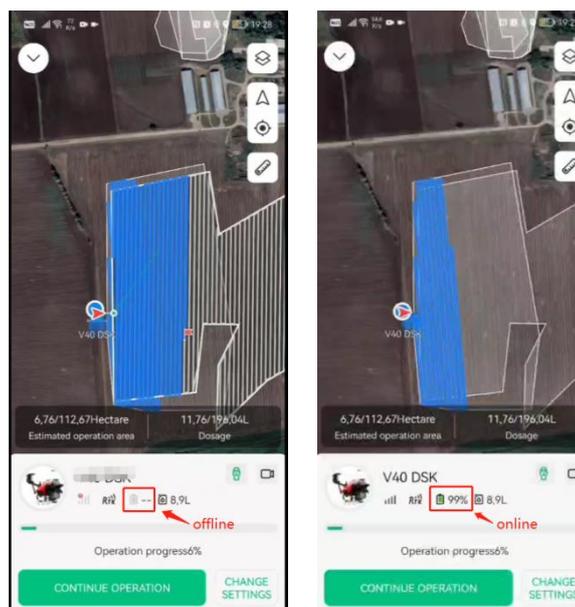
good internet access.

- iv. Smartphone is connecting 4G but not LNT; Turn off smartphone's 4G, make sure your smartphone is connection to LNT.

3. **Problem & Scenario:** UAV fail to start or resume the flight route.



Analysis: Look at the battery icon. When the UAV gets online, the battery icon is green. Oppositely, when the UAV is offline, the battery icon turns into grey. You may see that the color of battery icon is consistently switching between green and grey. This is because the UAV is consistently switches between online and offline. This could be due to the software issue or network connection issue.



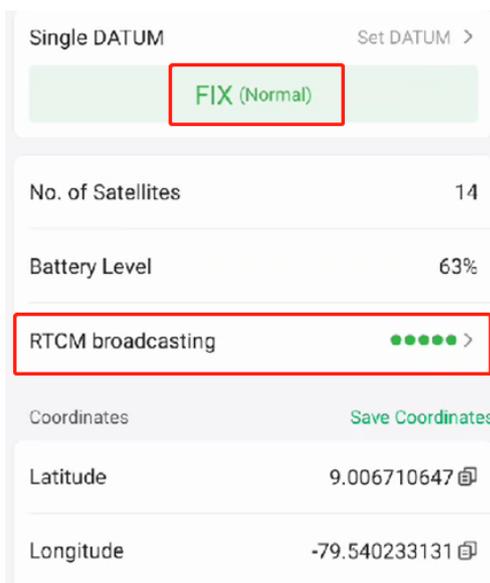
Solution:

-
- i. Check if the ACS2 remote controller is in field mapping mode. If yes, please quit ACS2 field mapping mode. Connect your smartphone to LNT hotspot.
 - ii. Put the LNT into working mode. The working mode will disable the hotspot of LNT, that can significantly reduce the signal interference and increase the signal quality.
 - iii. Use your ACS2 remote controller to manual flight the UAV. If it works fine, please restart everything. If not, the WIFI system (antenna, cables, RTK mode in flight control, etc) of UAV may have some issues.
 - iv. Update the firmware or software of all the devices, including LNT, ACS2, UAV, RTK, App.
 - v. Regarding to this issue, find the frequency of occurrence and contact XAG technical support

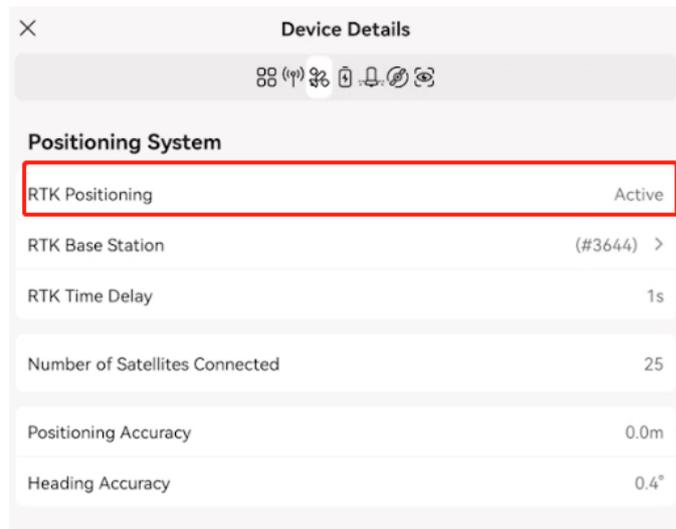
4. **Problem & Scenario:** UAV fail to connect RTK station

Analysis & Solution:

1. Check if RTK station is in FIX mode and RTCM is broadcasting



2. Check if the UAV has the number of satellites greater than 16
3. Check if the UAV RTK is active



4. Change another RTK station
5. Change another UAV

Chapter 7

Mission Preparation

Limitation and Safety

Operational Limitations

- Maximum operating height of 30 meters AGL
- Maximum distance between aircraft and remote pilot or observer of 1000 meters
- Operations are limited to VLOS and EVLOS
- The remote pilot must operate one aircraft at a time, unless otherwise approved by local authorities
- The remote pilot must be able to take control of the flight during any flight phase
- Ensure a minimum Safety Margin of 30m between flight limit area and third party, ground structures or populated areas
- Ensure a minimum Safety Margin of 30m between flight limit area and authorized airspace limits
- Comply with MAPA (Crop spraying Activity) and DECEA (Airspace Access) regulations if applicable

Environment limitations

Operating Temperature Envelope	10~40 ° C
Wind Speed Limit	10m/s
Atmospheric condition	No significant meteorological formations
Precipitation	No rain
Visibility	Visual Meteorological Condition

Local Evaluation: Ground Risk Assessment

- Identify the obstacles in the field, add the obstacles into the field map using ACS2 Rover
- Identify the terrain of the field, be aware of undulating land
- Identify human activities nearby
- Identify ground wind speed, humidity, and temperature

Flight Authorization Request

According to the local regulations and laws, please request flight authorization if necessary.

Personal Protective Equipment preparation

Safety is paramount in preparing pesticides, so please strictly follow the guidelines below.

- Check if your long sleeves, trousers, mask, goggles, and rubber gloves are worn out. Replace them when they do.
- Wear a mask, goggles, long sleeves, trousers, and rubber gloves before preparing pesticides upwind in an airy and shady area.
- NEVER smoke, eat or drink when spraying pesticides. When tubes or nozzles are clogged up, unclog

them with soft objects or clean water. Do NOT blow them with your mouth.

- If pesticides get into your eyes, rinse them immediately with plenty of clean water. When you have symptoms such as headaches, nausea, and vomiting, stop the operation, take off your protective clothing and go to the nearest hospital with the packaging of the pesticides applied.
- Upon completion of the operation, wash your hands with soap and remember to wash your body thoroughly in time.
- Soak your protective equipment in lye and wash it.
- Pesticide containers and packaging must be collected for proper disposal. NEVER discard pesticide packaging in ditches, wells or places with people and animals, otherwise, pesticide hazards, poisoning or environmental pollution could occur

Chemical Preparation and Care

Use pesticides in accordance with manufacturers' safety instructions.

- During operation, the protection of aircraft besides people is also important. Beware of liquid getting into the circuit board in the installation or removal of the liquid tank, causing short circuits and damaging the aircraft. Minimize malfunctions resulting from improper operation.
- Prepare pesticides with clean water as dirty or muddy water could reduce the dispersity, wettability, and permeability of pesticides in water, causing them to precipitate and become less effective. Impurities in water could break down part of the active ingredients in pesticides, reducing their effectiveness.
- After adding clean water, stir the solution thoroughly so that pesticides fully dissolve with fewer precipitates and thus become more effective. Do NOT use warm water in pesticide preparation as the solution could crystallize and precipitate as the water cools down.

Inspect Devices Battery

Before the mission, fully charge the batteries of smartphone, RTK station, ACS2 remote controller, LNT, and UAV. **Replace the battery if it's bulge.**



Bring the power bank to the field in case of smartphone and ACS2 remote controller short of battery.

Defining UAV Take-off and Landing points

The landing point is the same as take-off point. For safety concerns, please select the take-off point according to the below conditions:

- > 10 meters away from any objects and people.
- Out of restricted airspace. Routes of airlines, sensitive areas and danger zone
- Must be in flat and open field, without significant sand and rocks
- stay away from ditches, trees, buildings, power line, etc

Routine Check for LNT Network

Check if Smartphone is connected to LNT network

LNT is directly connecting to smartphone through WIFI. The communication range between LNT and smartphone is less than 100 meters.



Check if WLAN mode is enabled

“WLAN mode” MUST be enabled during operation. This will significantly strengthen the WIFI signal and eliminate signal interference.

When the UAV is not under operation, you can use WAN mode for LNT network, firmware update, data sync, remote debug, etc.



Disconnect smartphone from 4G network

Some smartphones will simultaneously enable both WIFI and 4G if one or another are weak. This will seriously disturb the LNT communication channel. as the XAG One App is requesting data from the cloud server but not the LNT. The users may find the drone consistently switching between online and offline. To eliminate this risk, **please disable the smartphone mobile data (4G), or turn on the smartphone's flight mode.** This action will only allow the smartphone to have access a unique channel, LNT hotspot.

Login XAG One account when LNT is offline

Disconnect LNT from internet, connect smartphone to LNT hotspot, login the XAG One account. Sometimes users may find that the XAG One account fails to login. This is due to the data lost from factory reset. To solve this, please reconnect your LNT to internet, login your account and wait an hour for data sync.

Firmware Update Using LNT

Make sure your LNT is connected to internet through WIFI router or hotspot, go to XAG One App, update all the devices' firmware.

Positioning LNT

1. Connect LNT to its battery
2. Turn on LNT
3. Check LNT LED indicators
4. Disconnect LNT from internet
5. Place LNT in a high and open space



XRTK4 Portable Station Setup

Understand GNSS/RTK and XRTK4

XRTK4 Portable station is a GNSS/RTK base station that send RTCM corrections (stands for Radio Technical Commission for Maritime Services) to the Rover devices. The rover device are the mobile units, including ACS2 remote controller and UAV.

Signals from the Global Navigation Satellite System (GNSS) are one of the main inputs used for aircraft positioning or time reference for communication. It allows radio receivers to determine their 3D space position and time, with an accuracy of 2 to 20 meters. GNSS is a general term describing any satellite constellation, including several satellite systems, specifically used in different regions. nowadays we are talking about GNSS, not only about GPS.

Satellite systems are:

GPS - US

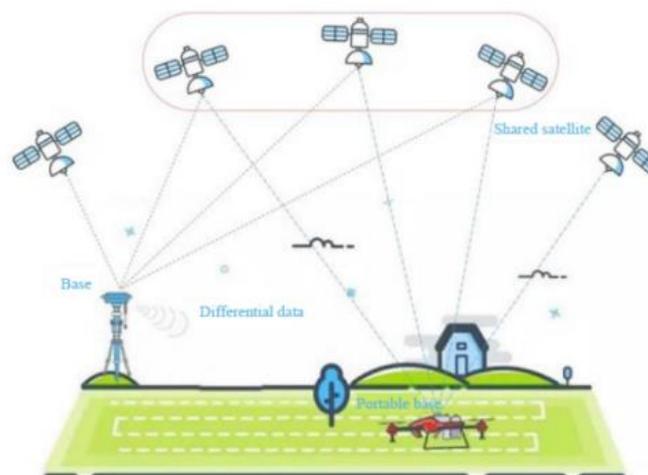
Galileo - Europe

GLONASS - Russia

BDS - CHINA

QZSS – Japan

GNSS/RTK accuracy depends on multiple factors, such as surrounding buildings, trees, vehicles, current weather conditions, numbers of the available satellites and more. The signals can be harder to get into the receiver if they are conflicted with surrounding distractions.



Positioning RTK Portable Station

1. Make sure that the ground is flat, and there are no surrounding distractions, such as buildings, trees, bad weather conditions, etc.



2. Adjust the screws to extend the legs of tripod



3. Place the tripod on the ground



4. Adjust the bubble level within the accuracy of 1 degree



5. Put your foot onto the step, and fix the tripod on the ground



6. Turn on XRTK4



7. Insert XRTK4 into the tripod fixture slot, lock the clamp



8. The XRTK4 portable station set up is done



Single Point

Description:

This method allows a XRTK4 base station receiver setup at a known location, from where the rovers (UAV, ACS2) can get the GNSS positioning corrections. Even though this method is easy to set up and use, it has poor position accuracy compared to XRTK4 fixed station network, which usually contains more than one XRTK4 fixed station and they are communicating through 4G network. Thus, once you use the single point coordinates to map the field and want to use it again next time, you must save this coordinate.



Question: When shall we manually select single point?

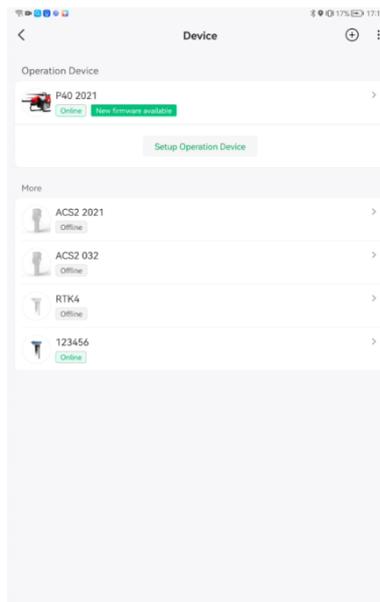
Answer: In LNT networking mode, users need to manually select single points.

But if in 4G mode where XRTK4 has 4G SIM card inserted, XRTk4 will automatically go into FIX.

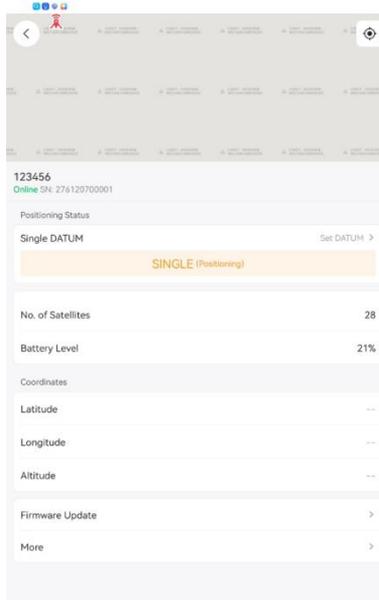
Devices	Network	4G SIM required?	FIX mode
Portable XRTK4	LNT	No	Manual select single point, then go into FIX mode
Portable XRTK4	4G	Yes	XRTK4 will automatically go into FIX mode
Fixed XRTk4	4G	Yes	If there is nearby FIX station, XRTK4 will automatically go into FIX mode

Procedure:

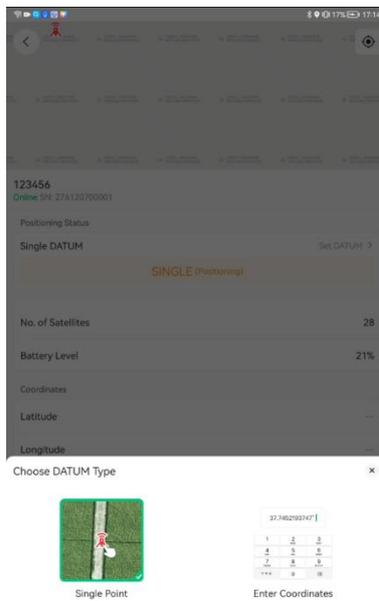
1. Choose the XRTK4 that need to set up



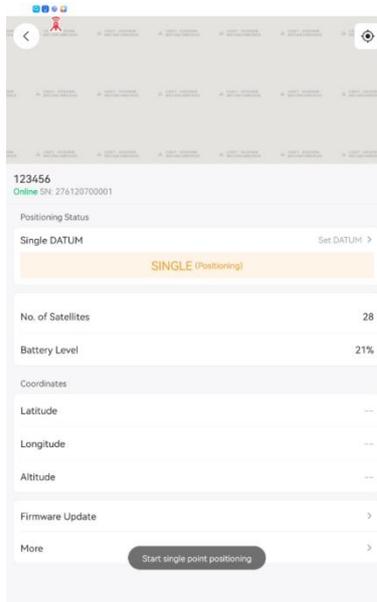
2. Press "Set Datum"



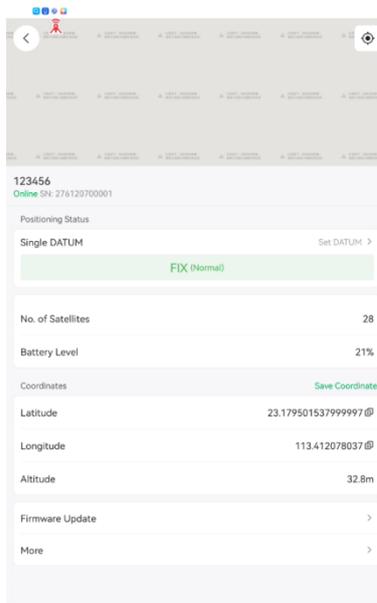
3. Choose DATUM type as single point



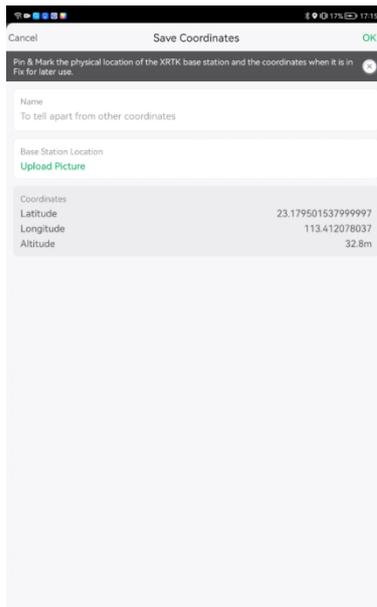
4. Wait for a while, this process may take up to 15 minutes



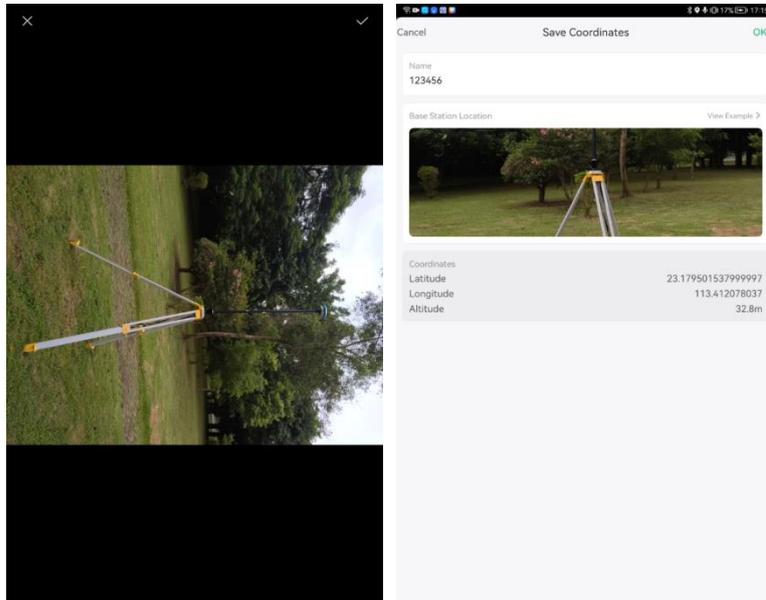
5. Once "FIX" is shown, the single point positioning is finalized
Press "Save Coordinate"



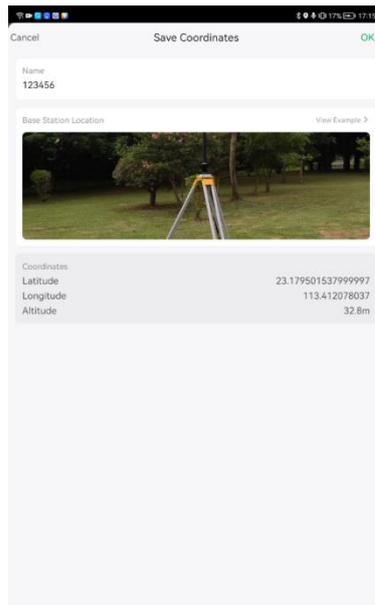
6. Input name and upload picture



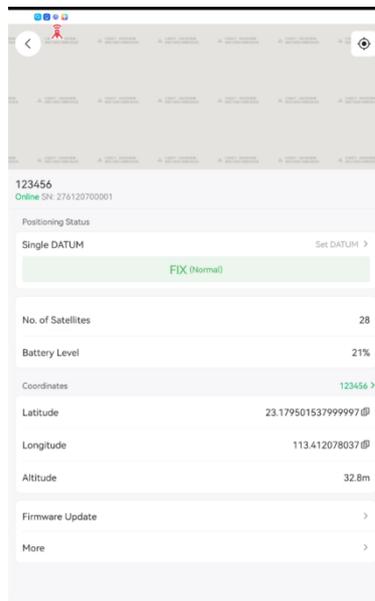
7. Take a picture of your XRTK4 portable station



8. Press "OK"



9. The coordinate is saved



10. Before taking away your XRTK4 portable station, please mark on the ground. So, when you come back to the field next time, you can place the XRTK4 portable station onto the exact spot where you marked.



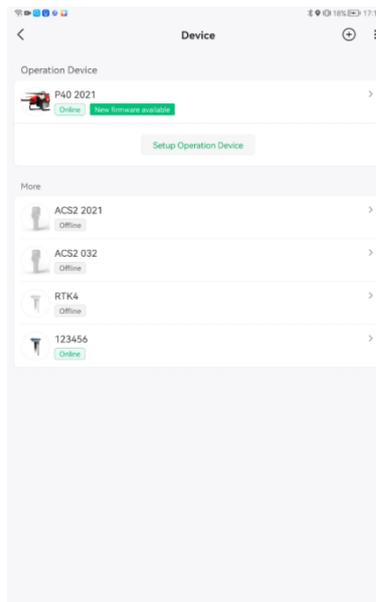


Enter Coordinates

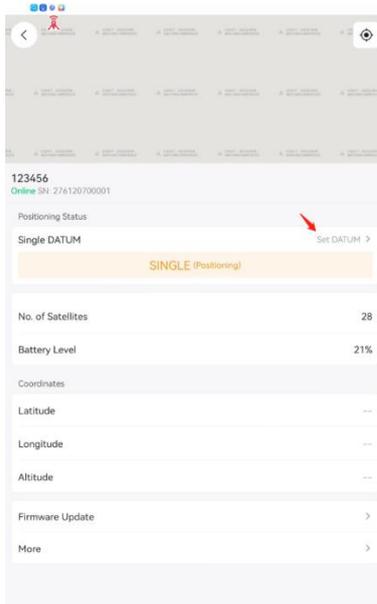
Before entering coordinate, you place the XRTK4 onto the exact spot that you put last time. And then enter coordinates that save previously. This is because the fields that we mapped previously are based on the RTCM correction data, which comes from the XRTK4 portable base station at the exact spot that you put last time. Otherwise, UAVs will fly out of the field and possibly cause accidents.



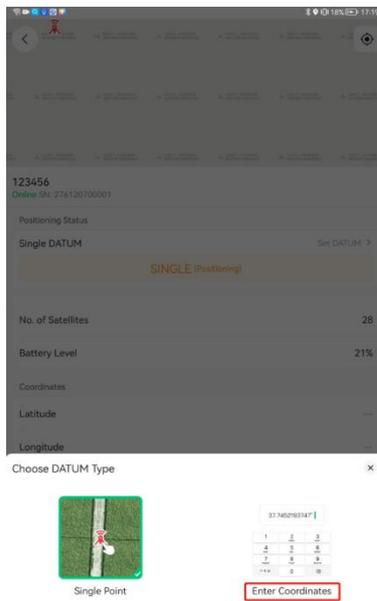
1. Choose XRTK4 that need to setup



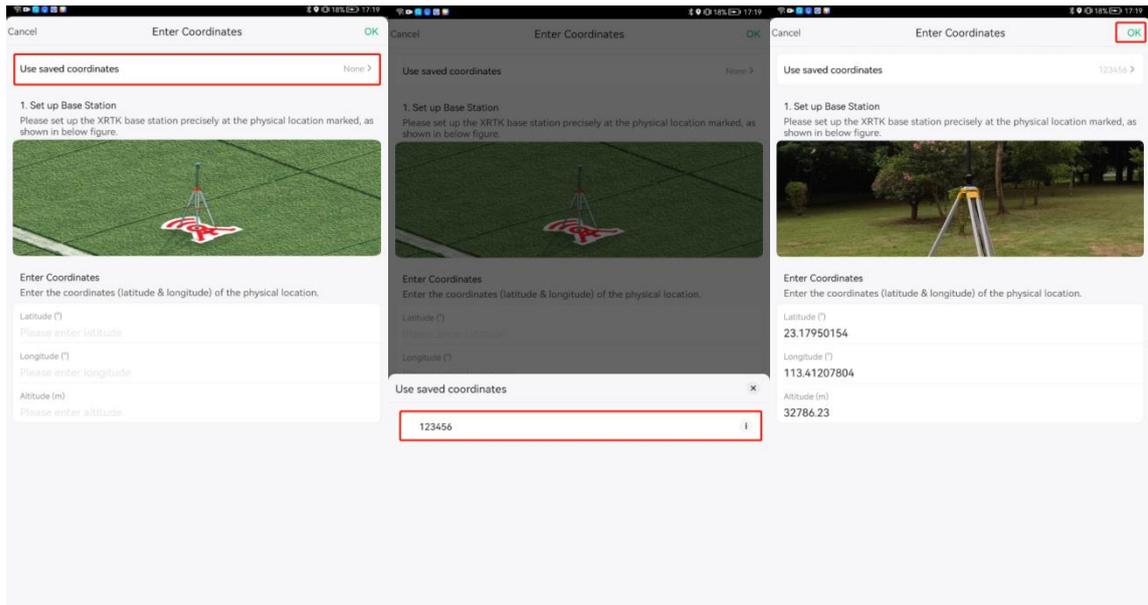
2. Press "Set DATUM"



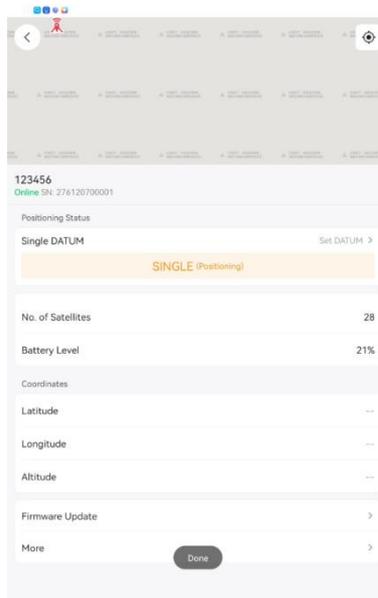
3. Choose “Enter Coordinates”



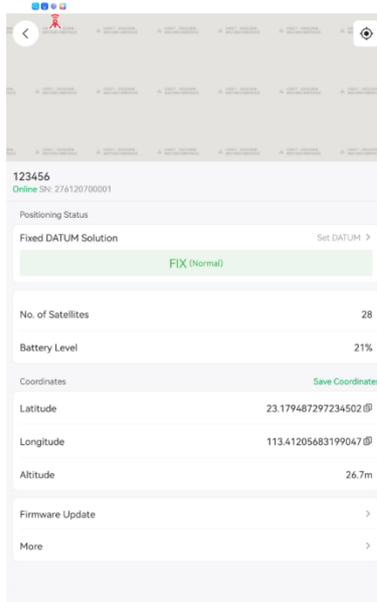
4. Choose “Use saved coordinates”



- It takes approximately half a minute for XRTK4 positioning



- Once the status of XRTK4 goes into "FIX (Normal)", the XRTK4 setup is completed and it's ready to use.





VRTK Flight and Offset Correction

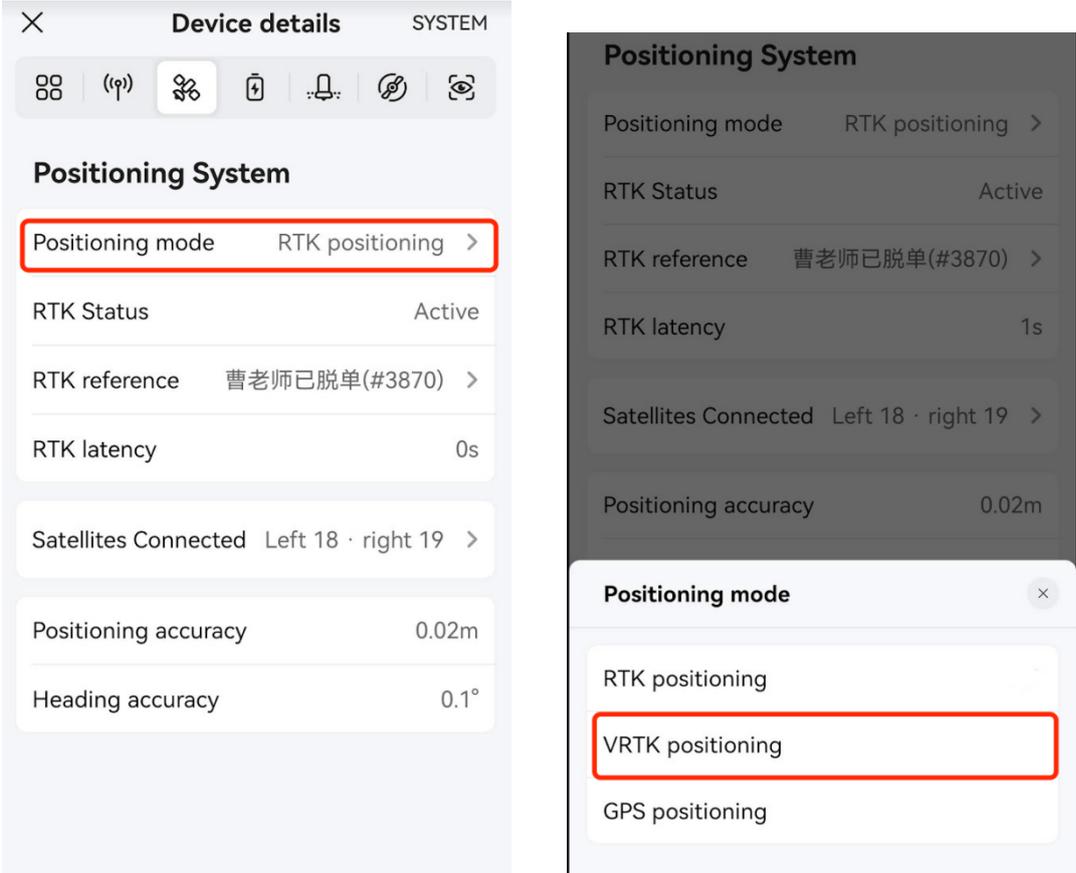
VRTK flight introduction

Since 2023, users of XAG agriculture drones can fly without the RTK station, but only with GPS or VRTK. With VRTK, the flight mission can maintain a relatively high accuracy level for a certain period of time.

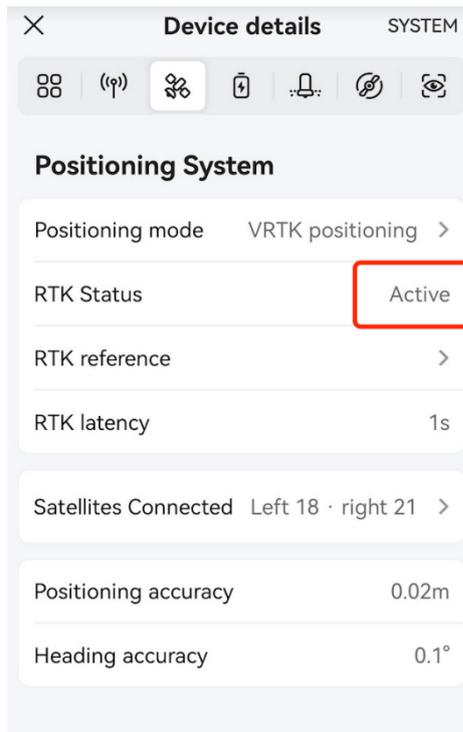
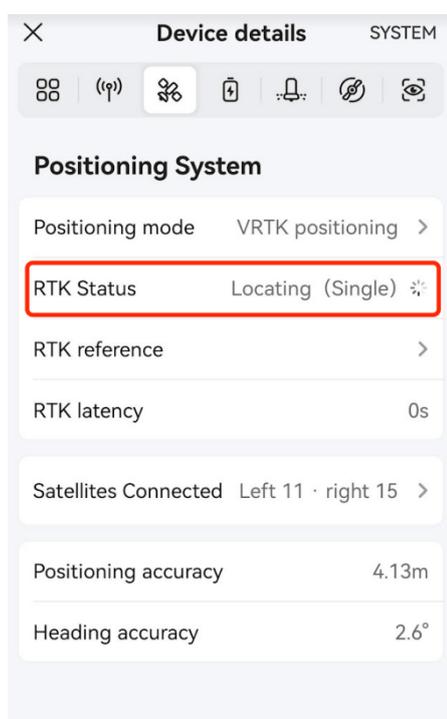
VRTK reference point is a base reference point set by the drone itself instead of using RTK station as base reference. As the UAV moves, the UAV will keep remembering the initial physical position as base reference, also known as virtual reference point. The UAV positioning system automatically enters RTK by processing convergence to this virtual reference point, and the drone can maintain a relatively high accuracy level for a certain period, usually 2 hours.

Set VRTK Reference Point

1. Place the UAV on a safe and open spot, power it on and keep it still.
2. Select the UAV, go to Device details page, tap Positioning mode and select “VRTK Positioning”



3. Wait until the RTK Status changes to Active.

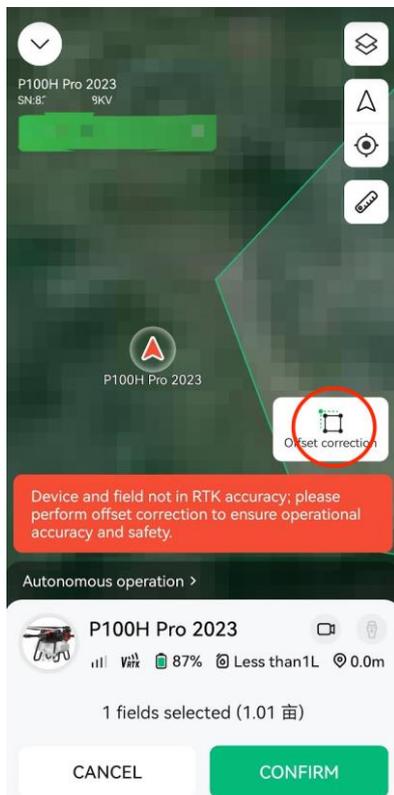


Offset Correction

1. Place the drone to the corner of field where you have marked a point during mapping.



2. Go to the operation page and select the field you are going to work on, you will find the UAV symbol is not exactly at the corner. There is a deviation from the point where it should be and you are required to perform offset correction. Tap “Offset correction” button on the screen



3. The offset correction tool will then show up with all the points of the field displayed. You can either use the arrows to fine tune the position of the field map (each click moves 0.5 meters), or just select the target point of the map.



4. Select the target point (field boundary reference point), and then tap “Offset to the drone” button



5. Then the field boundary will move according to target point, which will match to the drone position (drone symbol), Tap confirm button on the screen to complete offset correction. Now the relative position of the drone and the field is correct.

6. It is safe to move the drone to a safe place to take off and operate. **Perform the VRTK correction every 2 hours.**

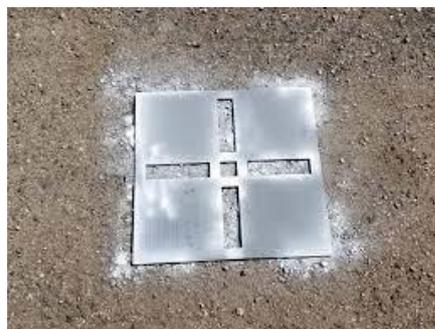


Precautions for VRTK flight

- Before enabling VRTK mode, make sure the field is free of difficult terrain or obvious obstructions around that would affect positioning accuracy.
- You should perform offset correction for the fields before performing a VRTK mode flight.
- Anytime you conduct a cold restart, please perform field offset correction again for the drone to resume its operation in the same field.
- When flying or mapping in VRTK mode, please complete the task within two hours, or please perform offset correction for each mission.
- In VRTK mode, lower positioning accuracy may result from a combination of operating environment, fields satellite status, offset correction., which may cause missed/repeated sprays, collision, or crash and not be considered as device or VRTK malfunctions. Please be cautious.

Tips for VRTK flight

Instead of using the corner point of the field for correction, you may mark a redundant “no-spray zone” on the ground suitable for the drone to take off during mapping. Do remember to make a physical mark on the ground where you add points to the map, so that you can center the drone on it for field map correction.



Pre-flight Check for UAV

Visual Inspection

Please perform daily check before operation. Use P100 as example.

Propellers visual inspection



Arm visual inspection



Motor base visual inspection



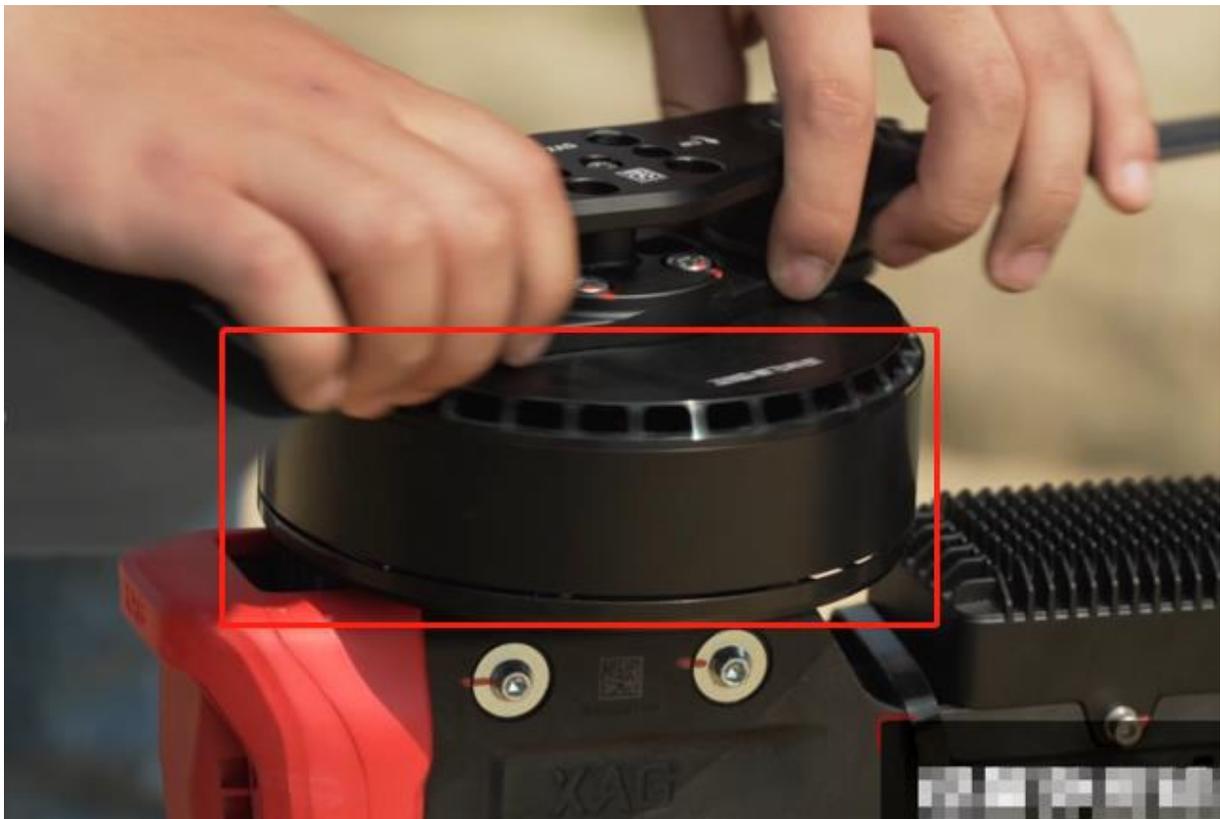
Rack visual inspection



Battery rack visual inspection



Rotate motor to check if the motor is firmly installed into its base. Also listen to the motor to check if there is any abnormal sound.



Rotate spray disk to check if the disk is firmly installed into the spray motor. Check if the spray disk can be rotated smoothly.

Check if the spray disk is damaged.

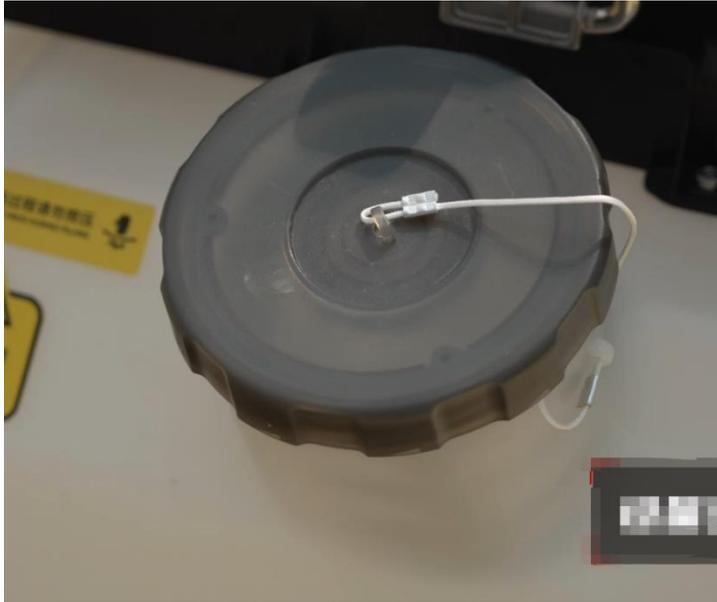
Listen to the motor to check if there is any abnormal sound.



Check the RTK antenna installation



Inspect the liquid tank inlet



Inspect the filter. Make sure it's clean and not damage.



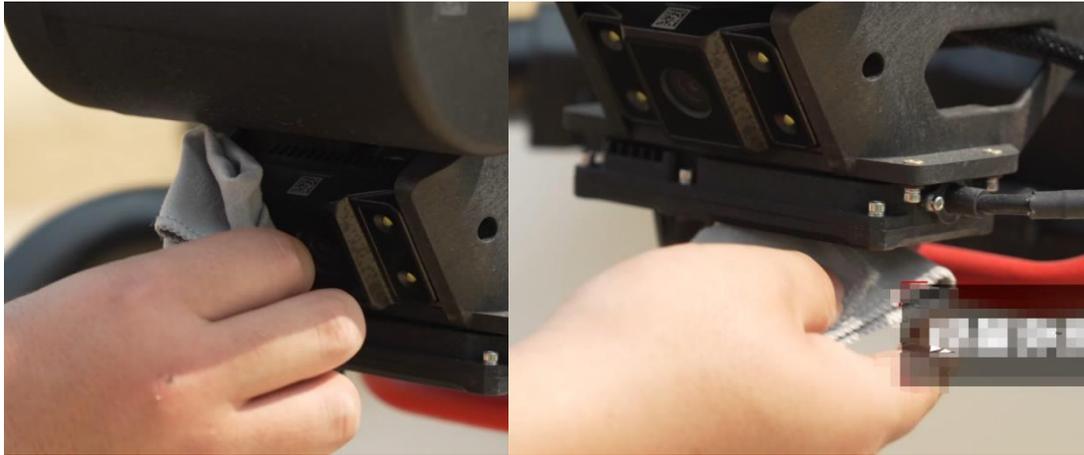
Inspect the terrain module and optic flow



Inspect the PSL camera



You may use lens cleaning cloth to wipe from the left to right



Inspect the dynamic radar



Clean up the battery socket



Check the remaining battery. Short press the smart battery power button



Inspect if the battery lock is damaged

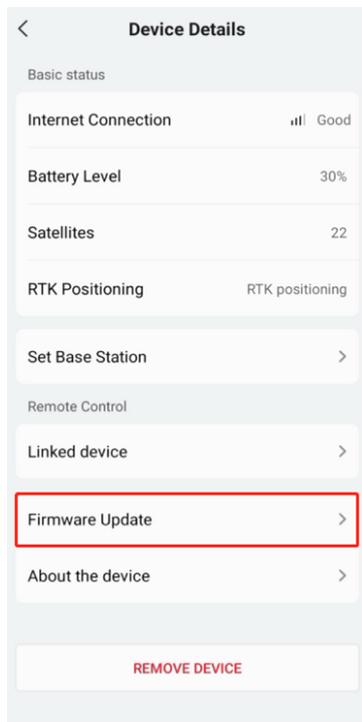


Make sure you hear the clip sound when plugging the battery socket



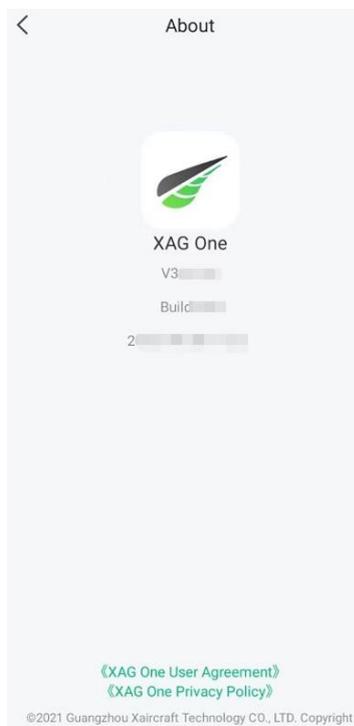
Firmware Update Check

Make sure your all your device firmware is updated to the latest version. If not, please update.



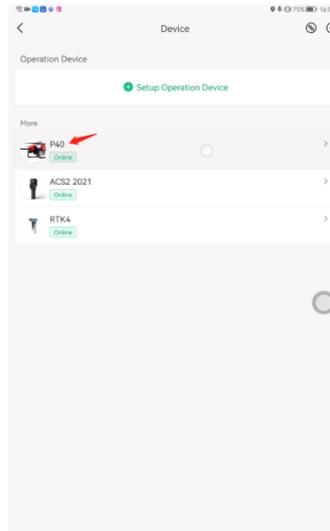
App Version Check

Make sure your App is updated to the latest version. If not, please update.

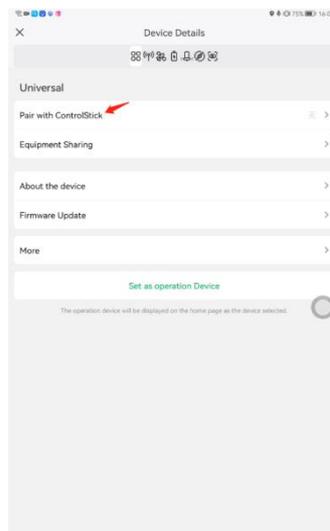


ACS2 Remote Controller Pairing Check

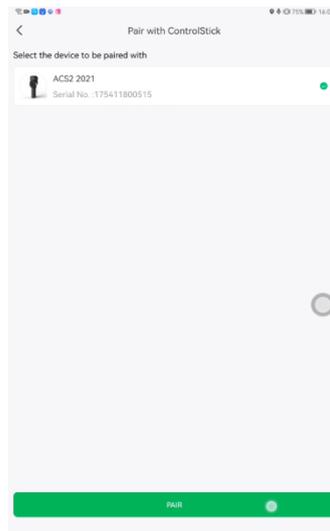
Go to UAV's setting



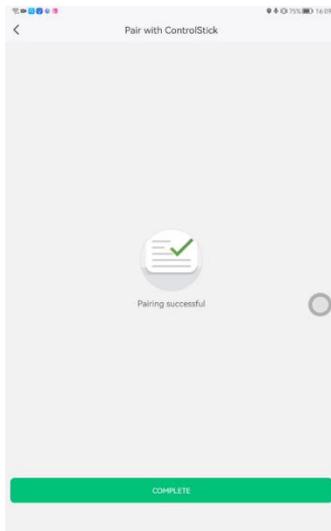
Select "Pair with Control stick"



Select the ACS2 2021, and press "PAIR"



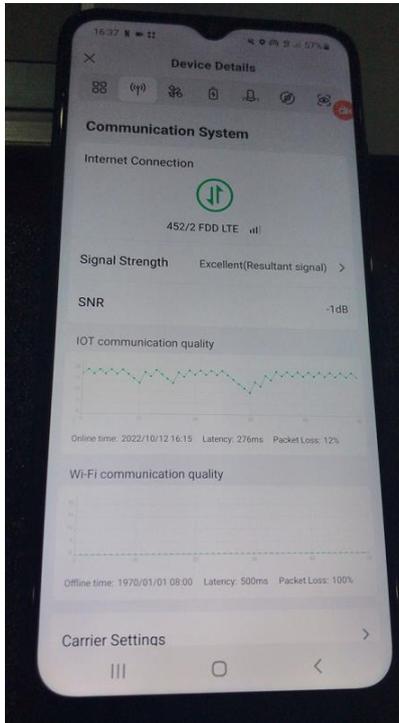
Pairing successful, press "COMPLETE"



UAV communication Check

If using 4G network, please check the IOT communication latency and packet loss.

If latency is greater than 300ms and packet loss is greater than 25%, the flight mission will be suffered.



If using duo channel (WIFI/ 4G), please check both IOT and WIFI communication quality.

The UAV will decide to use the channel that has the lowest latency and packet loss.



If you are using LNT, there are only WIFI signal active.

In summary

Communication signal	4G network	Duo channel	LNT
IOT (4G)	Yes	Yes	No
WIFI	No	Yes	Yes

Positioning System Check



- 1. Check if RTK positioning is "Active"
- 2. Check RTK time delay less than 10s
- 3. Check the number of satellites is greater than 16
- 4. Check the positioning and heading accuracy (within 1.2)

✕ **Device Details**

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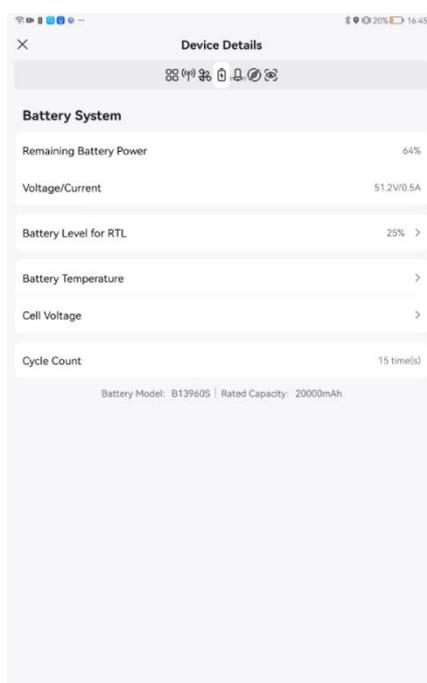
Positioning System

RTK Positioning	Active
RTK Base Station	(#3644) >
RTK Time Delay	1s
Number of Satellites Connected	25
Positioning Accuracy	0.0m
Heading Accuracy	0.4°

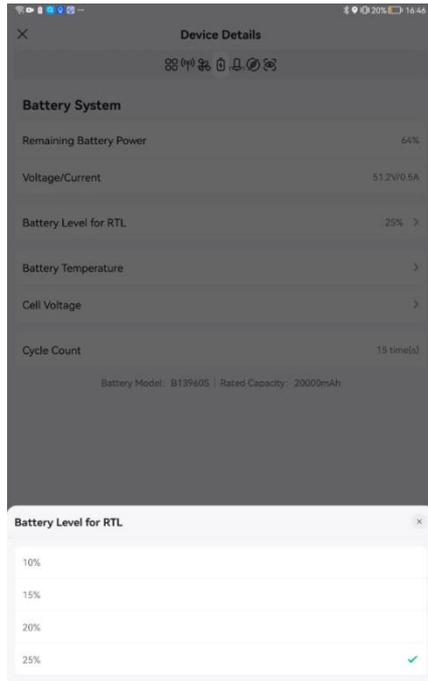
Battery System



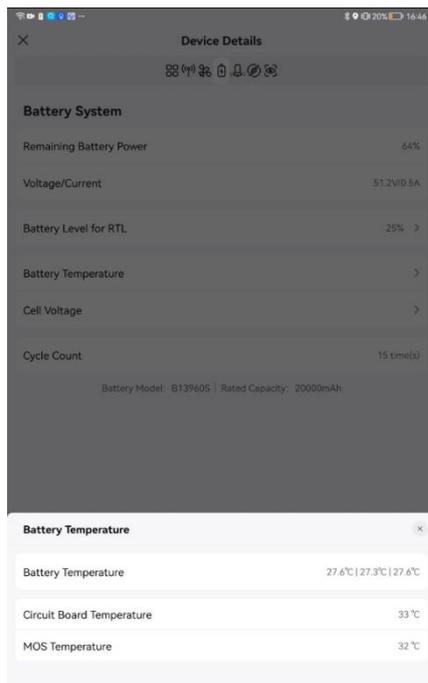
1. Check the remaining battery power



2. Battery level for RTL



3. Check the battery temperature

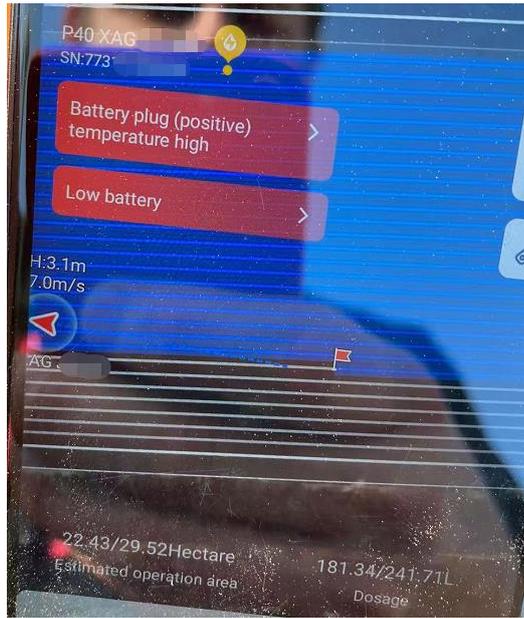


Component	Maximum allowable temperature (Celsius degrees)	Comments
Battery	54	three temperature sensors built inside the lithium core, real time measurement
Circuit Board	70	real time measurement
MOS	70	real time measurement

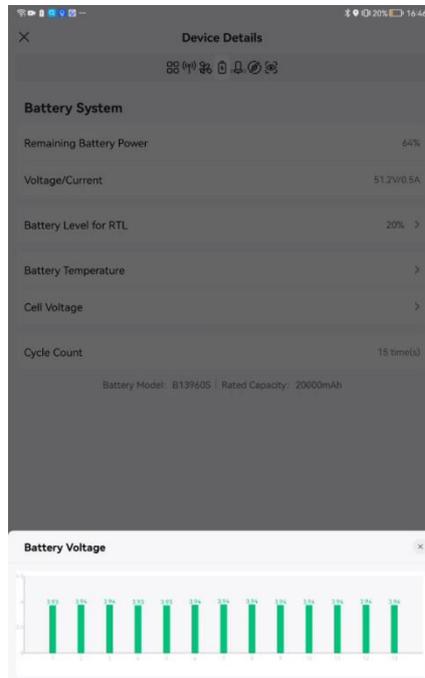
if the UAV reaches maximum allowable temperature of circuit board, MOS or battery temperature,

- i. the UAV will land immediately during the flight mission

- ii. the UAV will not take off when starting the flight mission.
- iii. the App will prompt warnings



4. Check the battery balancing. It means that the voltage of each cell of the battery pack should be balanced. Also, the voltage difference of each cell is “voltage gap”, the voltage gap of each cell should not exceed too much. Therefore, we have to ensure that when each cell is being charged and discharged, the voltage rise and fall are within a balanced and acceptable range.

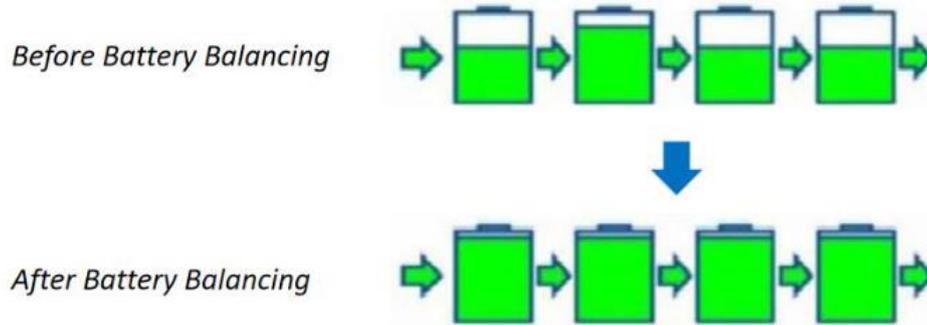
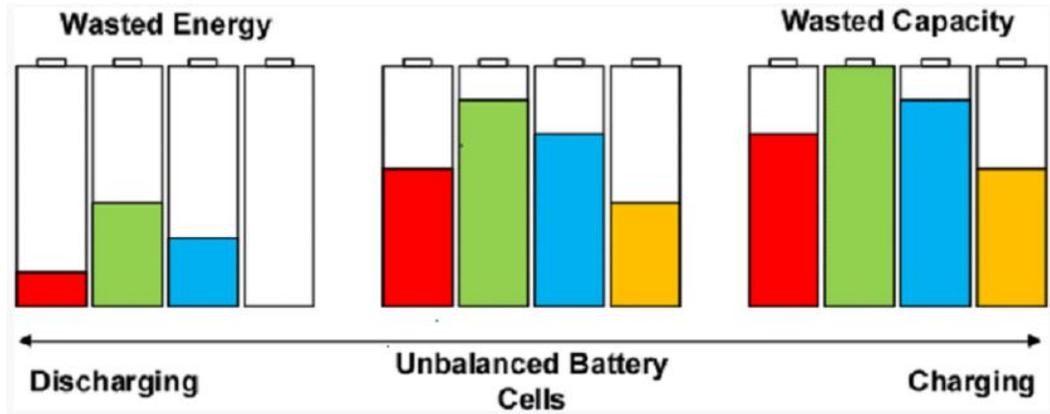


If you find battery balance lost (greater than 150 mV). Please turn off the battery immediately and move this battery to a safe place. Leave the battery alone for a few days and check if the cells can recover. If it can't, the battery may be scrap. Please contact XAG technician.



Knowledge of battery balancing.

Imagine that our battery pack is like different reservoirs, the same as the water pressure of each reservoir thus the same output of each reservoir. If we cannot ensure the equal level of water pressure of each reservoir, it will lead to one pool is dry and the other pool is still full. However, their staff will not check the remaining capacity of each reservoir, then a single pool will be overcharged due to refilled water uniformly.



Propulsion System Check



Propulsion Details

This page has the detailed information regarding to the electrical speed controllers (ESCs). Please check these ESCs before flight mission.

The screenshot shows the 'Device Details' app interface. At the top, there's a title 'Device Details' and a close button. Below it, there are icons for various settings. The main section is titled 'Propulsion' and contains a diagram of a quadcopter with four motors labeled M1, M2, M3, and M4. Below the diagram is a table with the following data:

	M1	M2	M3	M4
Rotational speed (RPM)	0	0	0	0
Current (A)	0.0	0.0	0.0	0.0
Mainboard Temperature (°C)	31.0	31.0	30.0	31.0
Status	1	1	1	1

Below the table, there are two buttons: 'Idle Test' and 'In-situ Flight Test', both with right-pointing arrows.

Idle Test (Mandatory)



During idle test, make sure there are no people nearby within 10 meters.



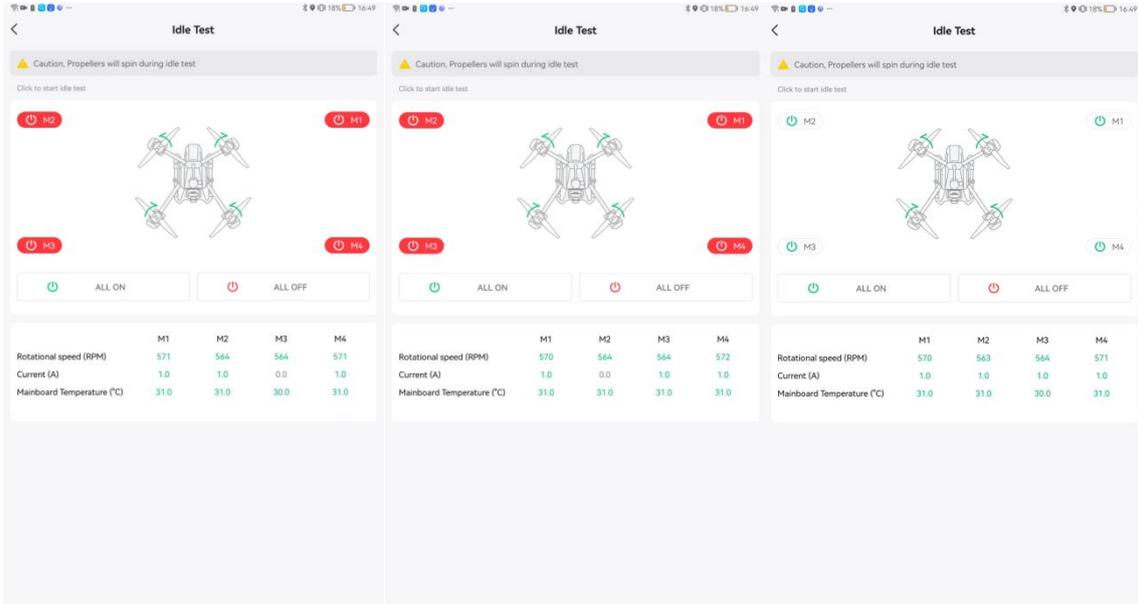
For good practices, idle test should be performed regularly. If the UAV is recently repaired or under maintenance, it's necessary to perform idle test before flight mission.

Things that need to be checked:

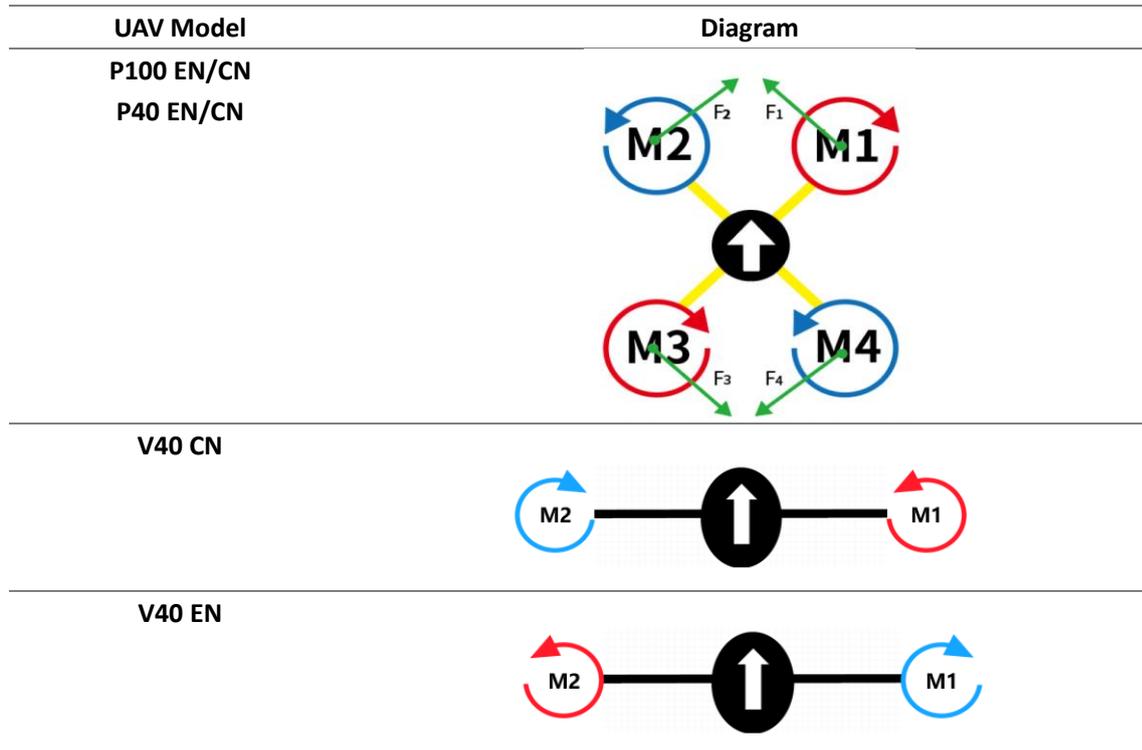
1. Propellers rotation direction: Turn on/off the motor individually to identify the propellers rotation direction. Make sure the propellers' rotation direction is the same as shown in the diagram.
2. Rotational speed (RPM); The difference among M1~4 should be less than 50 RPM.
3. Current (A); Check if the current is within range.

UAV model	Average Current (A)	Max. Current (A)
P40	1	2.5
P100, V40	2	5

4. Mainboard Temperature; maximum 90°C
5. While the motors are rotating, listen if the motor sound is normal.

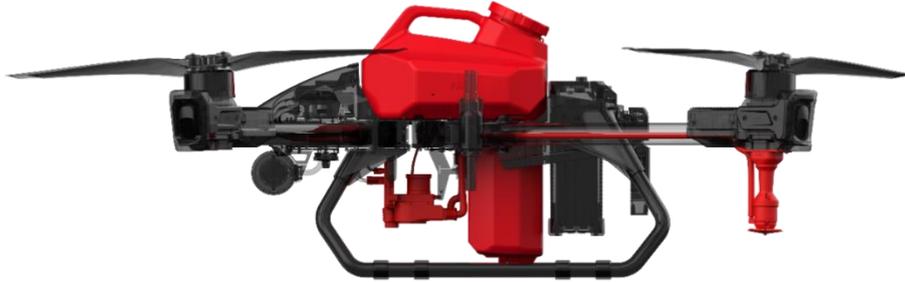


6. Check the propellers rotation direction



7. if the above items are checked and OK, you can perform a “take off and land” test

Spraying System Check



Spray System Details

Feel free to try all the items under the spray system details.

The screenshot shows the 'Device Details' interface for a drone's spraying system. It includes a title bar with a close button and various status icons. Below the title, there are several sections: 'Discharge remaining liquid' with a right arrow, 'Remaining Volume' showing 5.9L, and 'Flowrate' which contains a diagram of the drone with 'S2' and 'S1' labels. Below the diagram is a table with columns for 'S2' and 'S1' and rows for 'Pump Speed (RPM)', 'Pump Current (mA)', 'Nozzle Speed (RPM)', 'Nozzle Current (mA)', and 'Health Index'. The 'Health Index' row shows values of 1.30 for both S2 and S1. At the bottom, there are sections for 'Manual Spraying Test' with a right arrow, 'Spraying System', and 'Calibrate' with a right arrow.

	S2	S1
Pump Speed (RPM)	0	0
Pump Current (mA)	0	0
Nozzle Speed (RPM)	0	0
Nozzle Current (mA)	0	0
Health Index	1.30	1.30

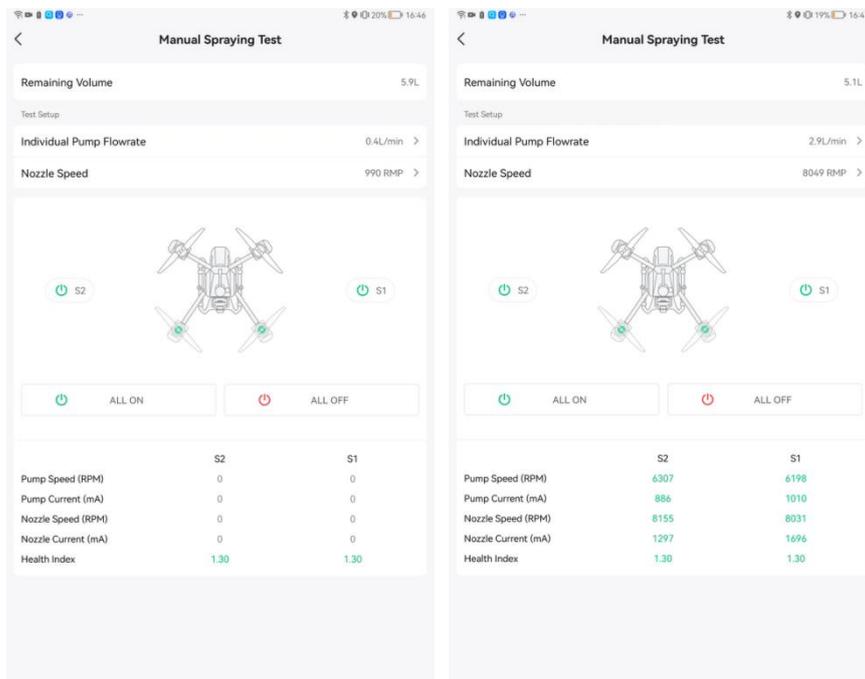
Item	Usage
Discharge remaining liquid	Remove the remaining liquid inside the tank. Clean liquid tubes;
Remaining volume	Check the remaining volume
Real-time flowrate	It's the real-time measurement of speed and current. Check if there are abnormal current and speed, for example, large current, no current, etc.
Manual spray test	Test the functionality of spray system; It's suggested to perform spray manual test after repair
Calibrate	Calibrate spraying system; this is optional. You can perform the spray calibration regularly. It's suggested to perform spray calibration after repair

Manual Spraying Test

Pour water into the liquid tank



Make sure the remaining volume has enough liquid to perform manual spray test. You are allowed to set the individual pump flow rate and nozzle speed. The speed and current measurement of S1 and S2 should be very close.





Please check the followings

- Tubes no leakage
- Normal spray disk spin
- Flow-out liquid without bubbles



if the liquid viscosity is too high, spray calibration is required.

The below example is that high viscosity chemicals result large droplet.



[velocity 8m/s, 8L/ha, spray width 6.5m, height 3m, droplet size 80 μ m]

Three possible causes big droplets:

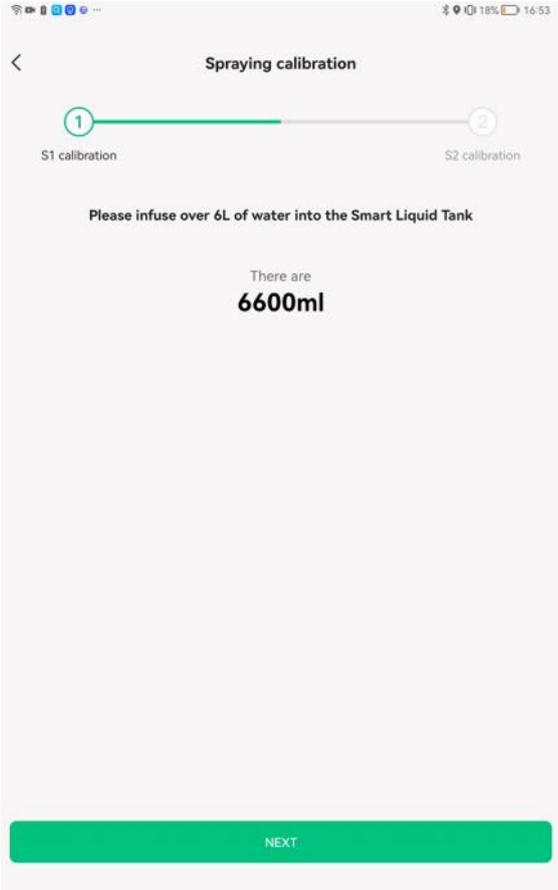
High velocity

High flight speed

High viscosity chemical

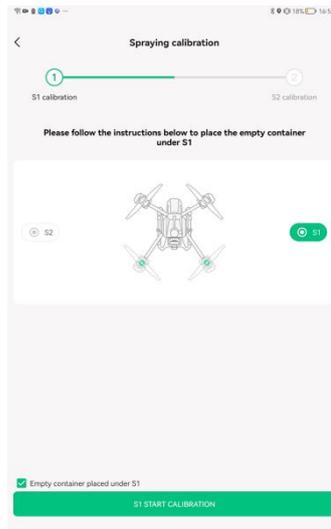
Spraying Calibration (Optional)

- 1. Each nozzle needs at least 6L water to calibrate.

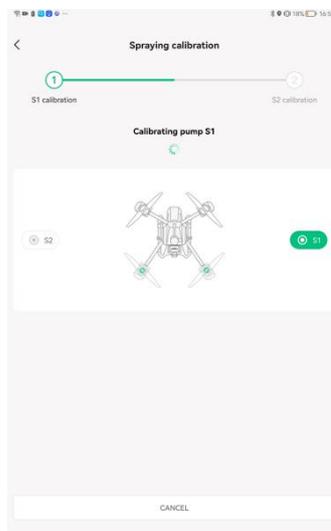


- 2. During spray calibration, the pump will deliver 6L water to the nozzle and the water will flow out of the UAV through nozzles. For the models before 2020, users were asked to place a measuring cup under the nozzle to know how much water was pumped by certain rotations of a pump. For the models after 2020, the liquid level sensor will measure and verify the volume of pumped water by itself.





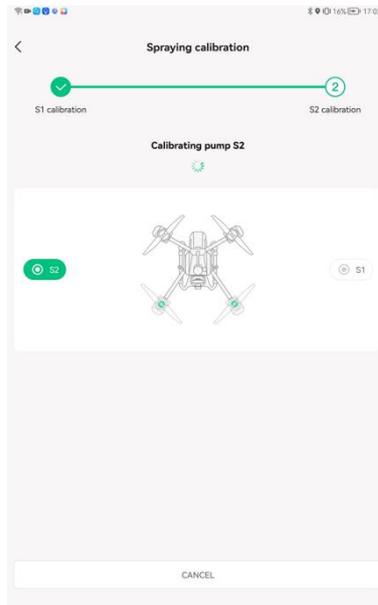
3. S1 spraying calibration is in process, it will stop and inform when finished.



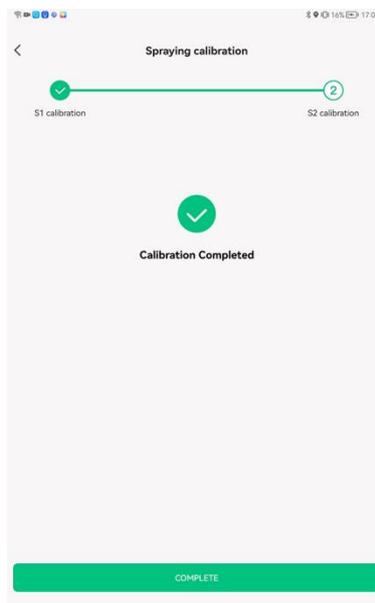
4. S1 spraying calibration is completed. It's ready to move forward to S2 calibration



5. S2 spraying calibration is in process



6. calibration completed



Sensing System Check

Make sure there are no red warning sign. Otherwise, the sensing system is malfunctioned.

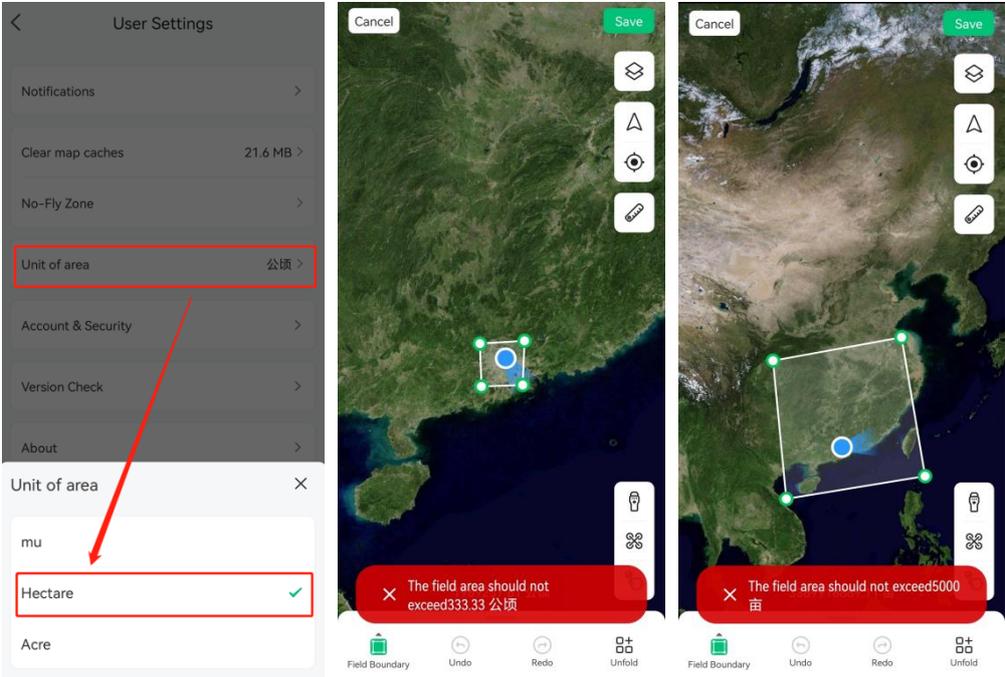


Chapter 8

Field Mapping

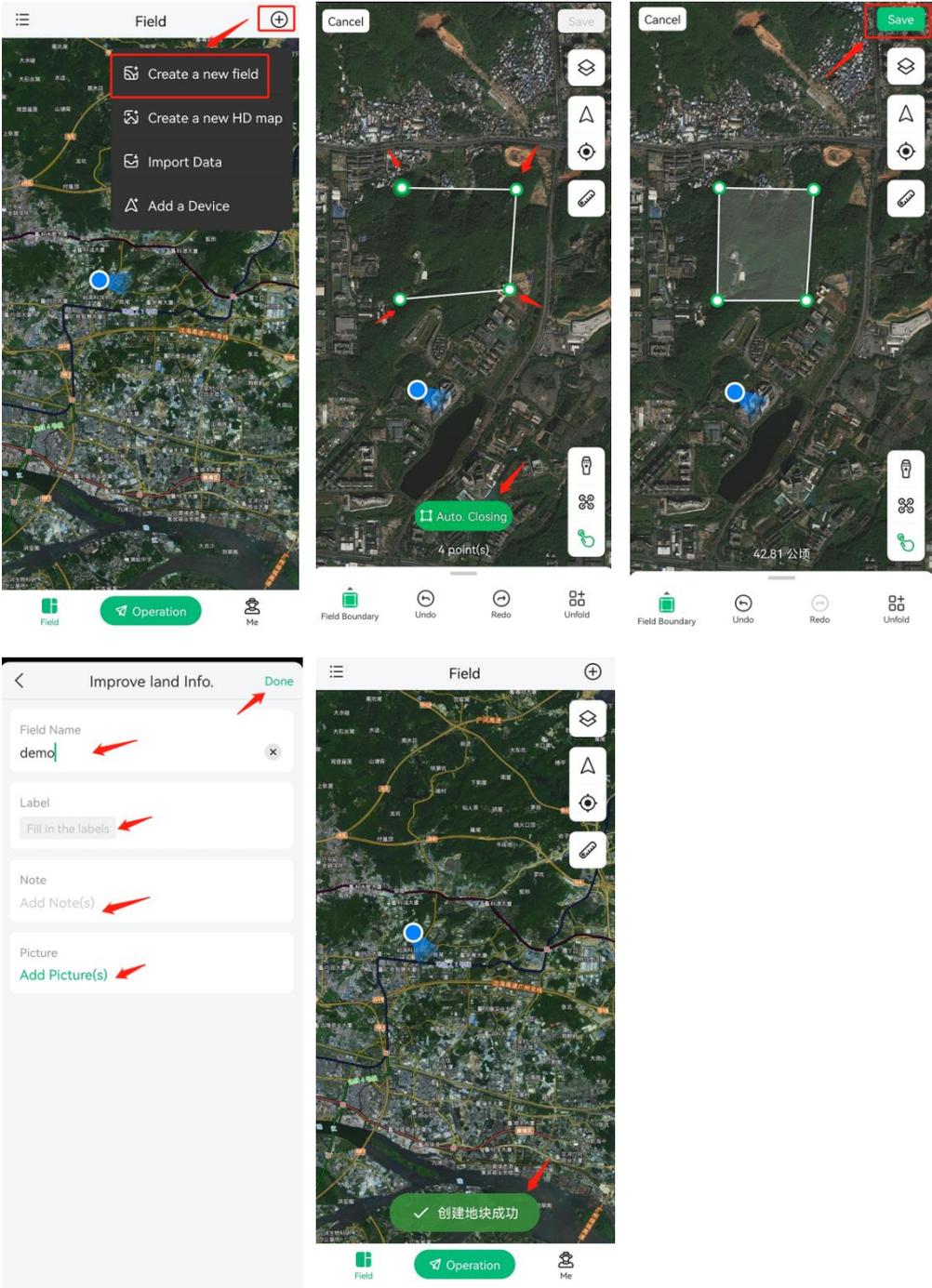
Limitation

User is allowed to draw each field less than 333.33 hectares or 5000 mu.
Before drawing fields, please change the unit of area.



Draw fields on App

User is allowed to draw field directly on the map. Go to "Create a new field" and add points on the map, auto close the field, input field information.



Preparation

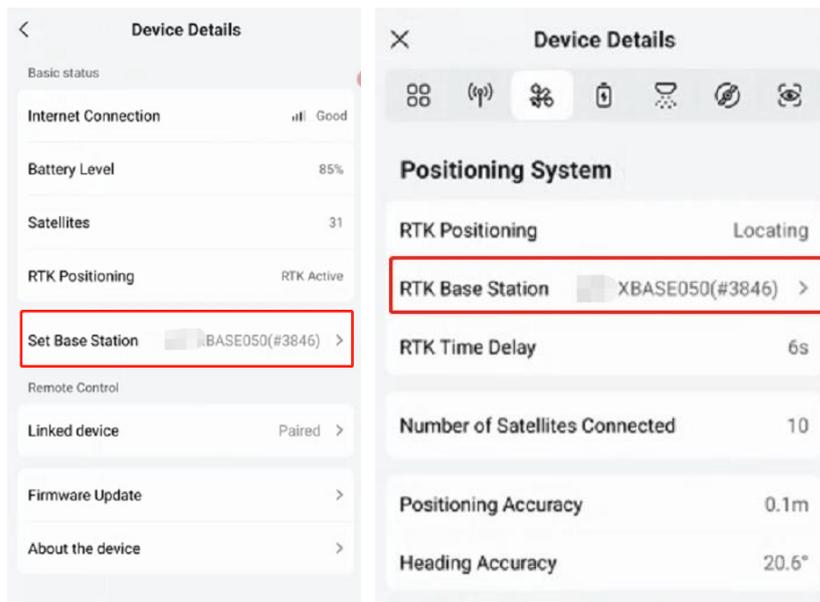
Method 1: Field Mapping using Fixed station under 4G Network

Items required:

- Fixed station or RTK portable station
- ACS2 2021 remote controller
- RTK rover
- Smartphone
- XAG One App

Description:

1. Make sure your fixed station has been setup and activated. If not, please contact Xcare team.
2. Select the nearest fixed station for UAV and ACS2 2021, if you want to fly your UAV after field mapping.



RTK fixed station has limited working coverage, normally 30km. Please make sure you are within 30km away from RTK fixed station.

3. Install the RTK module on top of the remote controller, press and hold the smart key ∞ of ACS2 2021, or Fn key of ARC3 Pro, that enables the RC to enter RTK mode.
4. Make sure that the RTK LED (6th) light of ACS2 2021 illuminates in green
5. Make sure that both 1st and 2nd light illuminate in green
6. Ready to perform field mapping

Method 2: Field Mapping using Portable Station under 4G/RCN Network

Items required:

- RTK portable station
- ACS2 2021 or ARC3 Pro remote controller with sim card
- RTK module
- Smartphone
- XAG One App

Description:

1. Enable internet access for the XRTK via RCN or 4G

RCN

1) Make sure the XRTK4 has been installed with the latest firmware.

Power on the XRTK4 and wait until the first led become solid red, click (do not long press) the F1 key to initiate pairing mode.

2) Make sure the ACS2 has been installed with the latest firmware.

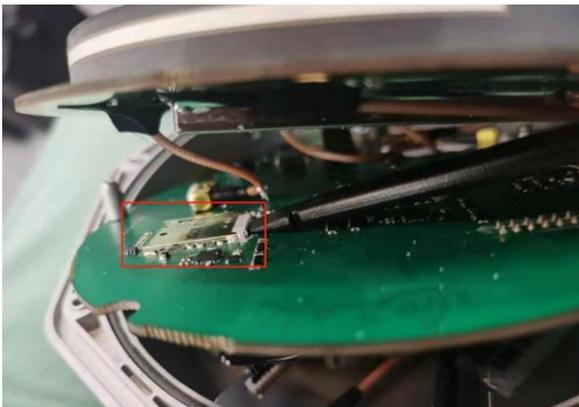
Power on the ACS2 and wait until the 3rd led turns off, then press and hold the power button until the 3rd led flashes in yellow, indicating the ACS2 has entered pairing mode too.

3) Wait until the XRTK4 and the ACS2 paired successfully, which means the XRTK4 can connect phone with the ACS2 hotspot

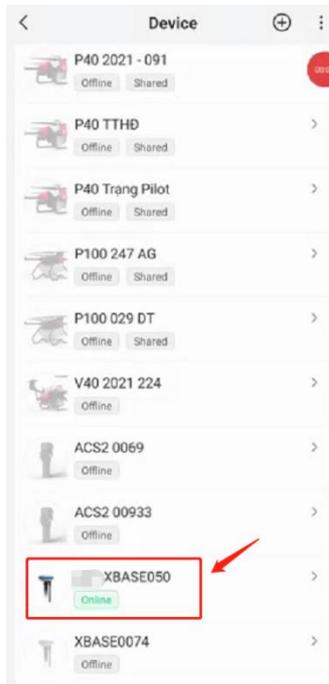
4G

Insert 4G SIM into XRTK4. You may need to disassembly the XRTK to insert the 4G SIM card.

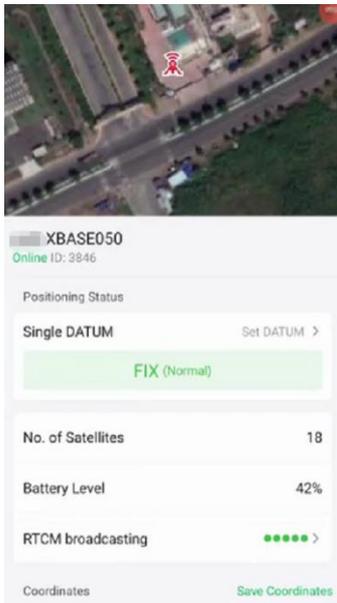
Make sure the SIM card is compatible.



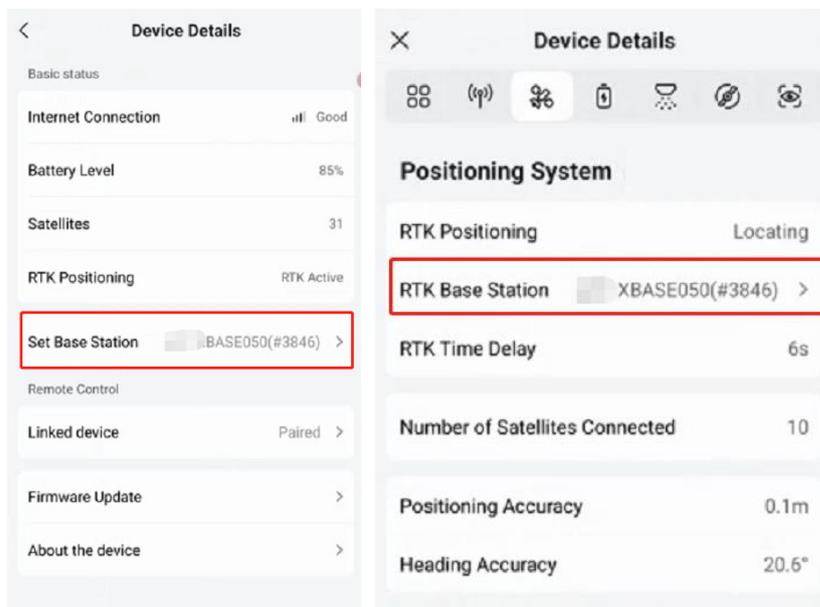
2. Power on the XRTK and wait until the initiation finishes, then long press F3 button until that all three LED lights are flashing.
3. Under 4G network (or RCN), use XAG One App account to scan XRTK4 serial number QR code, add XRTK4 into XAG One account.



4. XRTK4 firmware cannot be updated directly through 4G, but you may update its firmware with offline method or in RCN mode. For old RTK device, user may need to use the ACS2 2020 / XAG Agri 2 App method to update XRTK4 firmware.
5. Wait for the XRTK4 go into FIX mode.



6. Set base station to this XRTK4 for ACS2 2021. You can also set the base station for UAV if you will fly it shortly.



7. 3. Install the RTK module on top of the remote controller, press and hold the smart key ∞ of ACS2 2021, or Fn key of ARC3 Pro, that enables the RC to enter RTK mode.
8. Make sure that the RTK LED (6th) light of ACS2 2021 illuminates in green
9. Ready to perform field mapping

Method 3: Field Mapping using CORS under 4G Network

Items required:

- CORS
- ACS2 2021 remote controller
- RTK rover
- Smartphone
- XAG One App

Description:

1. You must have a valid CORS account
2. Make sure your UAV and ACS2 remote controller has internet access through 4G
3. On XAG One App setting, connect UAV and ACS2 2021 remote controller to CORS
4. Long press the smart key ∞ of ACS2 2021, that allows ACS2 enter RTK mode
5. Make sure that the RTK LED (6th) light of ACS2 2021 illuminates in green
6. Make sure that both 1st and 2nd light illuminate in green
7. Ready to perform field mapping

Method 4: Field Mapping using Portable Station under LNT Network

Items required:

- LNT
- RTK portable station
- ACS2 2021 remote controller
- RTK rover
- Smartphone
- XAG One App

Connect ACS2 to XRTK4 under LNT network



1. Long press the smart key  of ACS2 2021, that allows ACS2 enter RTK mode



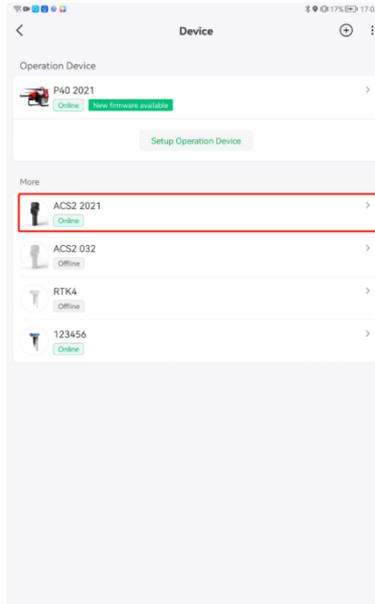
2. Make sure that the RTK LED (6th) light of ACS2 2021 illuminates in green



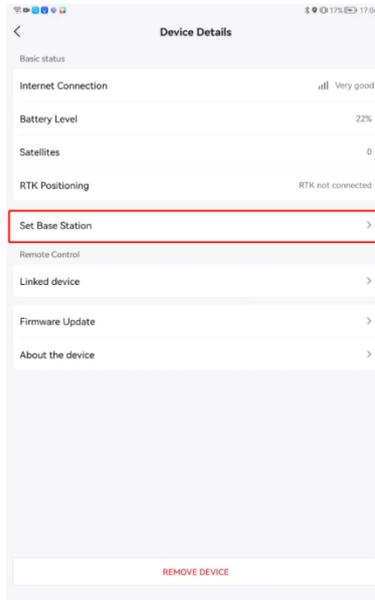
3. Make sure that both terminal and task status light illuminate in green



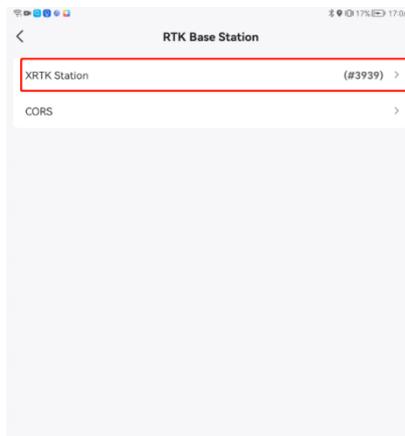
4. Make sure that smartphone is connected to LNT hotspot, but NOT the 4G network
5. Go to ACS2 2021 setting



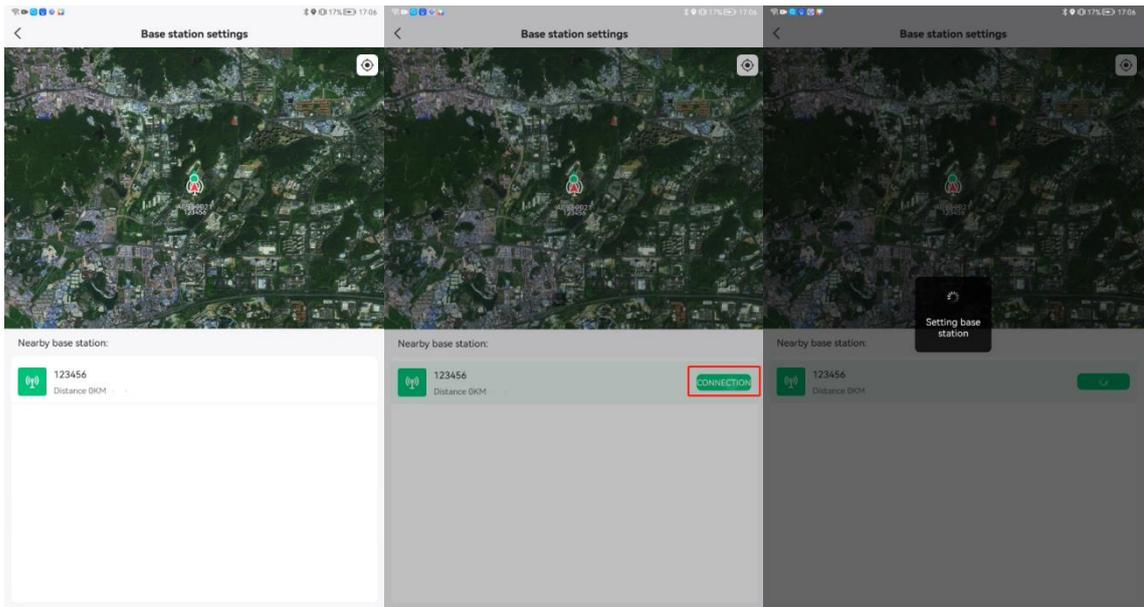
6. Under device details. Choose “Set Base Station”



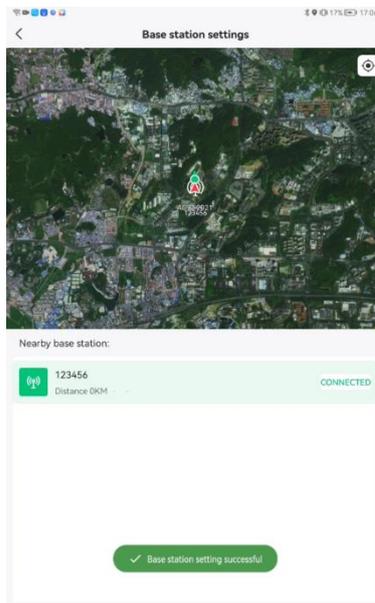
7. Choose “XRTK Station”



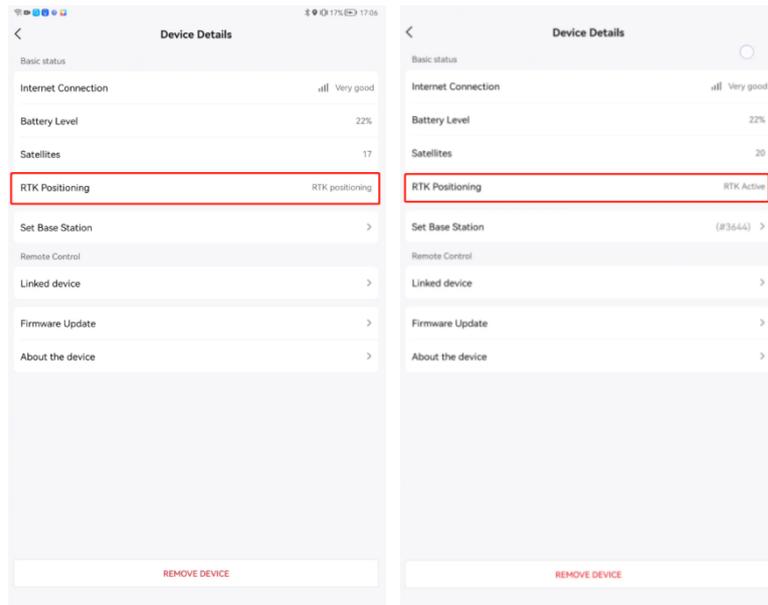
8. Connect your base station



9. Base station setting successful



10. Wait for 30 seconds for RTK positioning to be active.



If the RTK positioning status is displayed as **“RTK not connected”** or **“RTK positioning”**, ACS2 field mapping will not work. Make sure the RTK positioning status must be **“RTK Active”**.

Method 5: Field Mapping using VRTK with Remote Controller

Items required:

- ACS2 2021 or ARC3 Pro remote controller (with latest firmware)
- RTK module (with latest firmware)
- Smartphone
- XAG One App

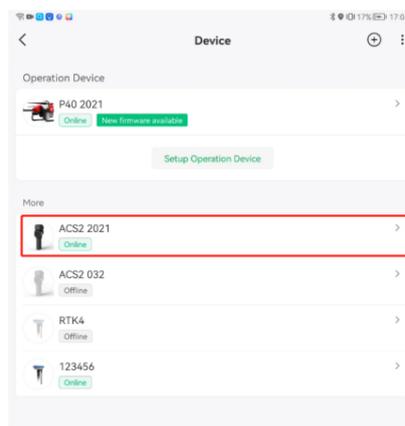
Introduction:

VRTK, short for Virtual Realtime Kinematic, enables our user to map or fly with much better precision than GPS **without** a physical RTK station. The reference point is set by the Remote Controller or the Drone itself before mapping or operating. Here is how to do the mapping:

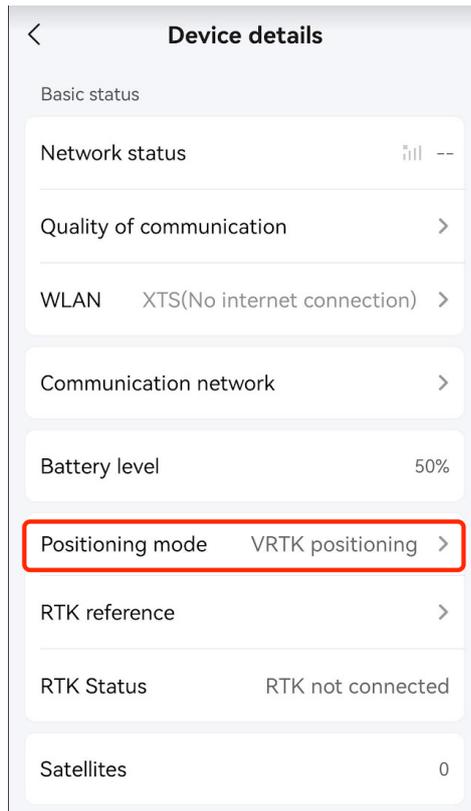
1. Turn on the RC with RTK module, then long press the smart key  to enter mapping mode. The module will begin to search for satellites.



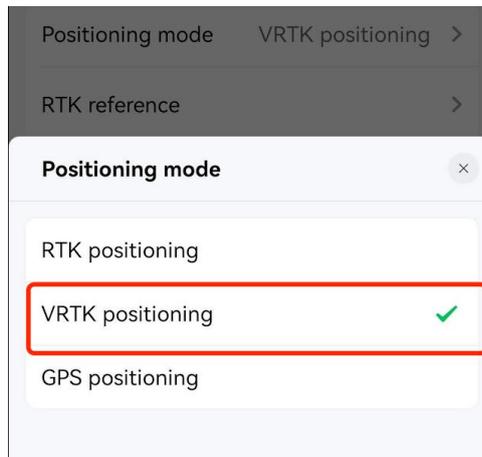
2. Make sure that smartphone is connected to ACS2 hotspot, but it does not matter if the ACS2 has internet access or not. (The second led can be on or off)
3. Go to ACS2 2021 setting



4. Under device details. Choose "Positioning Mode"



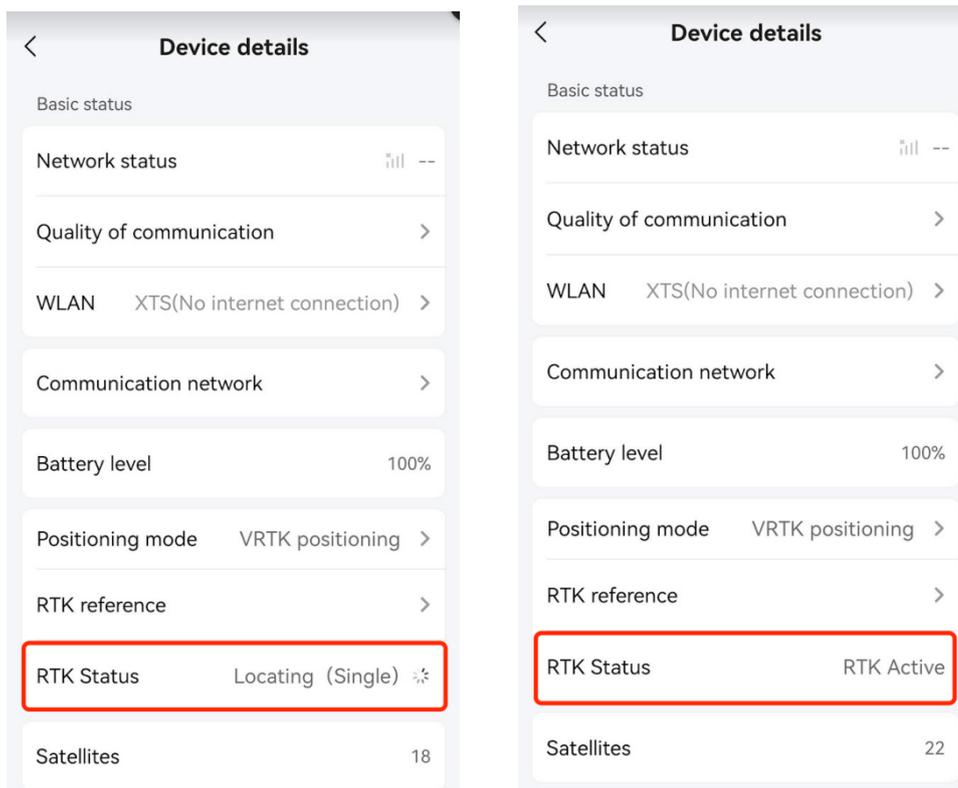
5. Choose "VRTK Mode"



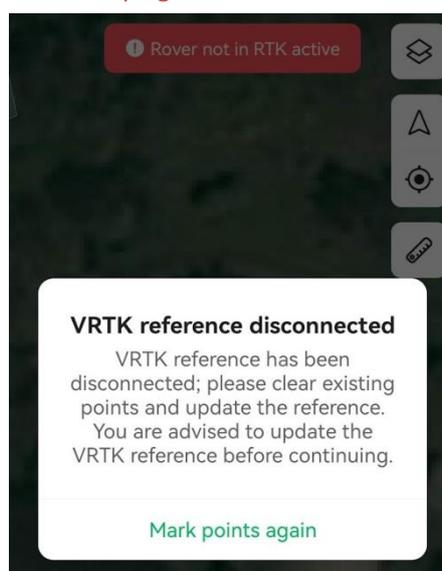
6. Place the ACS2 on a certain spot, keep it still with the RTK module pointing upwards



7. Wait until the RTK Status become “RTK Active”



1. Before enabling VRTK, make sure the field is free of complex terrain or obvious obstructions that could possibly block the satellite signals.
2. When using VRTK, always keep the RTK module vertically upward, do NOT block the RTK module by hand or put it under your body.
3. In case the RC exits VRTK mode (mostly because of losing satellite signals), all the marked points will be erased, and you will have to map again



Setup ACS2 RTK module

1. Go to the field.
2. Setup RTK station and make sure it goes into FIX mode, connect ACS2 to RTK station.
3. Turn on the ACS2 remote controller, Wait until the cloud communication LED indicator light (second from the left) illuminates
4. Plug RTK rover module onto the ACS2 2021 remote controller; The RTK LED indicator light (6th from the left) will soon illuminate. If RTK Rover Module is abnormal, please remove and plug it again.
5. Long press the smart key to enable Rover Mapping Mode. Once Rover Mapping Mode is enabled, the RTK Rover Module light indicator, 6th from the left, illuminates in green.

Hints:

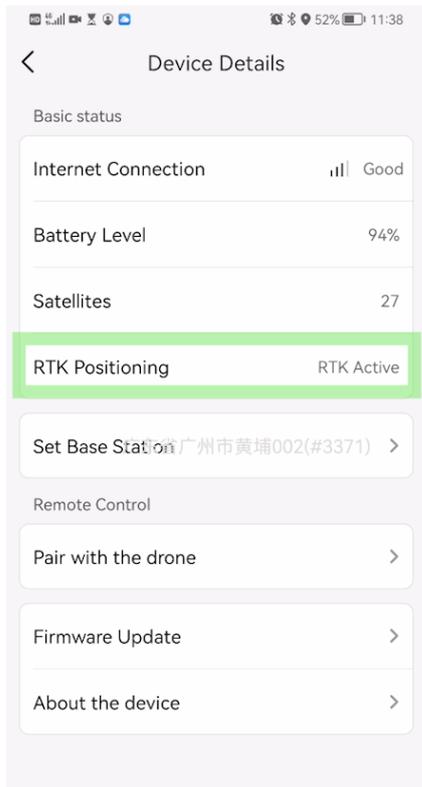
To add a point, simply press button A

To delete a point, simply press button B

To Enable/disable Rover Mapping Mode, long press the smart key ∞



6. Check the ACS2 device details
 - a) Make sure the status of RTK positioning is "RTK active".
 - b) Make sure the base station has ID number, where in this example, the ID is #3371.
 - c) The number of satellites is greater than 16.



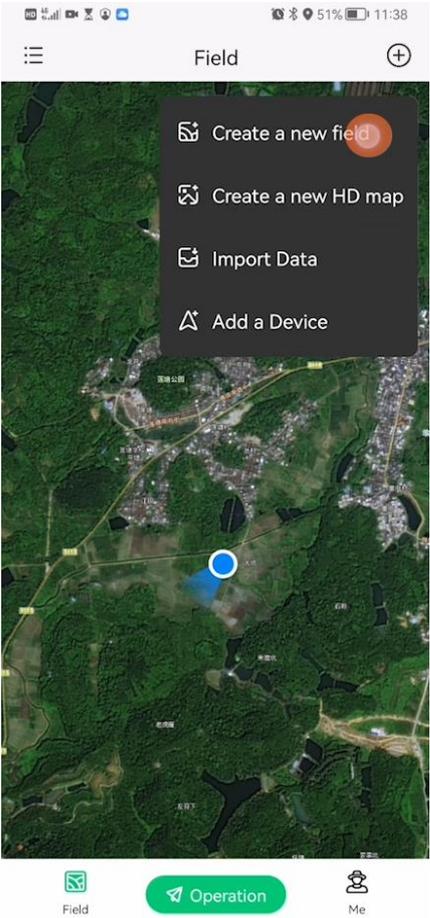
7. Connect the smartphone to ACS2 hotspot. This will significantly increase the communication range between smartphone and LNT. For more information, please refer to the section “Local Network Terminal in Field mapping”.

Create field boundary using ACS2 Rover

- 1. Find out the field mapping area and points that need to be put. The example shows that 4 points are sequentially set to create field boundary.



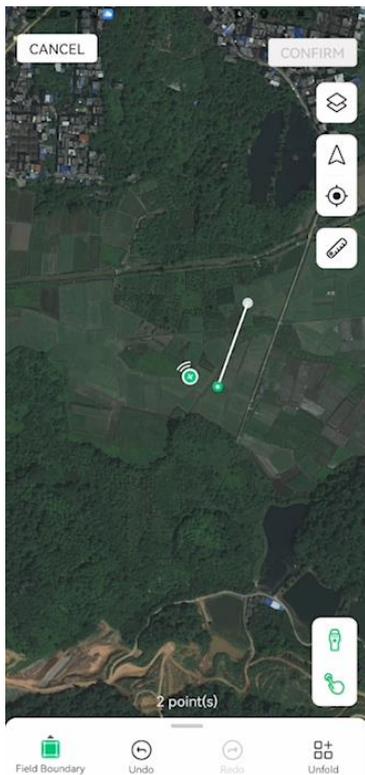
- 2. In XAG One app, create a new field



-
3. To receive better RTK signal, make sure holding ACS2 remote controller vertically, allowing RTK module pointing upward

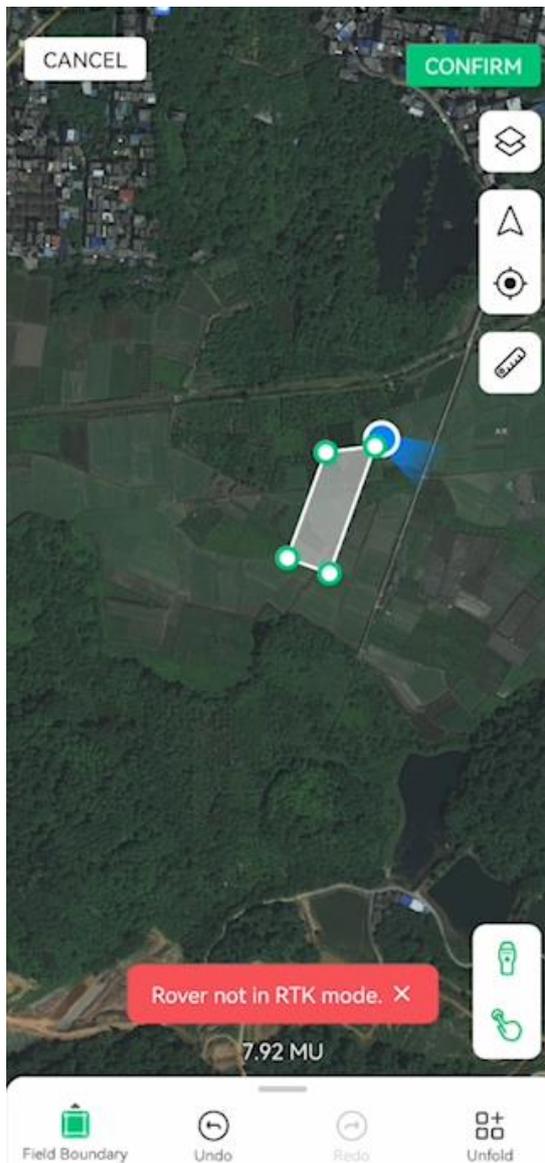


4. Walk into the field and add points. Press A to add points, Press B to delete points. \





5. Once the field mapping is completed, press the point #1 to enclose the field. Then press confirm to edit the field information. The field area will display in the App. Quit ACS2 mapping mode by long press the smart key. As the mapping mode quit, the app will display "Rover not in RTK mode". Remove the rover from ACS2 remote controller.



-
6. Complete field information, input field name, add pictures, add notes and press Save.

< Complete field information SAV

Field Name
Demo1 ×

Label
Fill in the labels

Note
Add Note(s)

Picture

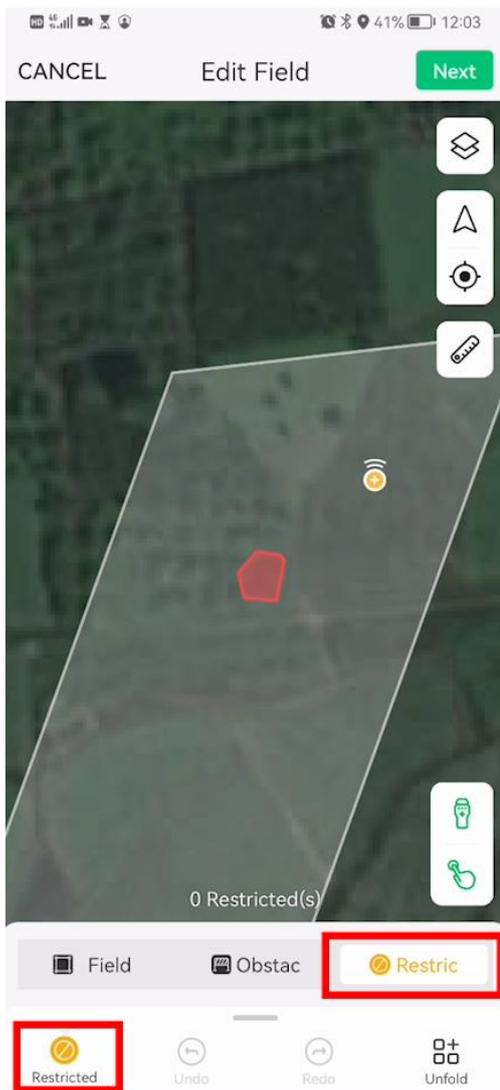

7. Field boundary is created successfully.

Create restricted area

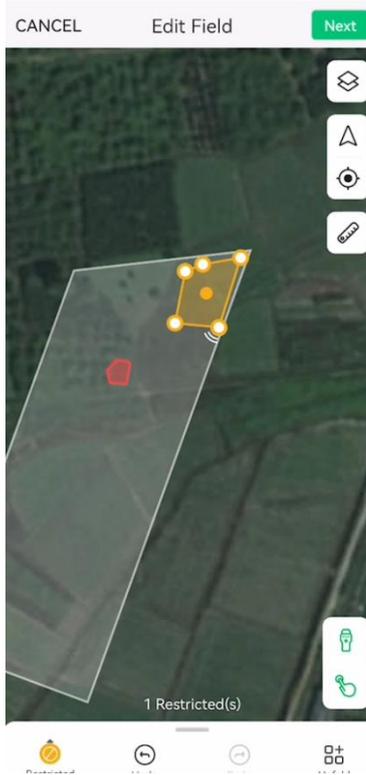
1. After the field boundary is completed, we can create restricted area
2. Define the restricted area. Within the restricted area, the UAV will automatically turn off the spray system.



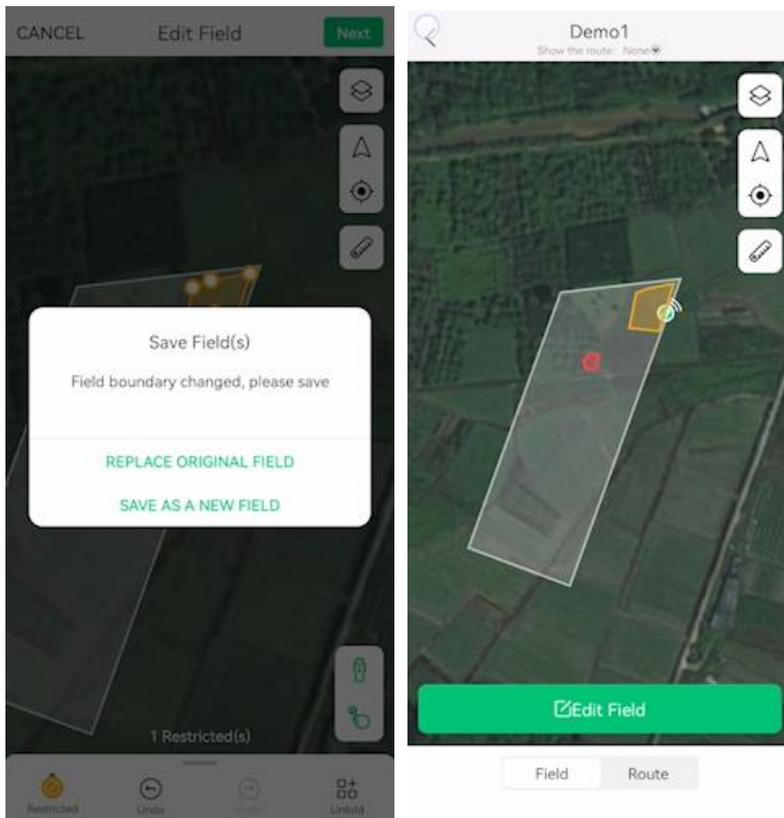
3. Select restricted area



4. walk into the field and manually add points using ACS2 Rover



5. Save field



6. Restricted field is created successfully.

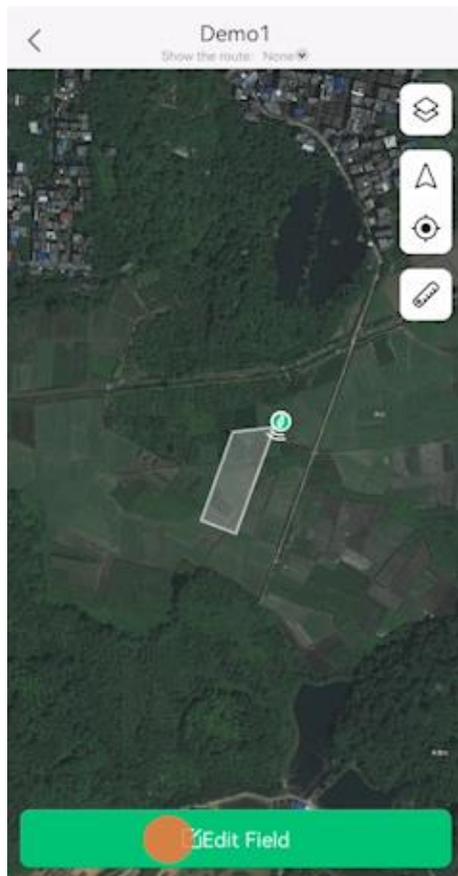
Enclosure obstacles

1. Find the obstacle in the field.

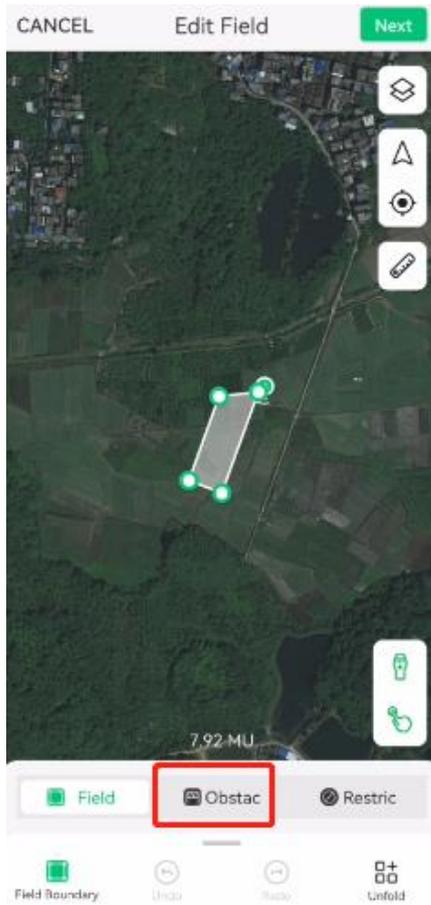
Hints: it's important to isolate obstacle as sometimes the radar may not stable and fail to detect obstacles under complex environment.



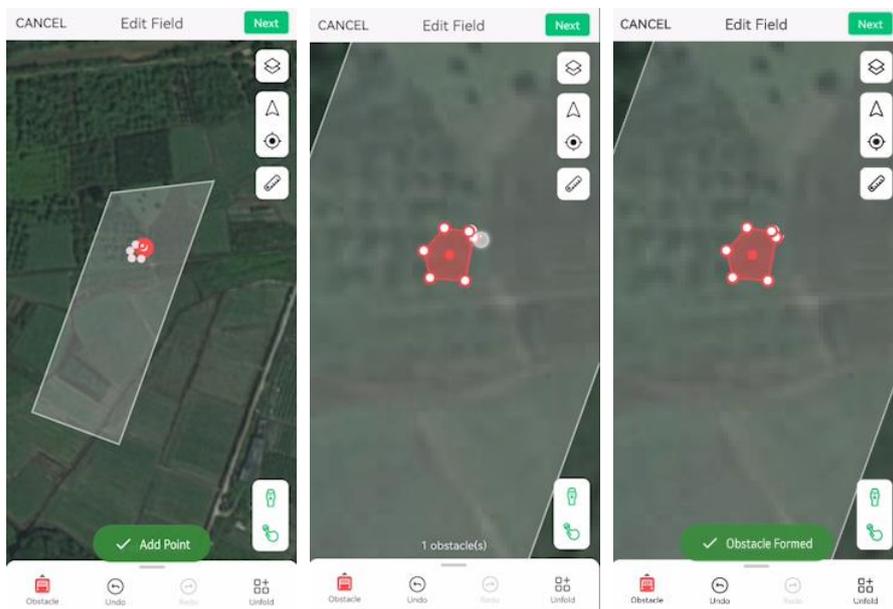
2. Open App, press edit field



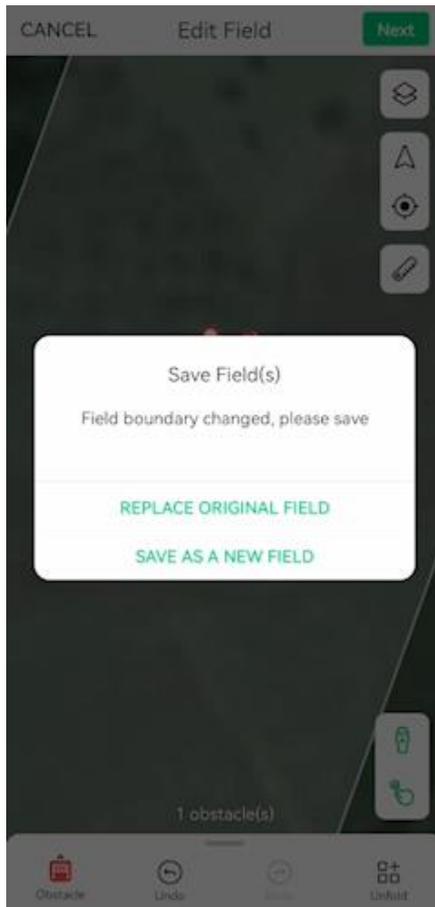
3. Choose obstacle



4. walk into the field and set points using ACS2 Rover. Press the 1st point to form obstacle



-
5. Save field(s)



6. Obstacles is created successfully

Chapter 9

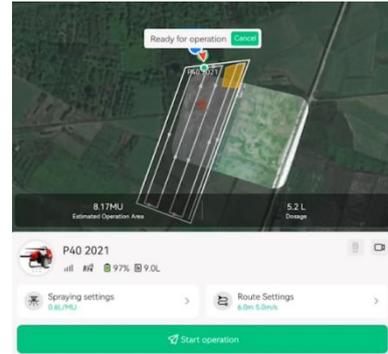
Flight Mission

Flight Planning

According to the operation experience, the users need to figure the proper parameters that can maximize the outcome. The outcome can be affected by the terrain, weather, temperature, wind speed, humidity, types of plants, chemicals, etc. In some situations, users may need to run some tests before decide the parameters.

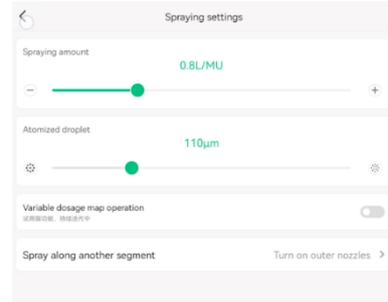
Parameter	Unit	Description
Spray amount	min/mu	controlled by the flow rate of peristaltic pump (L/min), flight speed(m/s), flight height (m), Route interval(m)
Atomized droplet	um	Control by the rotating speed of spray tray, flow rate of peristaltic pump Affected by weather temperature, humidity, wind speed, etc.
Flight height	m	measured by GNSS/RTK
Flight speed	m/s	m/s = displacement divided by time. Displacement is measured by GNSS/RTK Time is measure by the clock in flight control
Route direction		The heading direction is defined by the UAV head. The UAV head is positioned by two GNSS/RTK antenna.
Route interval	m	Spray width
Boundary safety distance	m	The distance from field boundary
Obstacle safety distance	m	The distance from obstacle when UAV hovers
Operation area	# of routes	The flight route is divided by several sub-routes. User can select the specific sub-routes for operation
Follow terrain	ON/OFF	The Radar scans downward and measure the height between UAV and ground. Accordingly, the UAV can adjust its height.
Obstacle avoidance	ON/OFF	The Radar scans obstacles.
Automatic route optimization for break point continues flight	ON/OFF	UAV will automatically customize the flight route according to its location, remaining battery power and payload weight. The purpose is to shorten the flight duration with full payload, which will significantly consume the battery.

Main menu



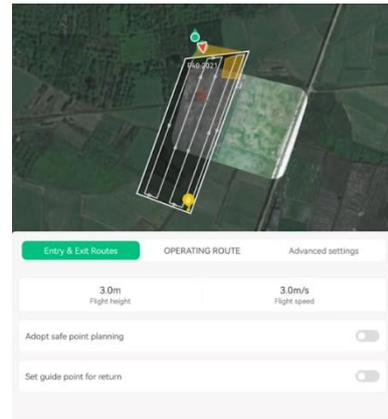
Spray setting

**Spraying amount
Atomized droplet**

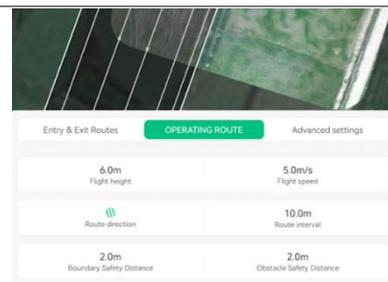


Route Setting

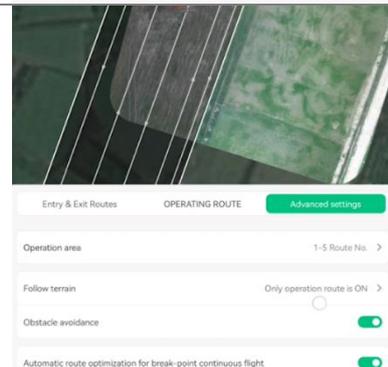
**Entry & Quit Route (Flight
Height, Flight Speed)**



**Operating Route (Flight Height,
Flight Speed, Route Direction,
Route interval, Boundary Safety
Distance, Obstacle Safety
Distance)**



**Advanced setting (Operation
area, Follow terrain, Obstacle
avoidance, Automatic route
optimization for break point
continues flight)**



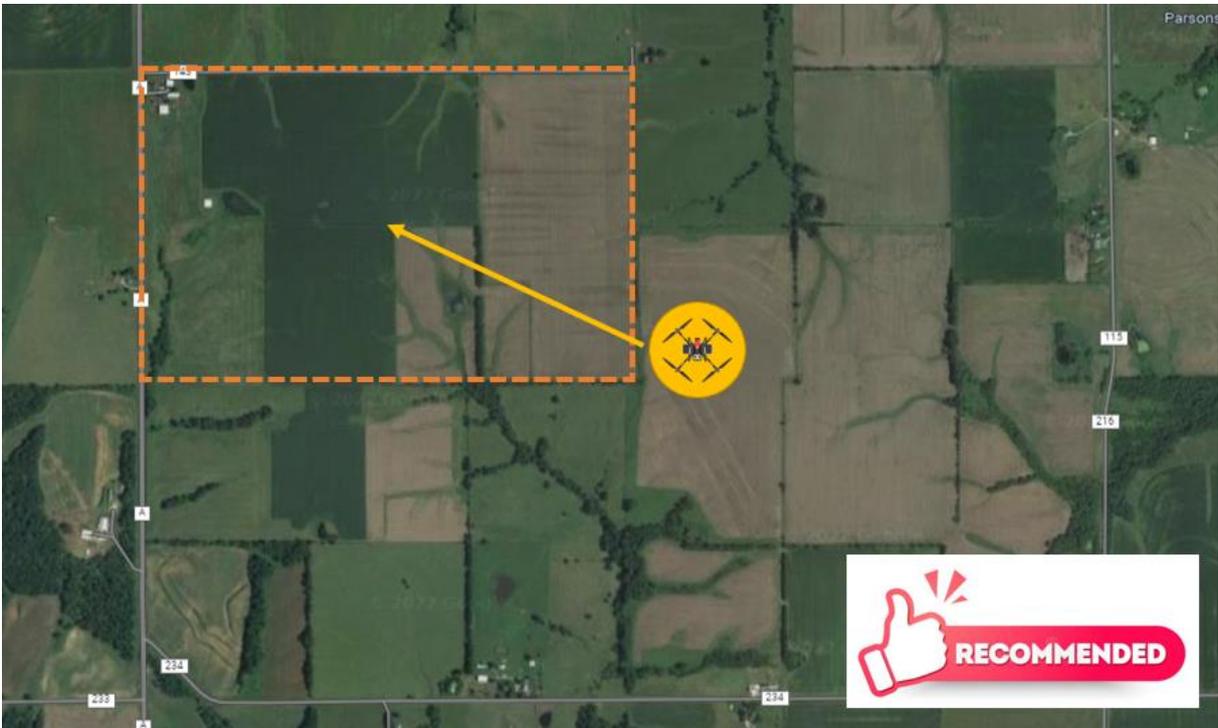


Improve flight mission efficiency

There are many ways to improve the flight efficiency, Firstly, do not place your drone far away from the field.

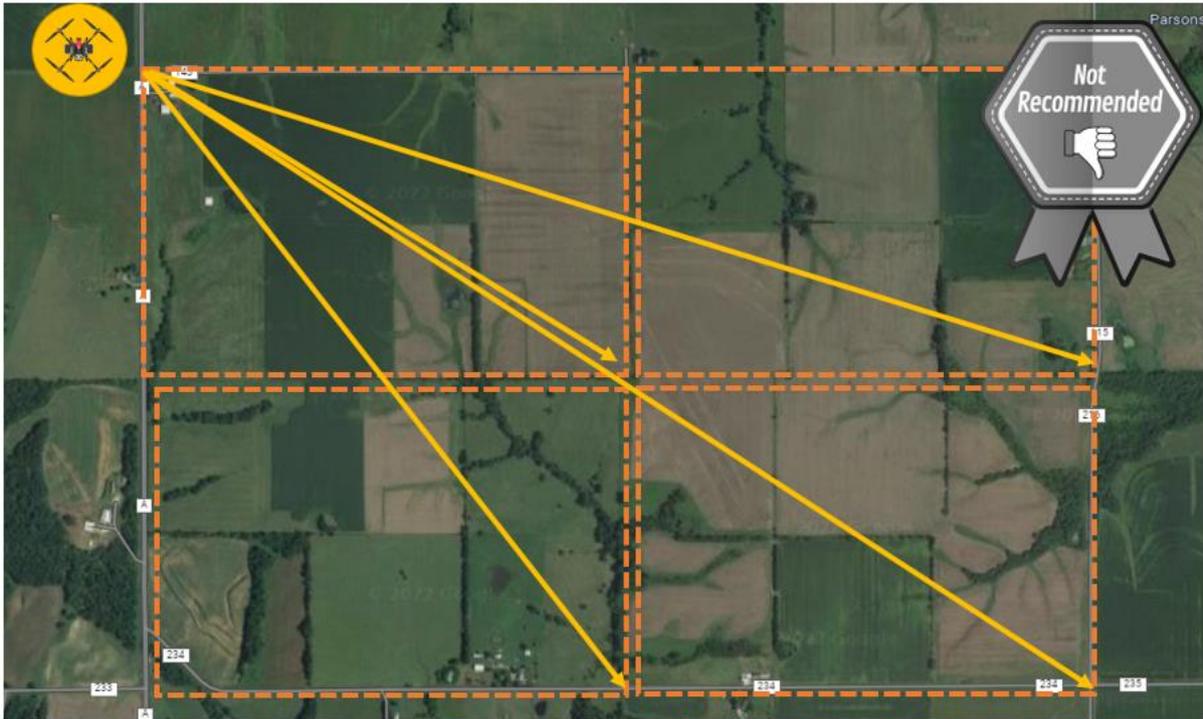


it's suggested to shorten the distance of entry and exit route. In this way, the drone can have more battery power in the field.



Secondly, when you have multiple fields, place your drone in the proper position that minimize the entry and exit route distance.

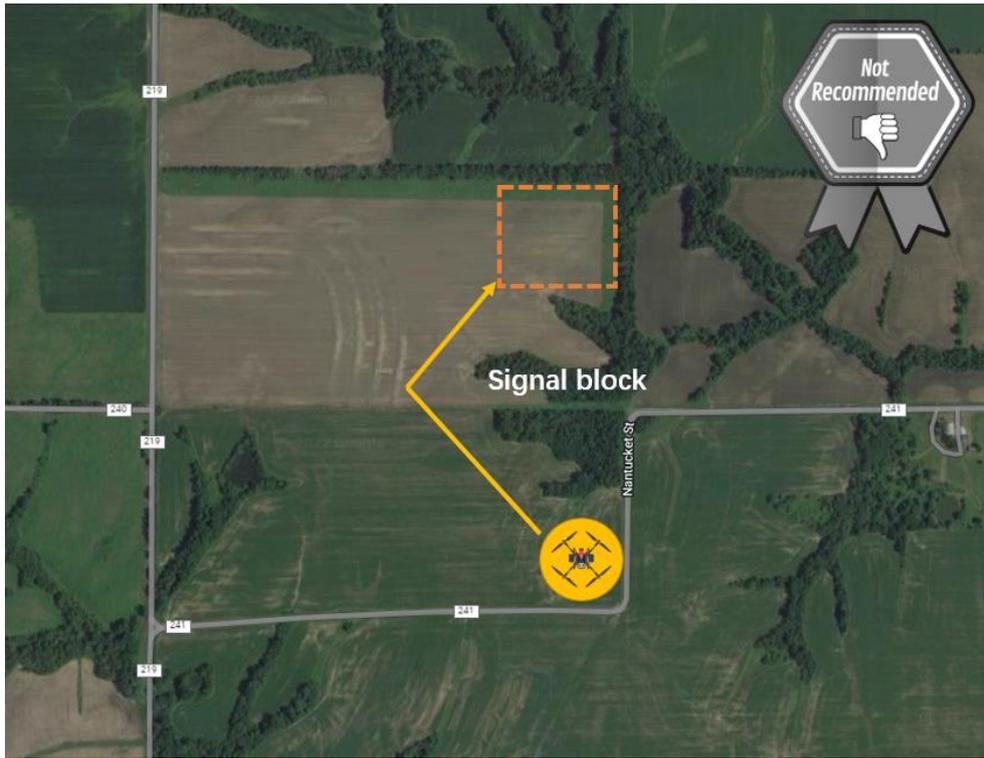
In this example, the drone is close to one field but far away from the others. **Not recommended.**



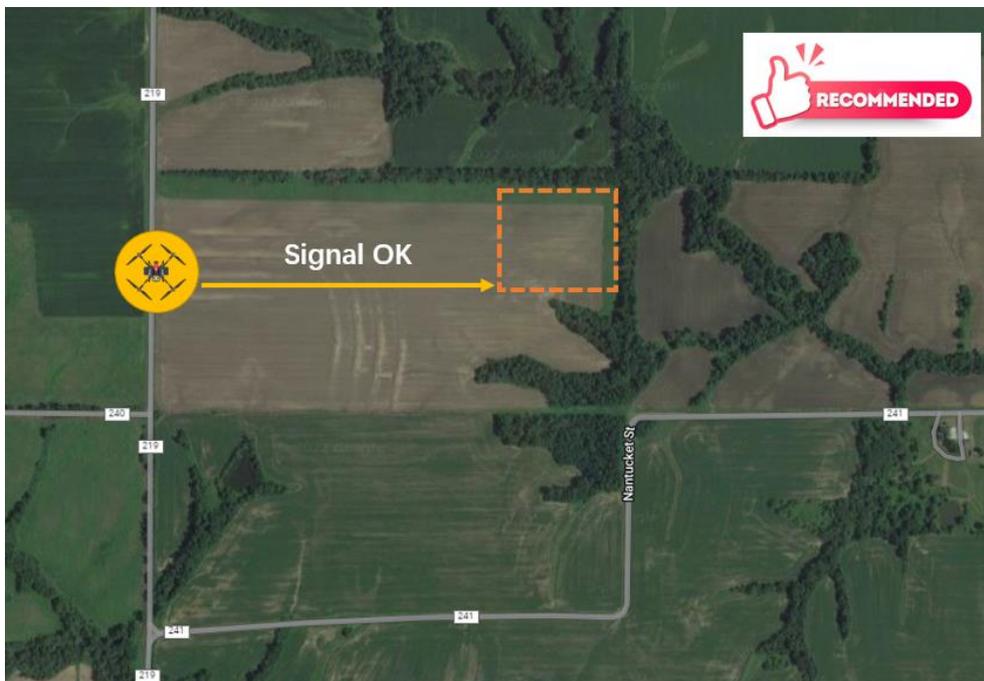
Thus, we should place the drone in the center of fields. **Recommended.**



Thirdly, please avoid signal blocking like trees, bush, mountains, hills, etc.



Place your drone on the position where there is no signal blocking.

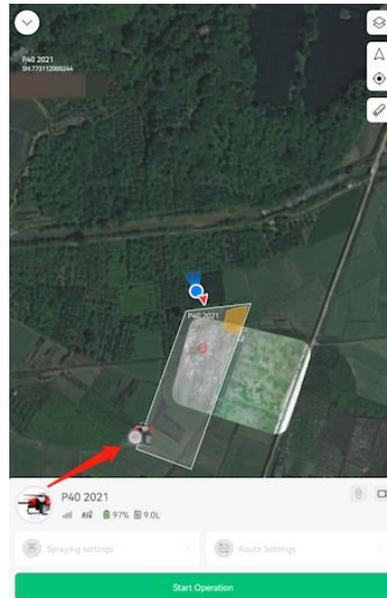


Autonomous Flight Mission

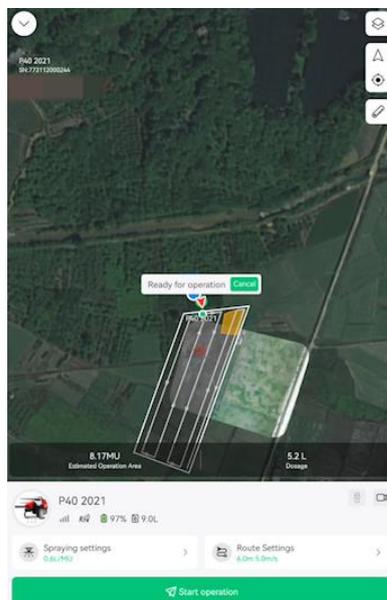
Autonomous flight mission allows the UAV to complete the spray or spread task in fully automation. The UAV will use the AI navigation algorithms to compute the optimized routes according to the given field and parameters.

- | No. | Process |
|-----|---------------------------|
| 1 | Drag the UAV to the field |

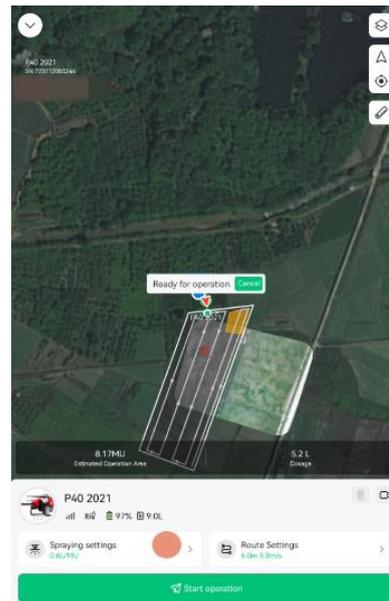
Photo



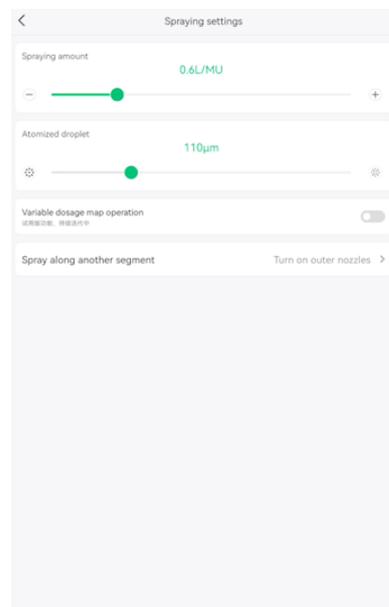
- | | |
|---|---|
| 2 | Check the signal strength, RTK status, battery status, the remaining liquid in the tank, the status of ACS2 remote controller |
|---|---|



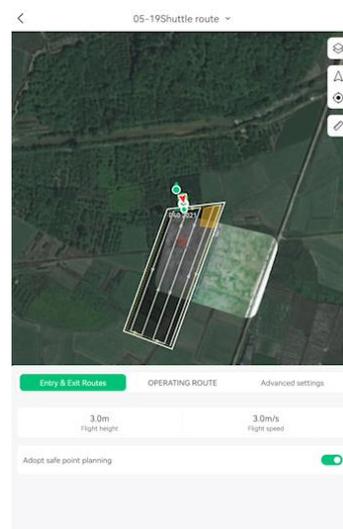
3 Go to the spraying setting



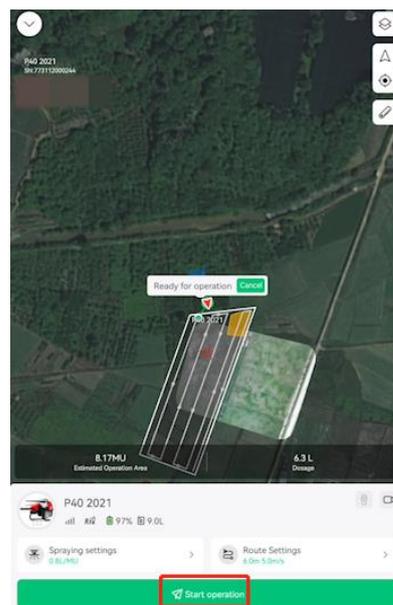
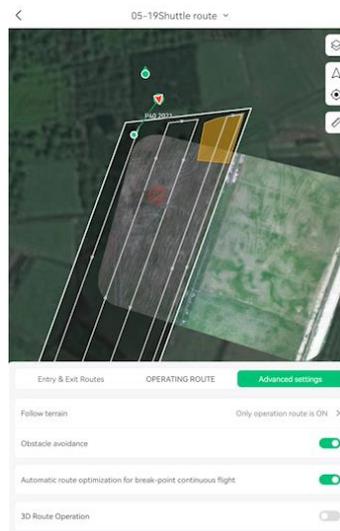
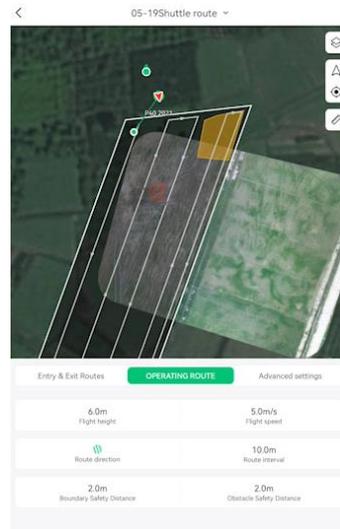
4 set the parameters of spraying amount and atomized droplet



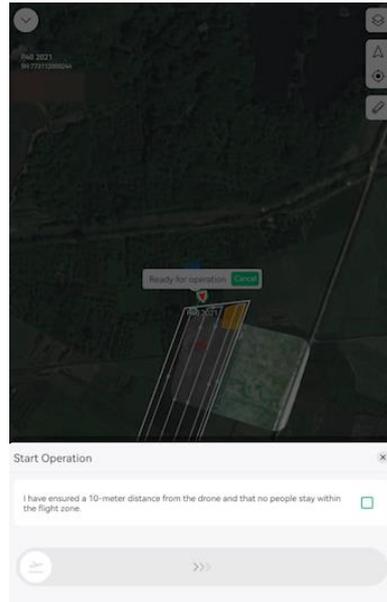
5 Change the route setting



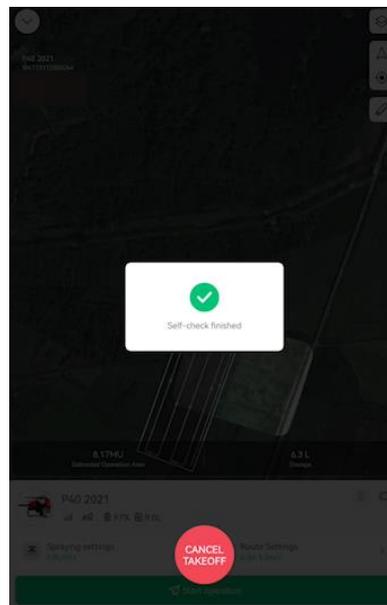
6 Start operation



- 7 Safety Check. People can stay 10 meters away from the UAV



- 8 Wait for self-check finished

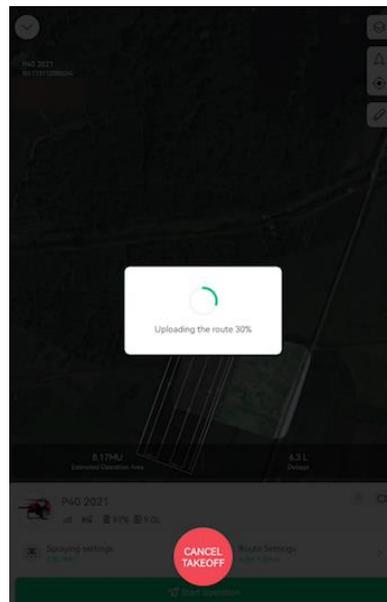


- 9 Uploading the route

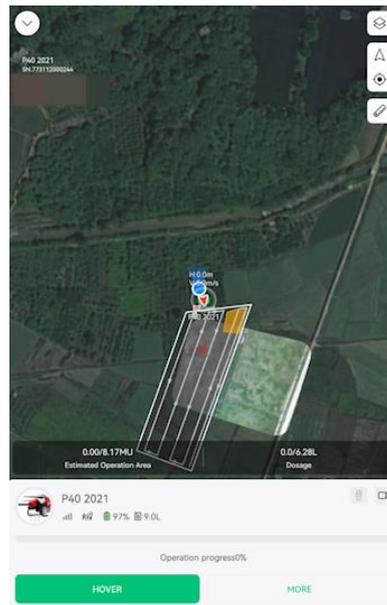


Safety Awareness:

make sure the ACS2 remote controller is holding in hand during the whole process of operation, in case of that you need to take over the control of the autonomous flight



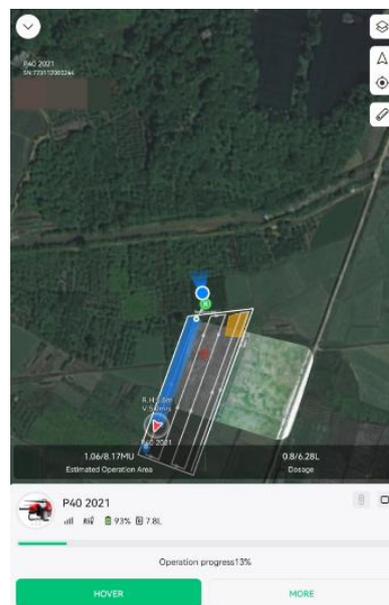
10 UAV takes off



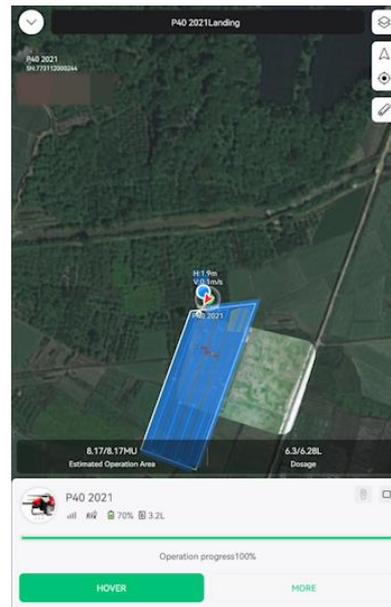
11 The UAV will be firstly heading to the safe point of entry route, then enter the field.



12 Operation in process



- 13 Mission completed. The UAV will turn off the spray immediately and ready to return the takeoff point.



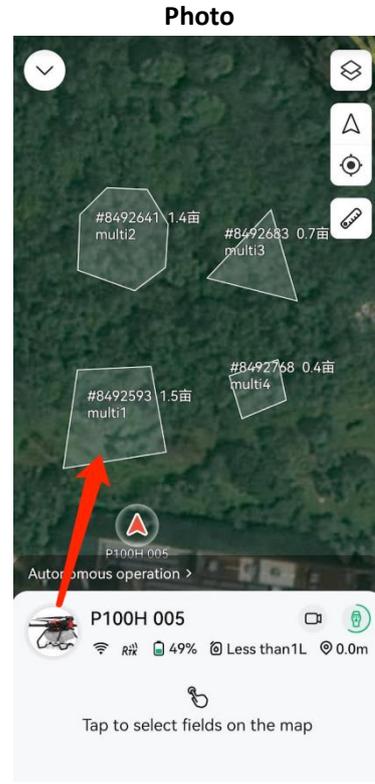
- 14 UAV land



Continuous Operation on Multiple fields

Continuous operation on multiple fields allows the UAV to spray or spread on multiple fields in fully automation. The total area limitation for such operation is 13.3 hectares, maximum number of fields is 10.

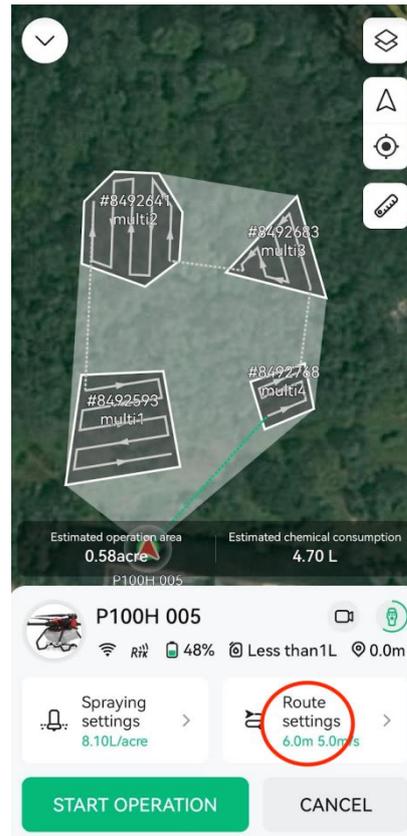
- | No. | Process |
|-----|---------------------------------|
| 1 | Drag the UAV to the first field |



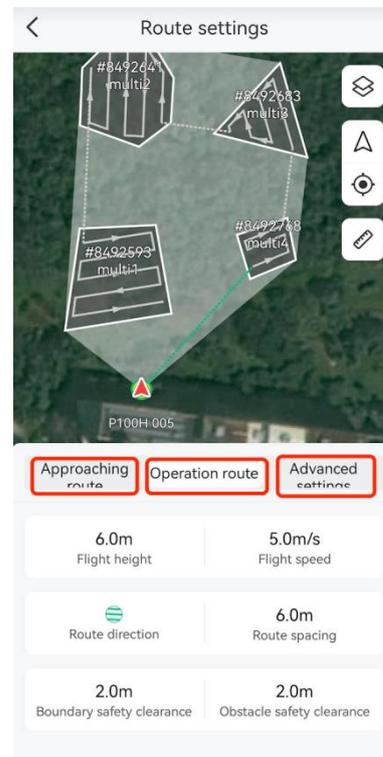
- | | |
|---|--|
| 2 | Drag the UAV to the second field and repeat with the third and more. |
|---|--|



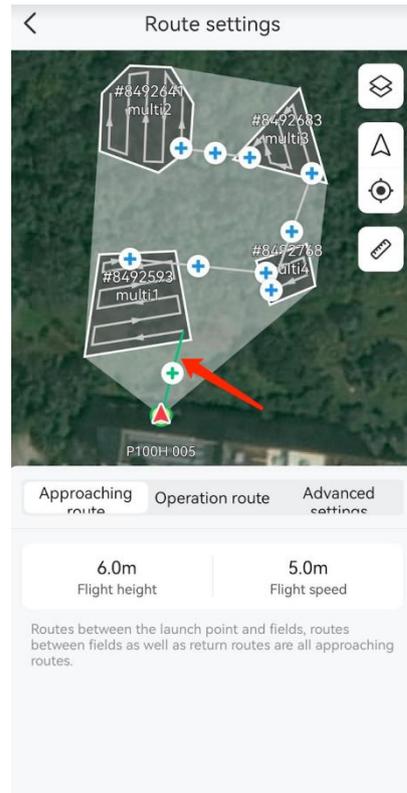
- 2 After selecting fields, tap “route settings”



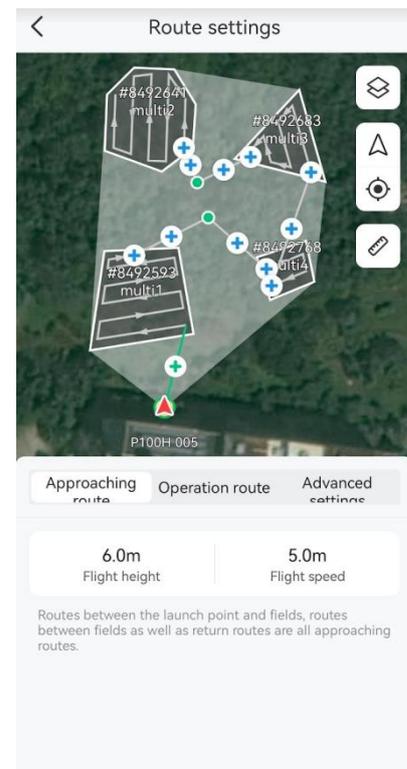
- 3 On Route Setting interface, you can set the flight height, speed, and other parameters separately for approaching routes (enter and exit) and operation routes.



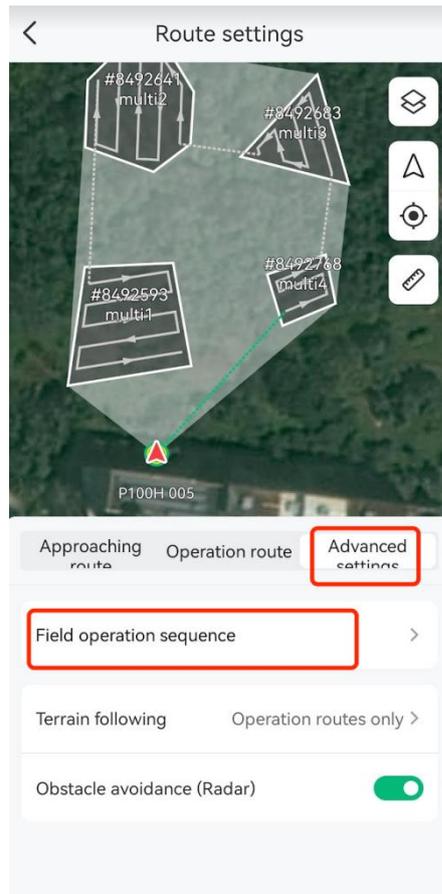
- 4 On Approaching Route setting page, you can set the speed, height, tap the entering route, “+” symbols will appear in the middle of each connection routes between the fields to enable you to set guide points for safe flight between fields.



- 5 You may drag the guide points to move it or add more guide points by tapping the “+” symbol.



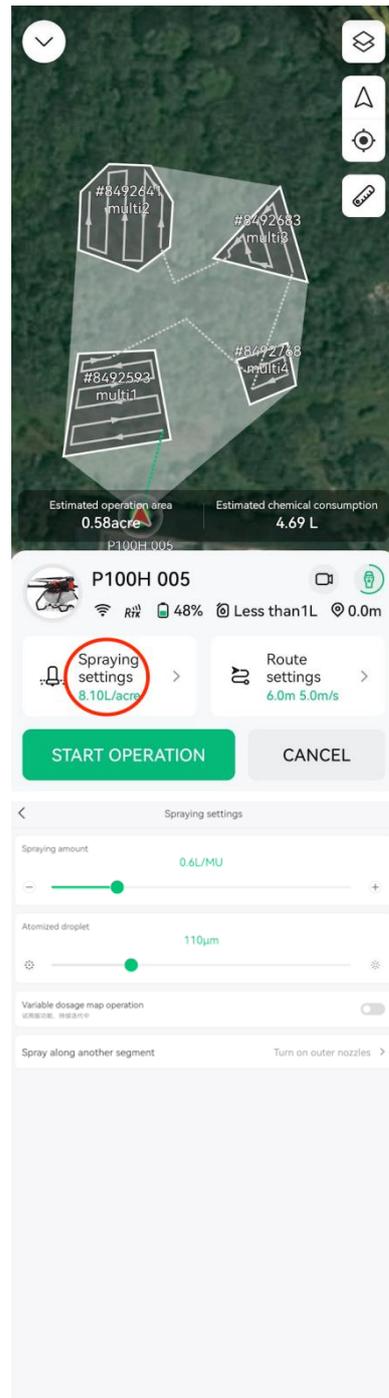
- 6 On Advanced setting page, you may change the operational sequence among the fields



- 7 Hold the field tag on the list below and drag to the place you need to change the sequence. You will see the routes change afterwards. Please set the most reasonable and energy saving sequence.



- 8 After setting flight routes, return to the operation interface by tapping the “<” symbol on the top left corner. Here you can set the spraying parameters.



- 9 set the parameters of spraying amount and atomized droplet. Note: The spraying parameters are uniform for all the fields selected, cannot be set separately.

Start operation by tapping the “Start Operation” button. And follow the instructions illustrated by previous “Autonomous Flight Mission” step 6-14.



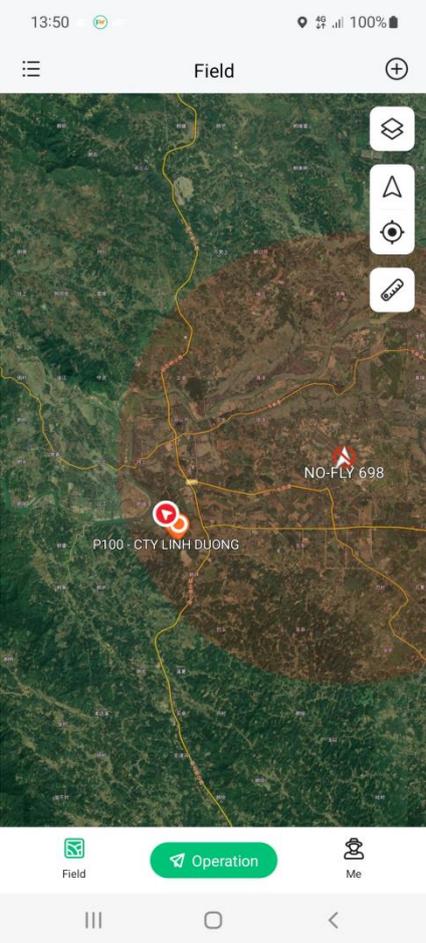
Safety Awareness:

If the drone returns midway through the operation, it's return route might not bypass the obstacles mapped. It is advisable to enable Obstacle Avoidance Radar, or make sure there is no obstacle in the whole **flight area** that displayed on the app.



Geofencing

Be aware of that there are non-fly zones that UAV is not allowed to fly.
If users want to fly their UAV in non-fly zones, they can apply for exclusion from XAG technical team.



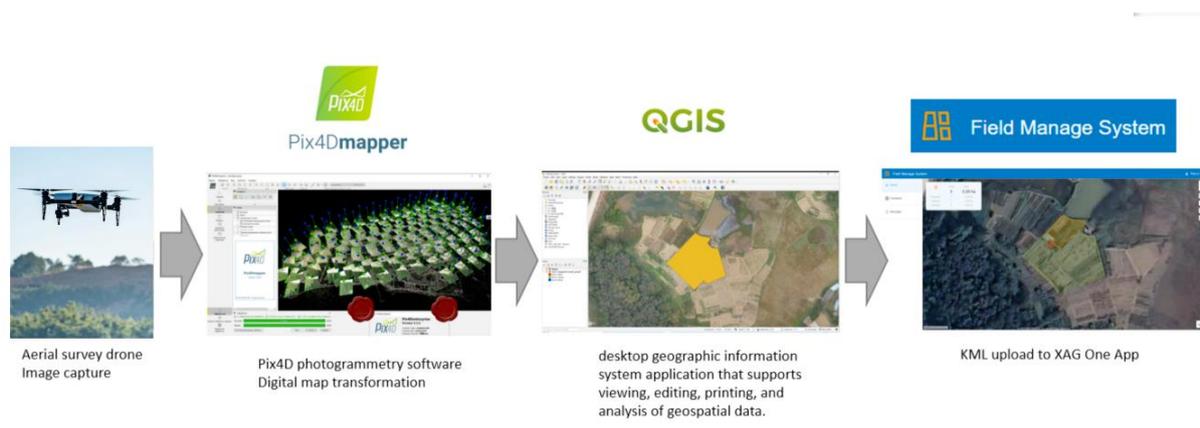
Areas that are not allowed to fly.

-  High pedestrian activities
-  Restricted airspace
-  Routes of airliners
-  Sensitive areas
-  Danger zone
-  Poor health condition
-  Pool device condition
-  Pool skill ability

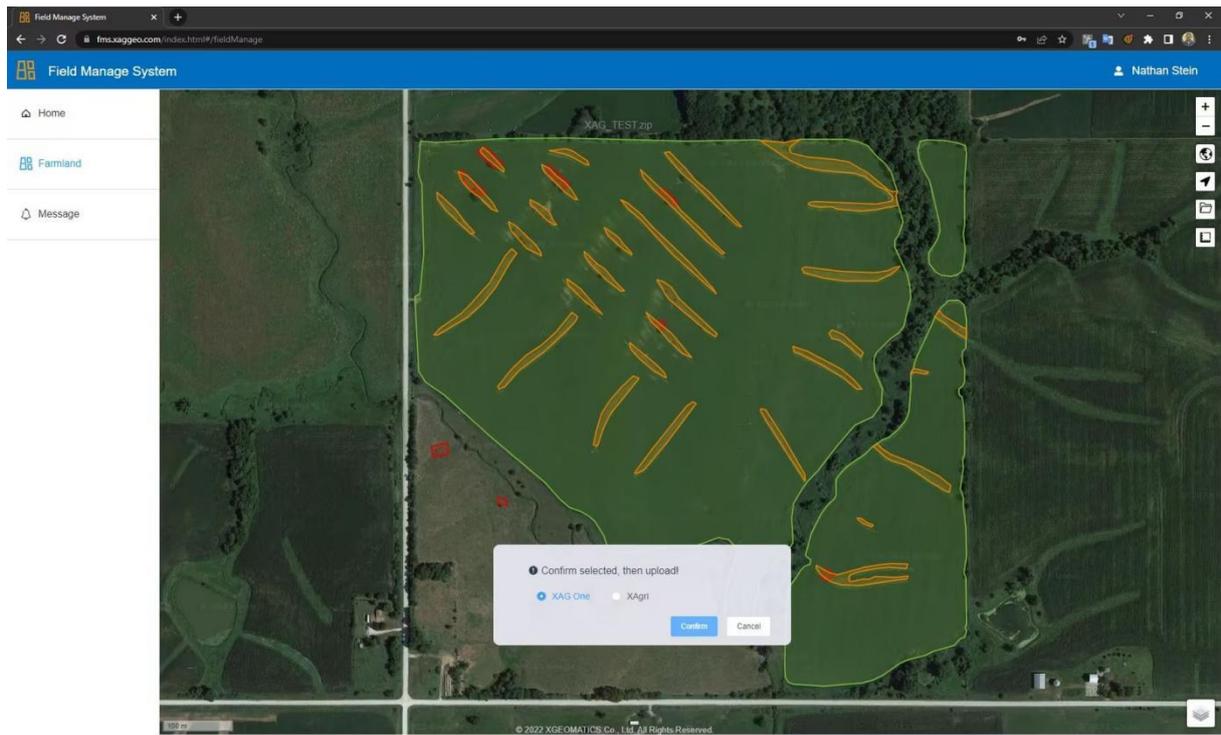
Chapter 10 Field Management System

Overview

XAG remote controller ACS2 with RTK module allows users to perform field mapping. This method is efficient when the field area is small and simple. When dealing with a large field area, it's more convenient to have aerial survey drones to capture and process a digital map, then draw out the field boundary, obstacles and non-spray area on computer software and output them as KML file. Once completed, users upload this KML to our Field Management System (FMS).



If the field condition is very complicated (see the map below), manual mapping with rover will be extremely exhausting with low efficiency, the FMS is designed to address such situation.f



Procedure

Prepare digital map (.tif)

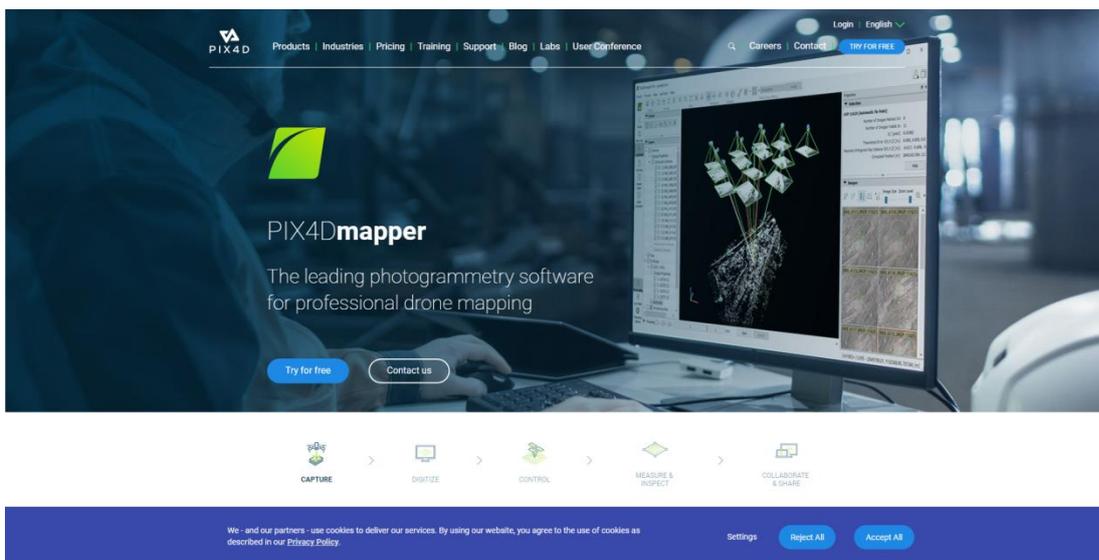
Please have your .tif file ready. You can generate the .tif file from any aerial survey drones, which can capture a sequence of images from a predefined field. Then use photogrammetry software to transform these images in digital maps (.tif) file.

Images captured by aerial survey drone



Images processed by Pix4D mapper

<https://www.pix4d.com/product/pix4dmapper-photogrammetry-software/>



Pix4D mapper output (.tif)

Pix4D-Test1 > 3_dsm_ortho > 2_mosaic

Name	Date modified	Type	Size
tiles	2023/4/12 11:07	File folder	
test1_transparent_mosaic_group1.prj	2023/3/9 17:44	PRJ File	1 KB
test1_transparent_mosaic_group1.tfw	2023/3/9 17:44	TFW File	1 KB
test1_transparent_mosaic_group1.tif	2023/3/9 17:44	TIF File	32,938 KB
test1_transparent_mosaic_group1.tif.aux....	2023/4/12 11:01	XML Document	2 KB



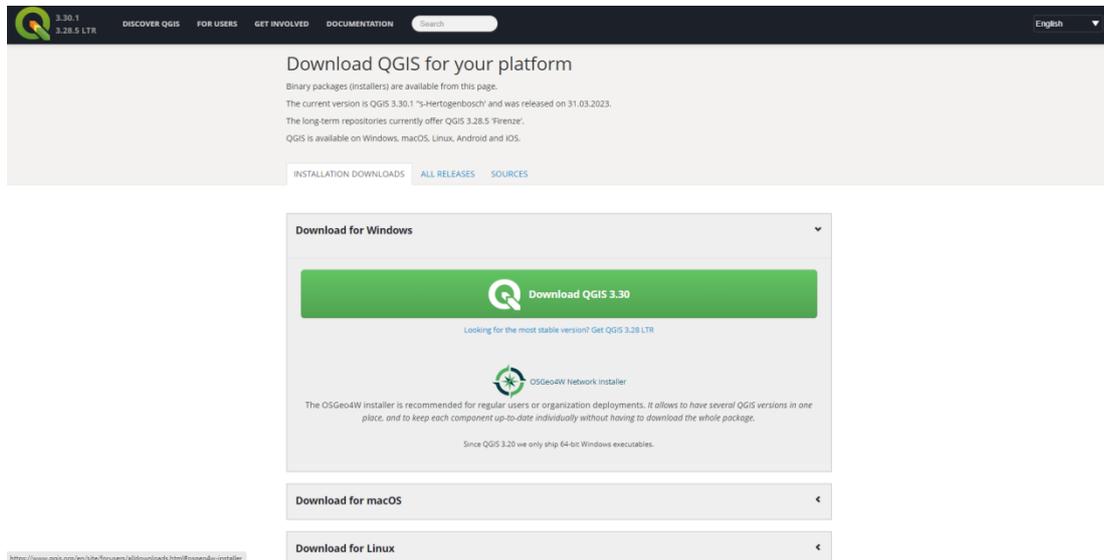
Some Pix4D packages support field editing, you can edit the attributes of the polygons directly with third party software like QGIS



Download and install QGIS

QGIS allows users to draw field boundary or polygon on digital map.

Download link: <https://www.qgis.org/en/site/forusers/download.html>



Install QGIS

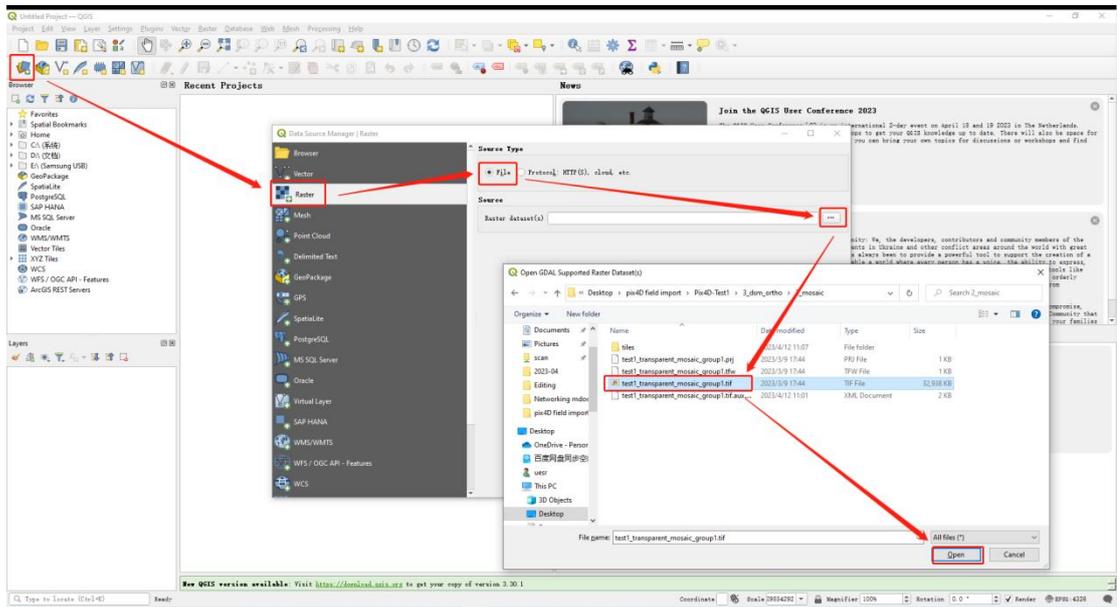


Import and Edit field on QGIS

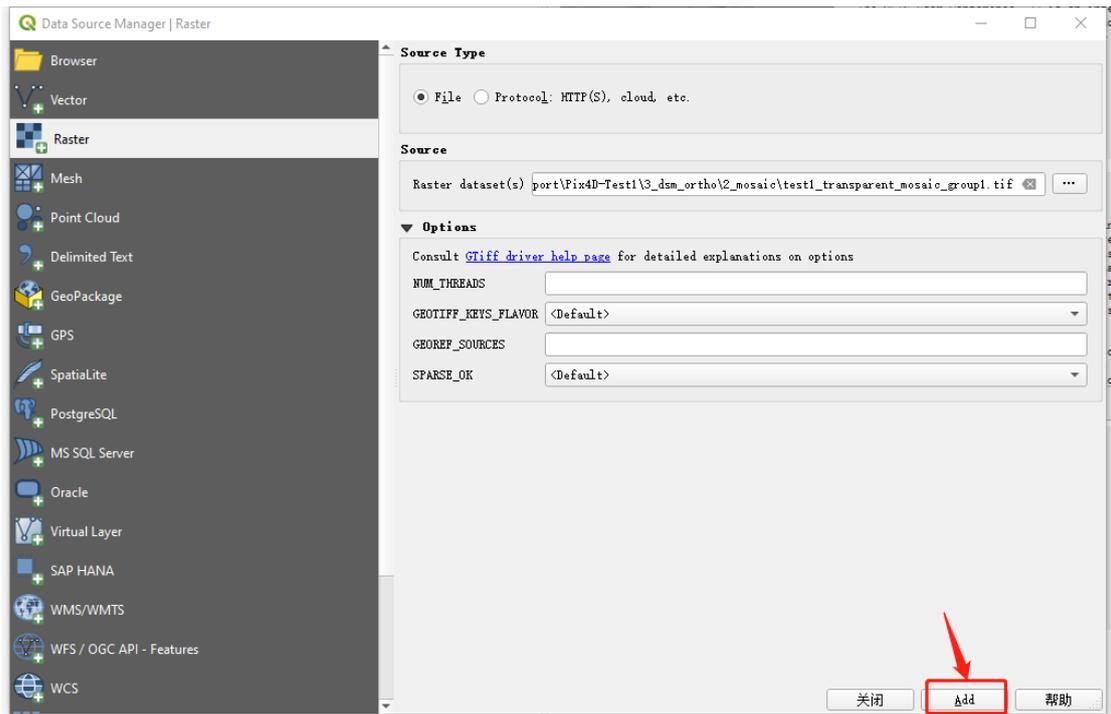
1. Open QGIS desktop

Name	Date modified
GRASS GIS 7.8.7	2023/3/23 9:41
OSGeo4W Setup	2023/3/23 9:41
OSGeo4W Shell	2023/3/23 9:41
QGIS Desktop 3.30.0	2023/3/23 9:41
Qt Designer with QGIS 3.30.0 custom wid...	2023/3/23 9:41

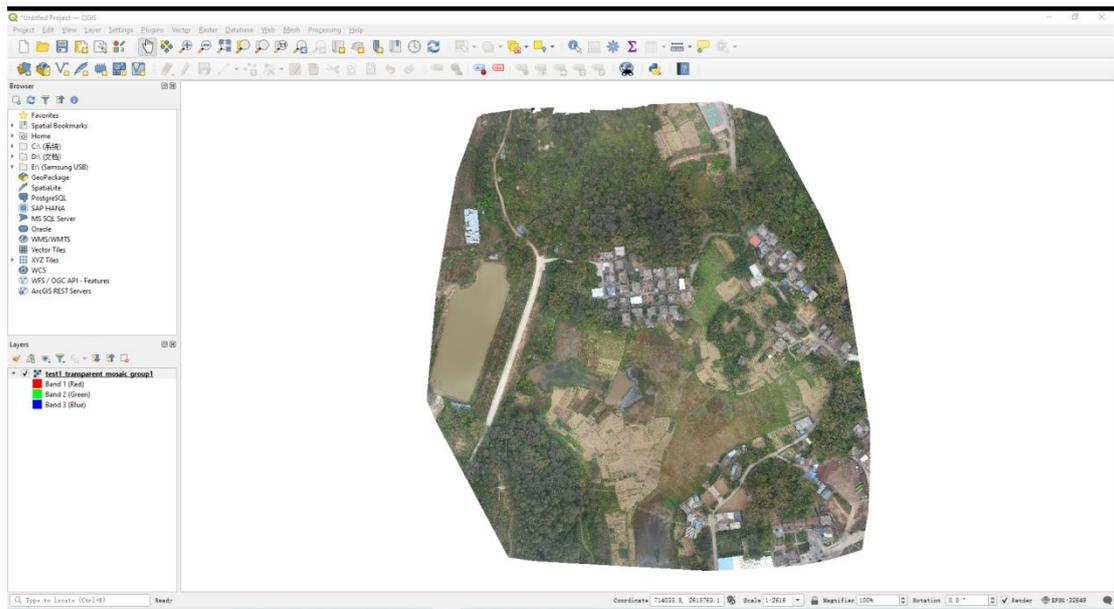
2. Open digital map (.tif)



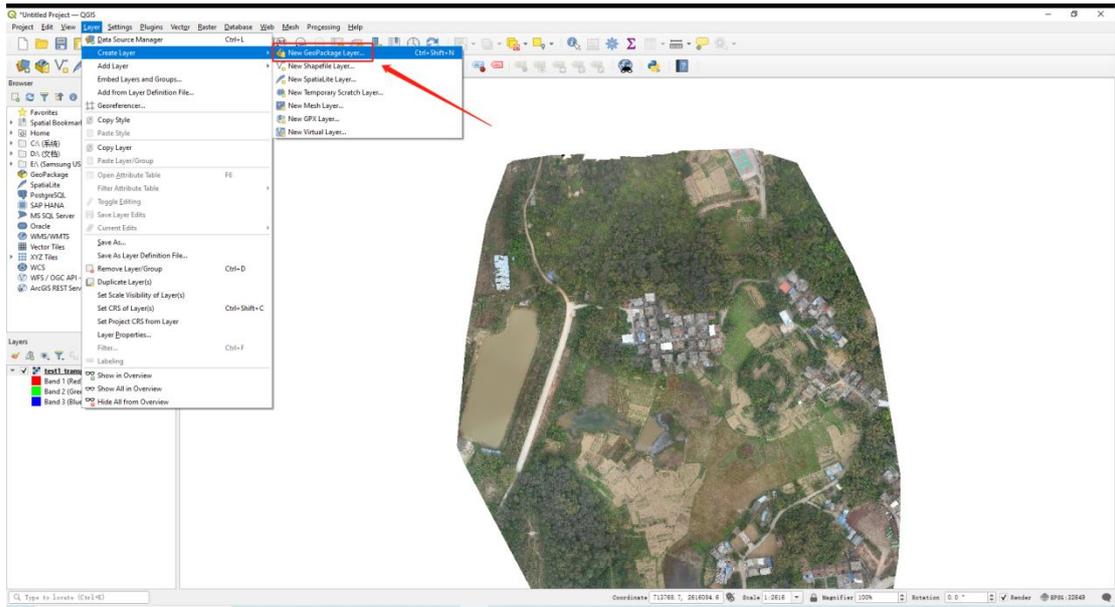
3. Add tif file



4. The digital map is added by QGIS,



5. Create GeoPackage layer



6. Edit layer info

We need to fill out the information on this GeoPackage layer page.

New GeoPackage Layer

Database:

Table name:

Geometry type:

Include Z dimension Include M values

EPSG: 4326 - WGS 84

New Field

Name:

Type:

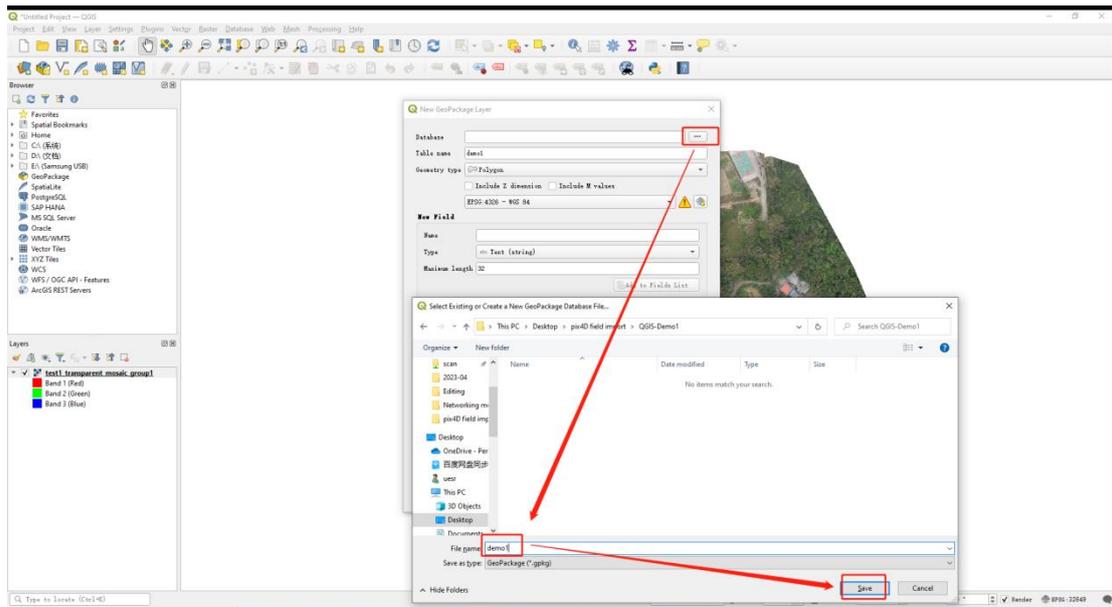
Maximum length:

Fields List

Name	Type	Length

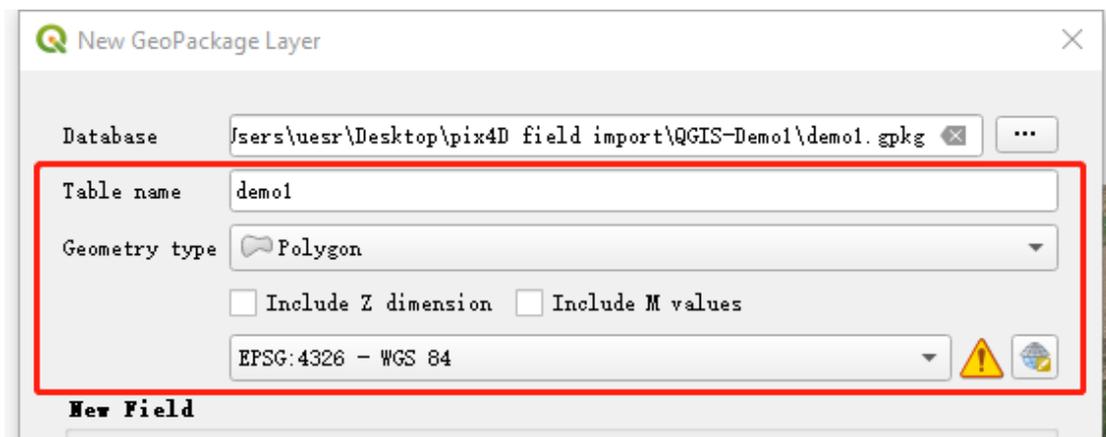
Advanced Options

Set the saved path



Give table name and set geometry type as polygon

Make sure us the default coordinate EPSG:4326 -WGS 84



Under New Field, create key attributes according to the followings:

No.	Name	Type	Maximum length	Comments
1	Name	Text(string)	32	give polygon a title
2	type	Text(string)	32	Polygon type. It can be only defined as either boundary, obstacle or nospray.
3	description	Text(string)	128	Explain polygon

New Field

Name

Type

Maximum length



New Field

Name

Type

Maximum length



New Field

Name

Type

Maximum length



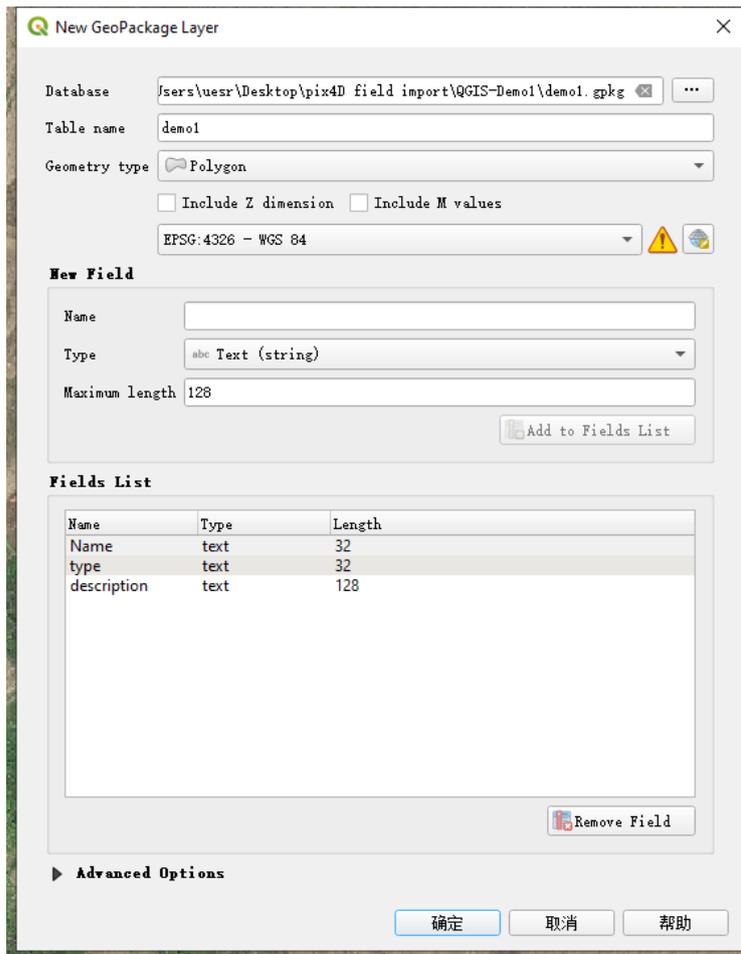
Press "Add to fields List" when New field info is filled.

Fields List

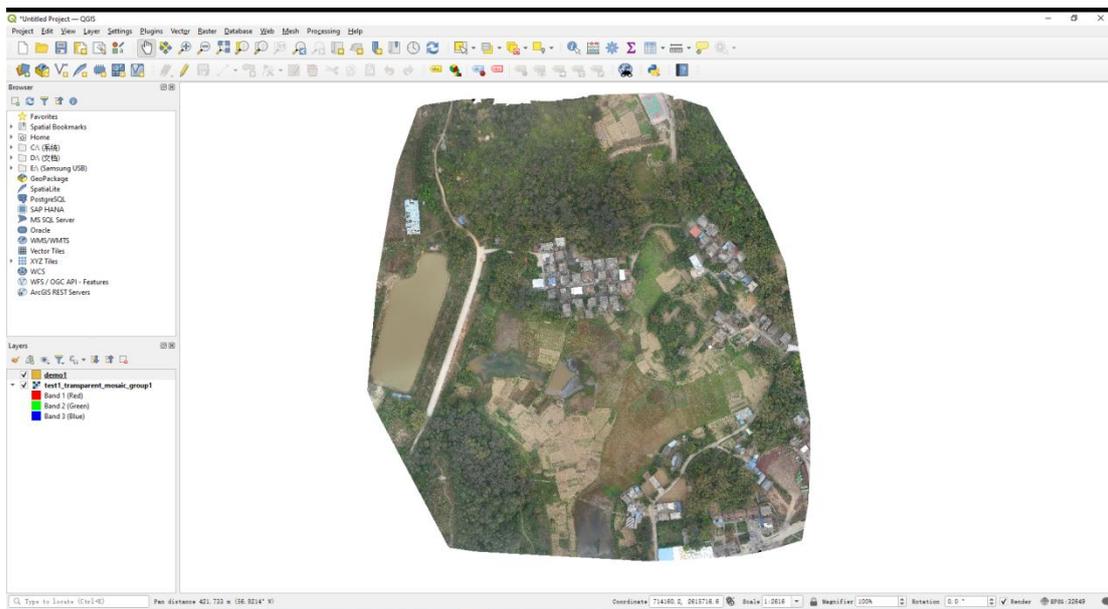
Name	Type	Length
Name	text	32
type	text	32
description	text	128



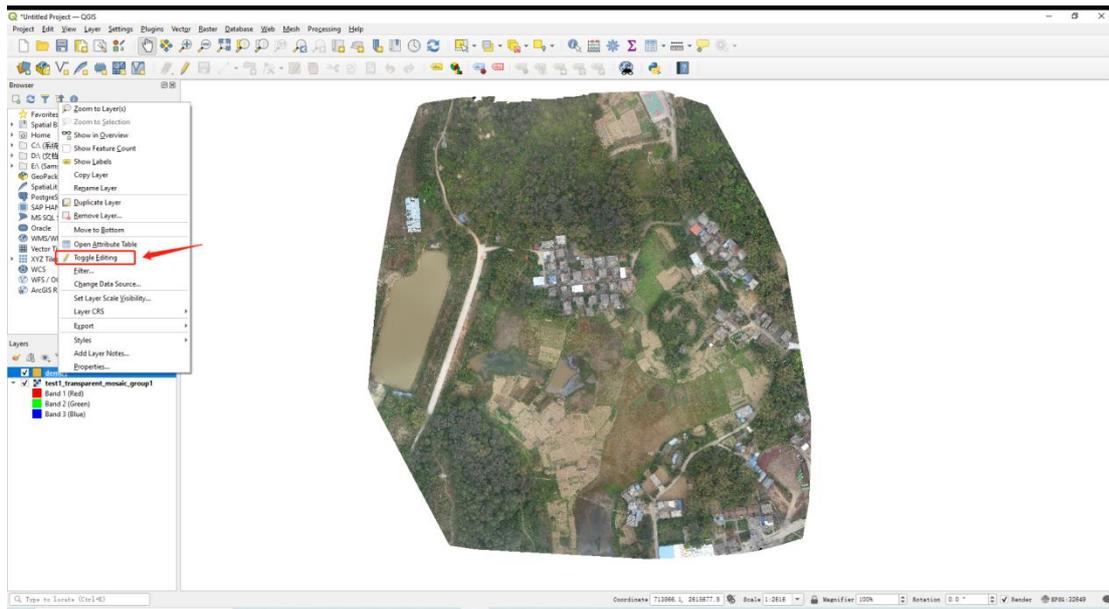
Press OK to process



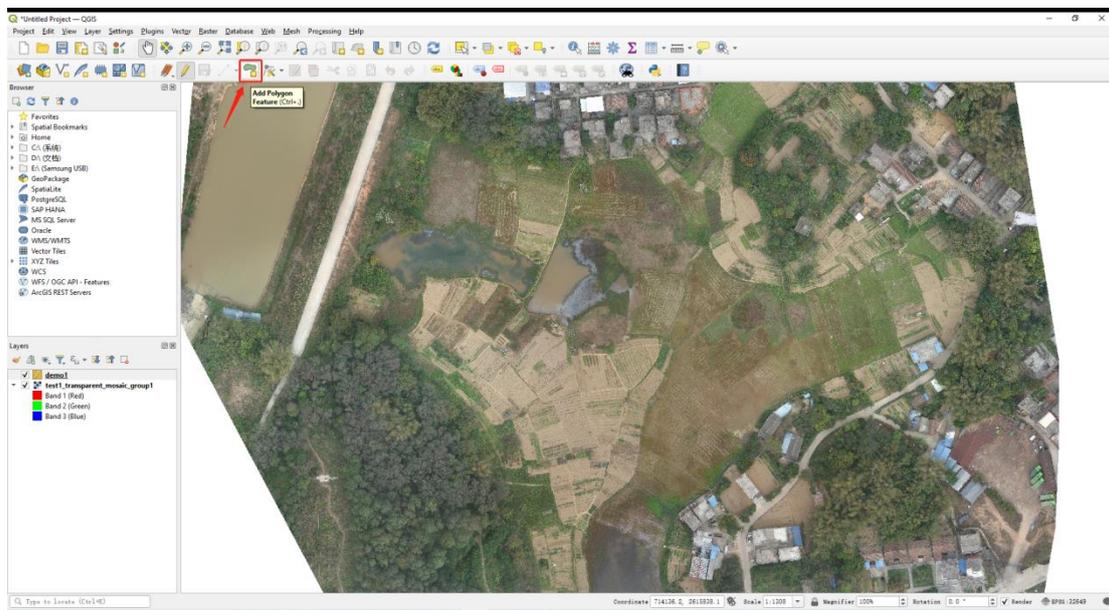
7. Now the new GeoPackage layer called Demo1 is created



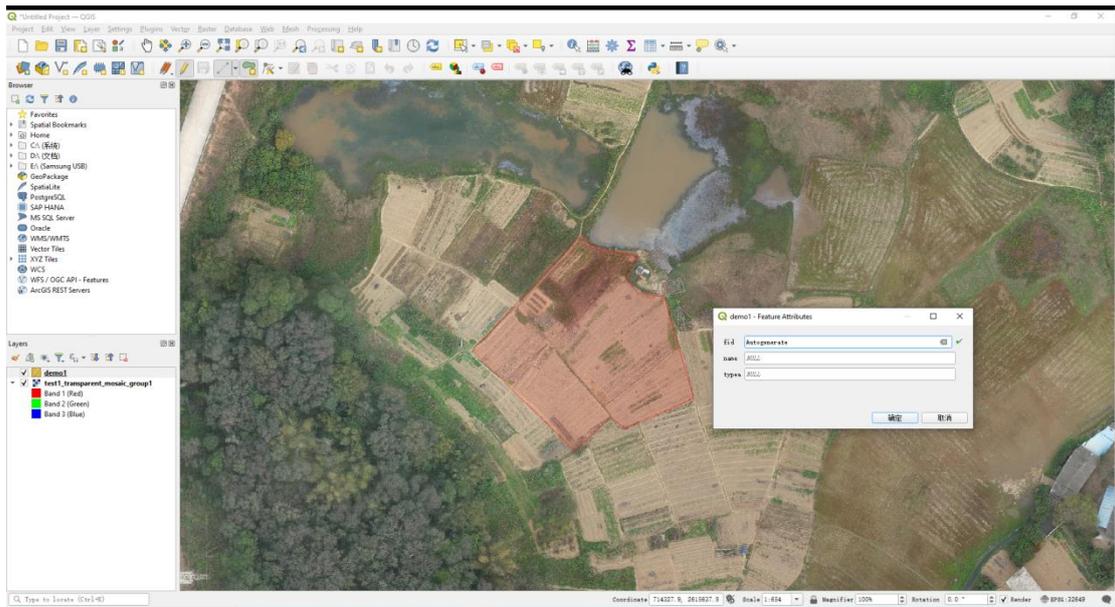
8. Press Toggle editing to allow layer editing



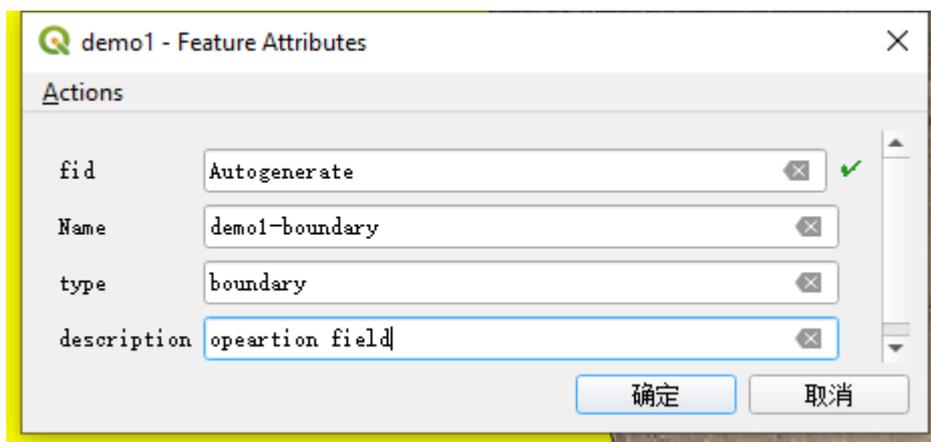
9. Use polygon tool to draw the field boundary



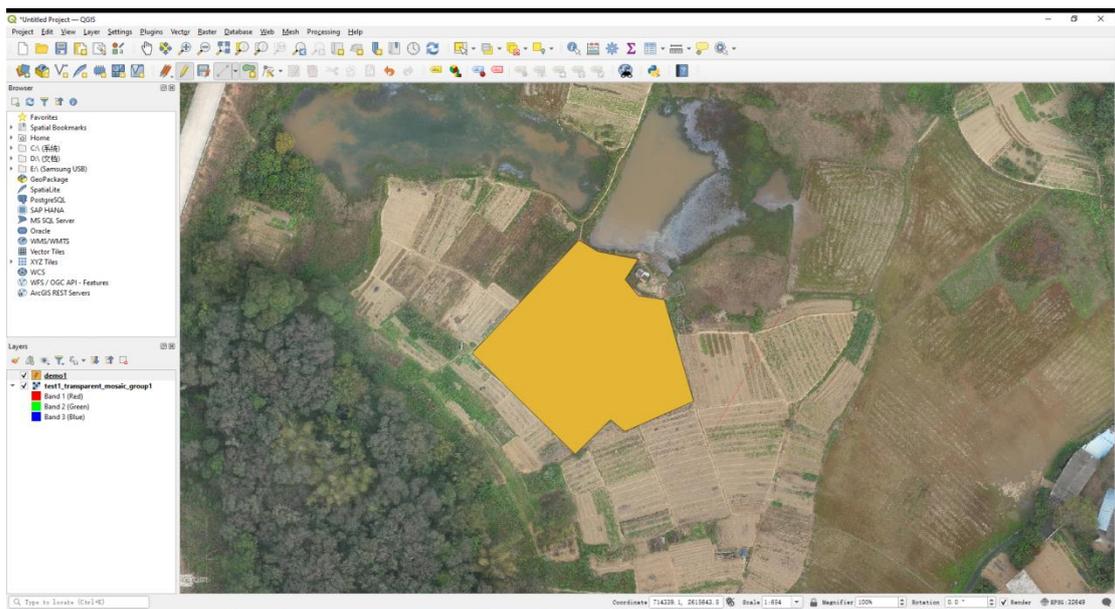
Once the boundary draw, you can press the right button of your mouse to save the boundary



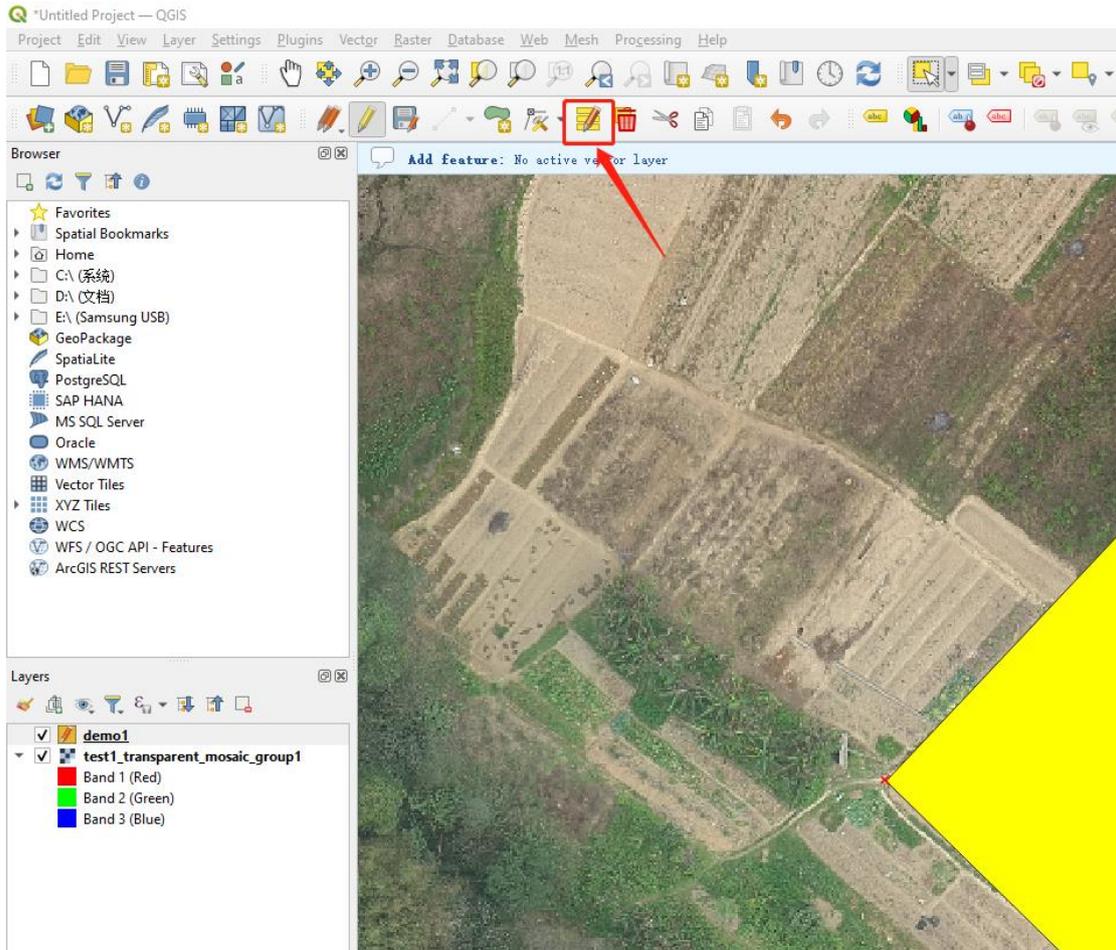
Fill out the fid, Name, type and description according to the feature attributes
 As we are drawing the field boundary, the type must be “**boundary**”.



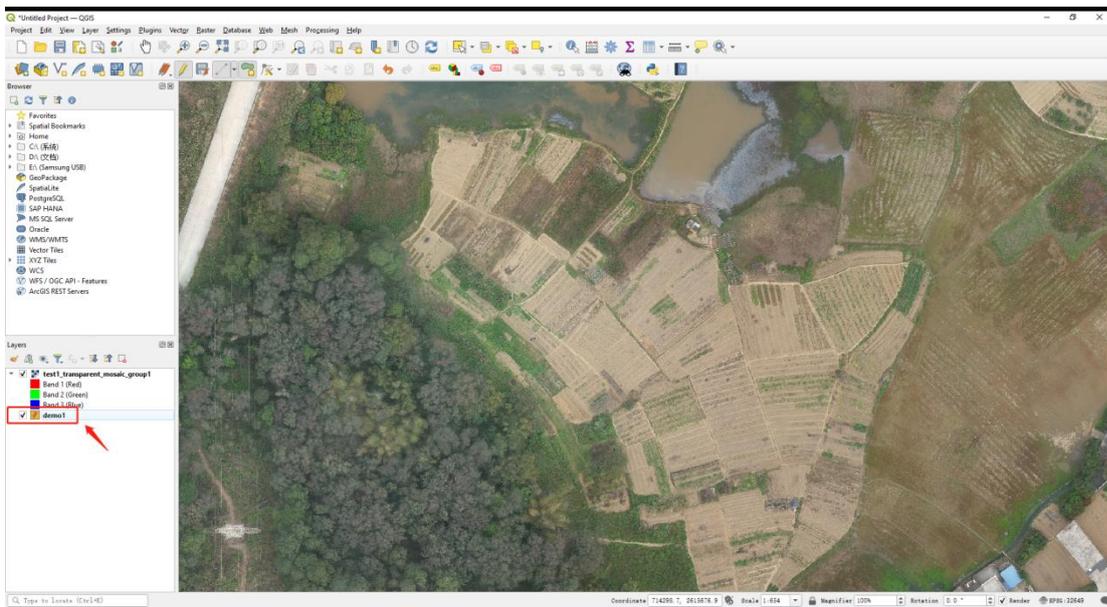
Press OK to proceed



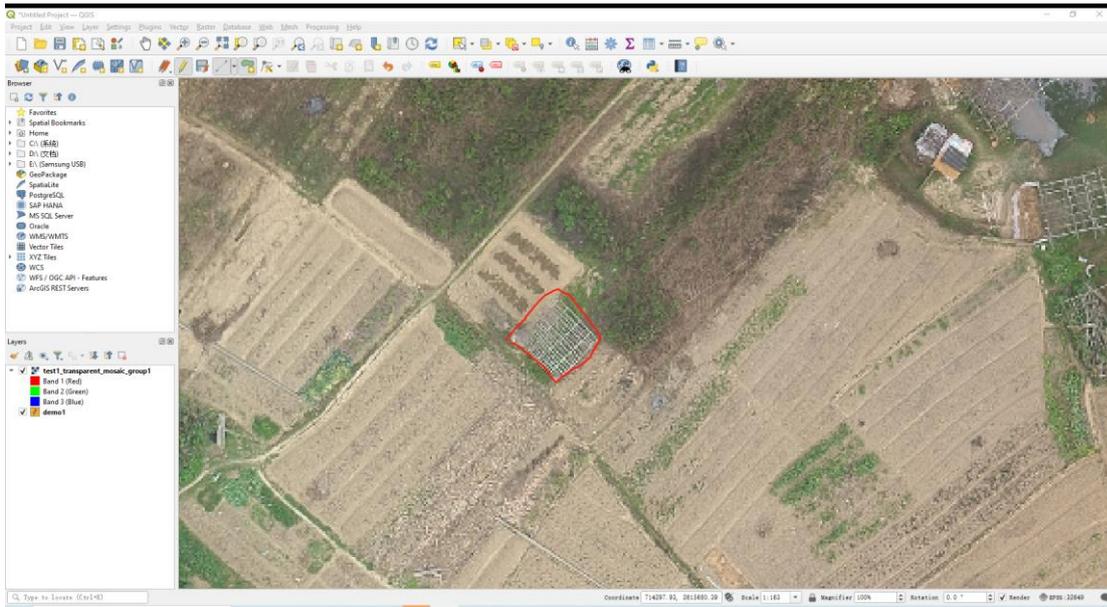
If attribute info is wrong, you can use the field edit to change the attribute info.



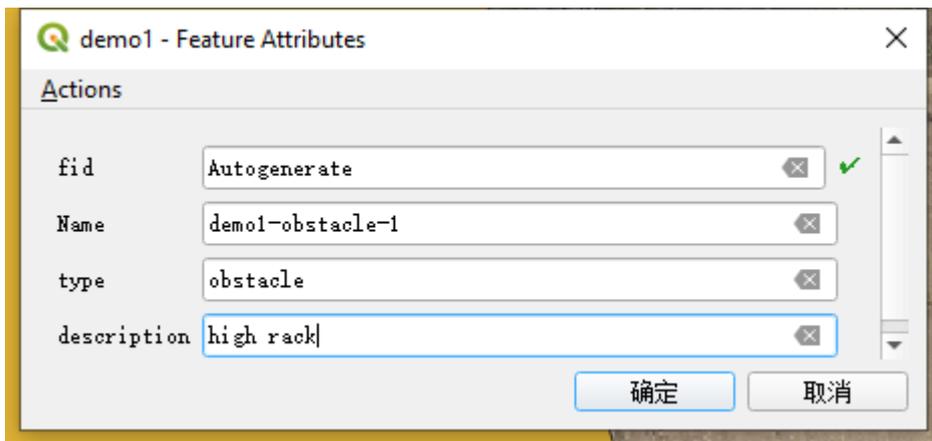
10. Pull demo1 to the bottom of the list so that the layer will not cover the digital map. Then you are free to draw obstacles or non-spray areas on the map.



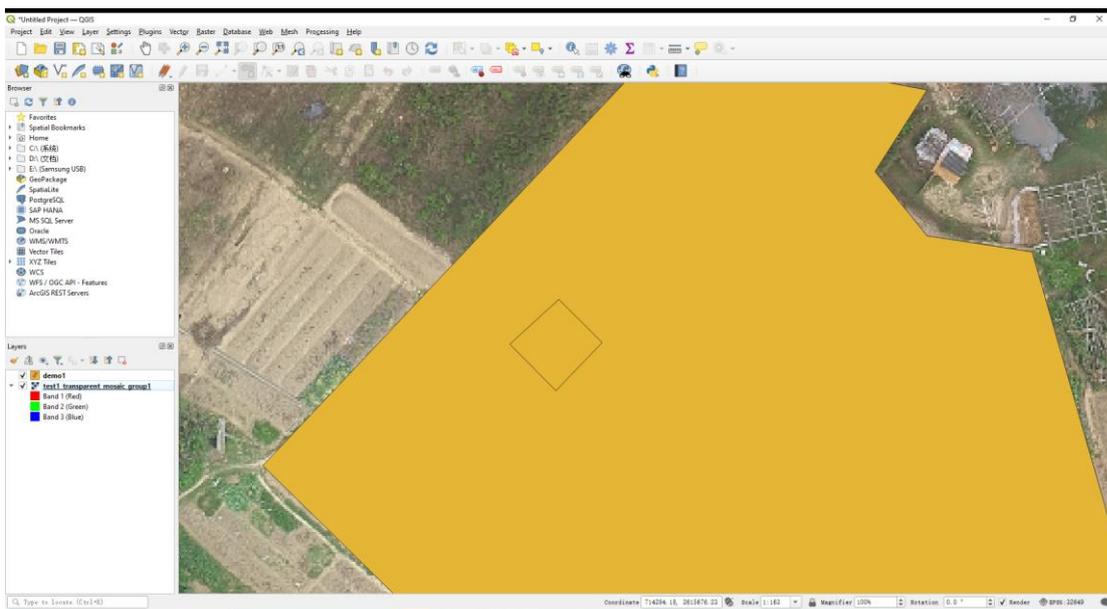
11. Draw obstacle

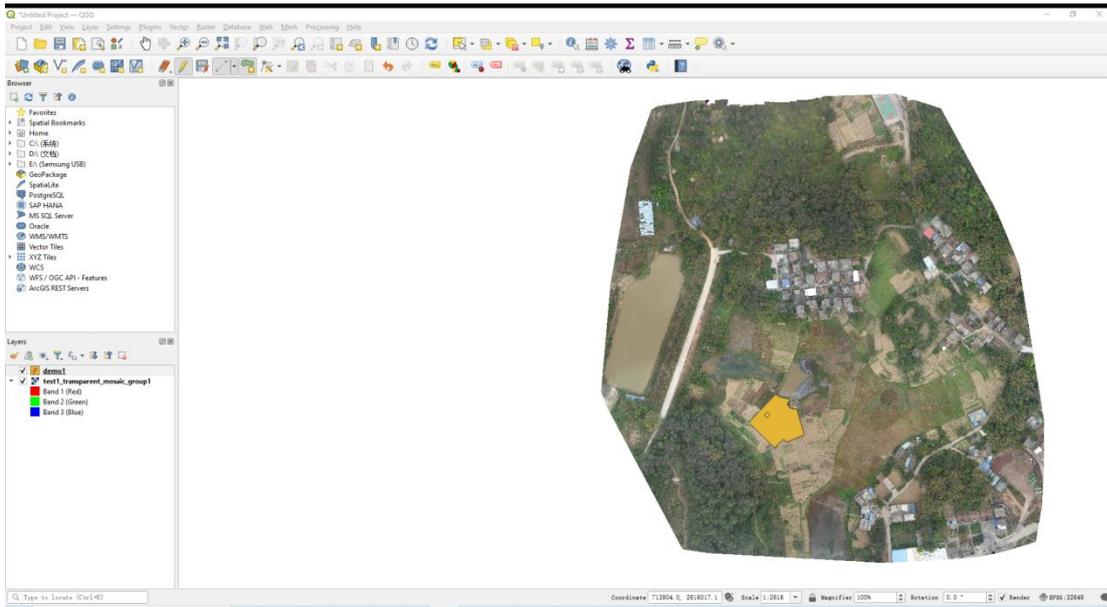


Fill out the fid, Name, type and description according to the feature attributes
 As we are drawing obstacle here, the type must be “obstacle”

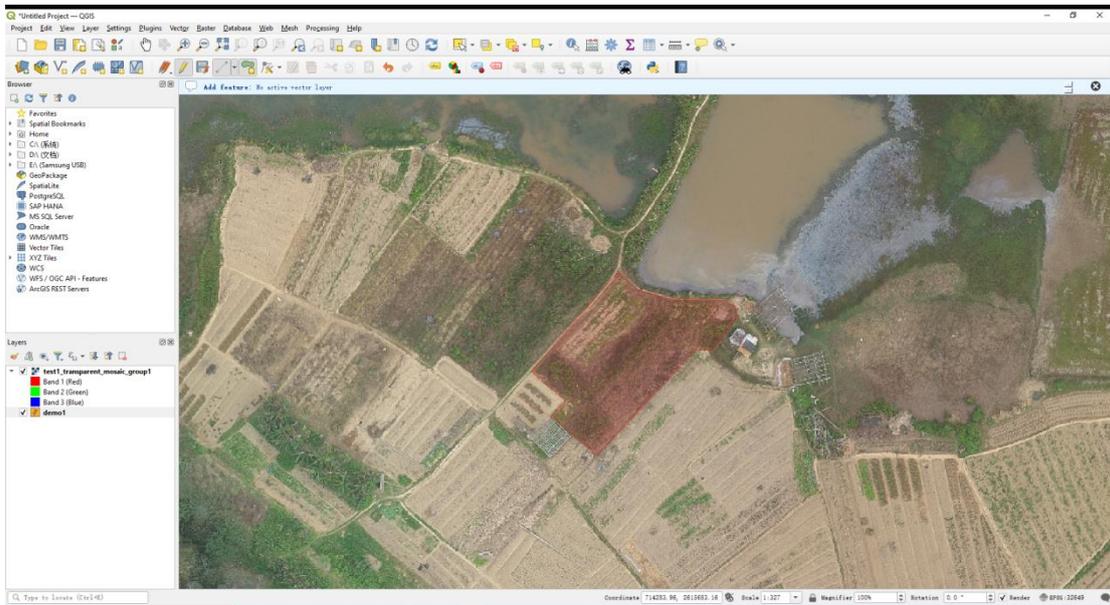


Now we can see the obstacle from the digital map.





12. Draw non-spray area



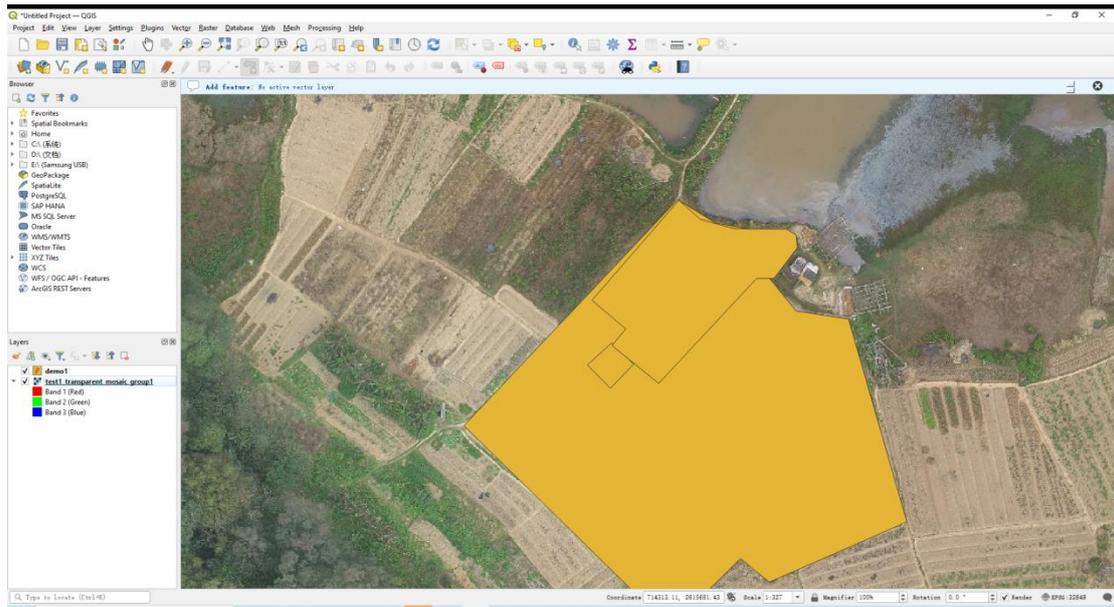
Fill out the fid, Name, type and description according to the feature attributes

As we are drawing non-spray area here, the type must be “nospray”

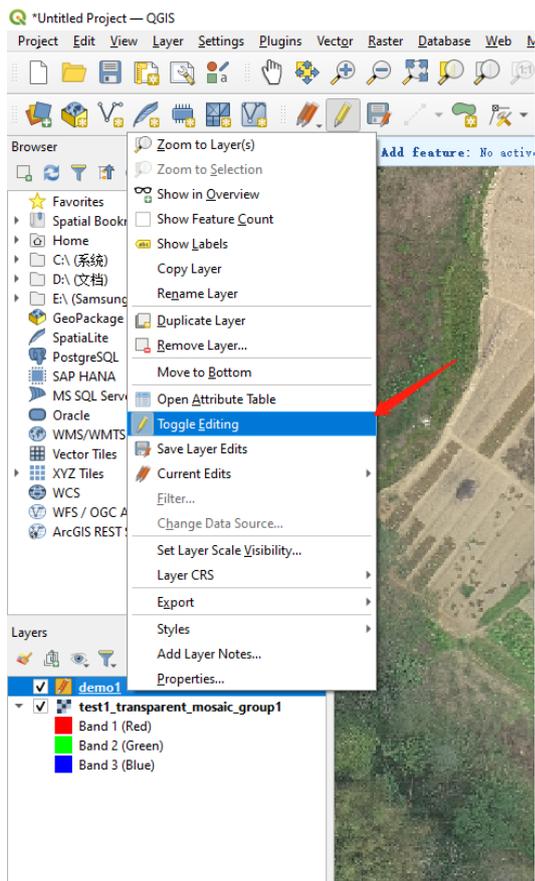
demo1 - Feature Attributes

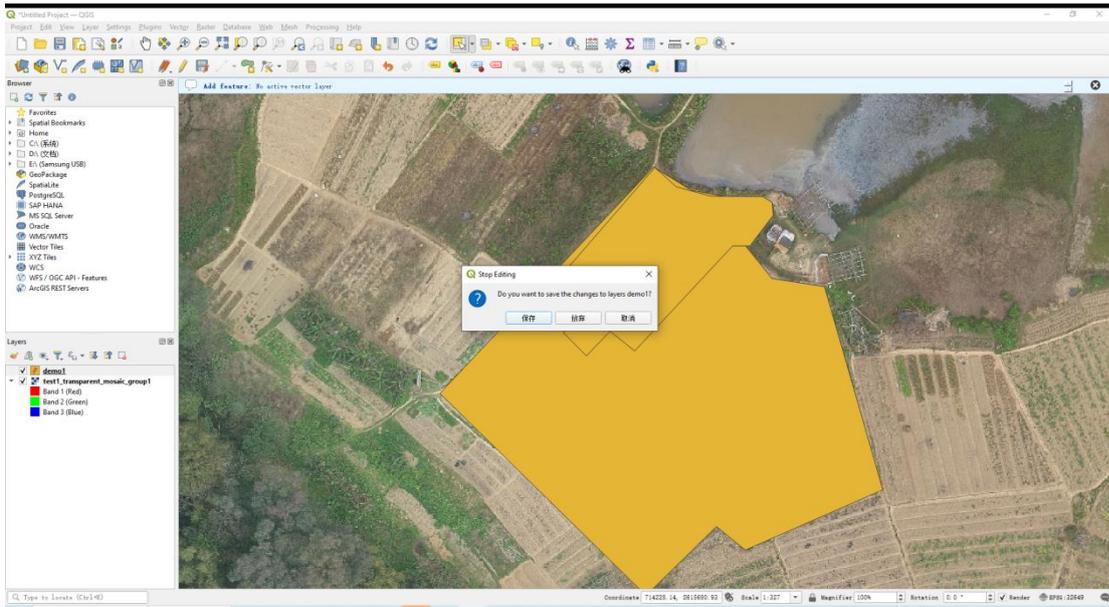
fid	Autogenerate	✕	✓
Name	demo1-nospray-1	✕	
type	nospray	✕	
description	grass	✕	

确定
取消

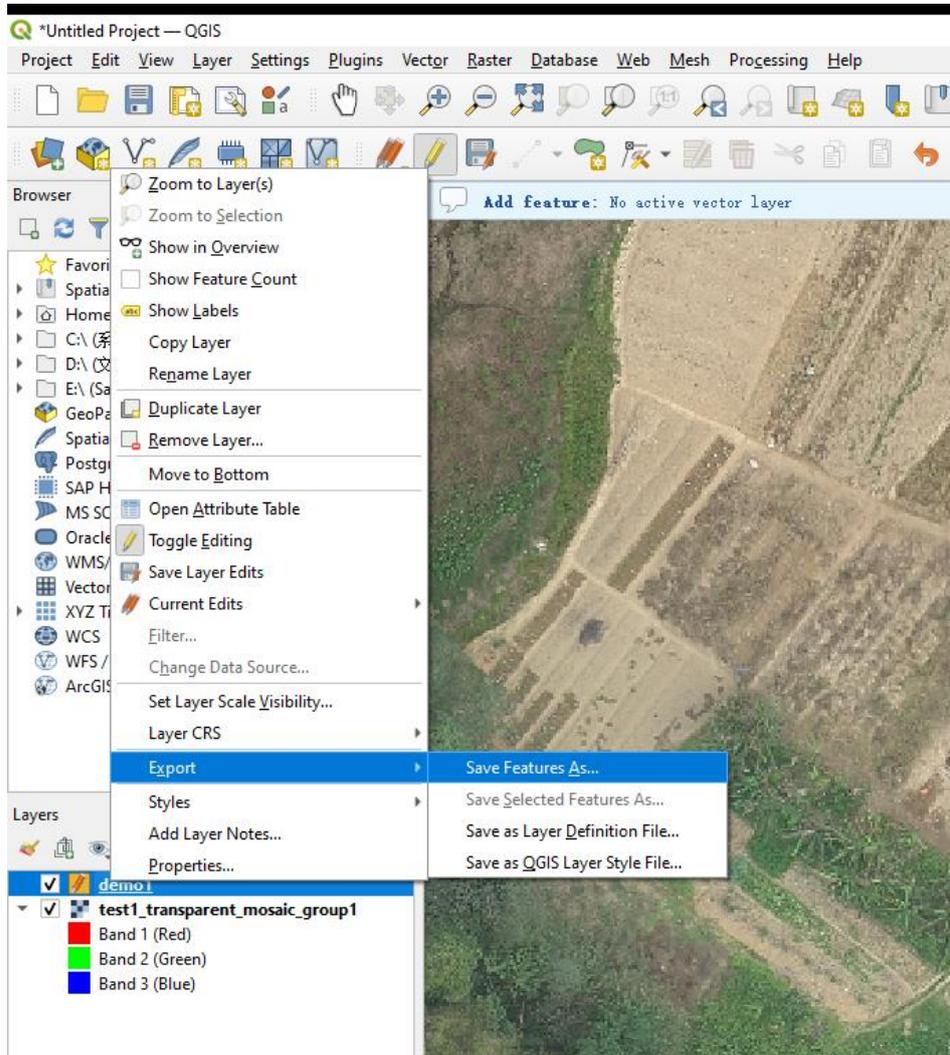


13. Press toggle editing again to save the layer

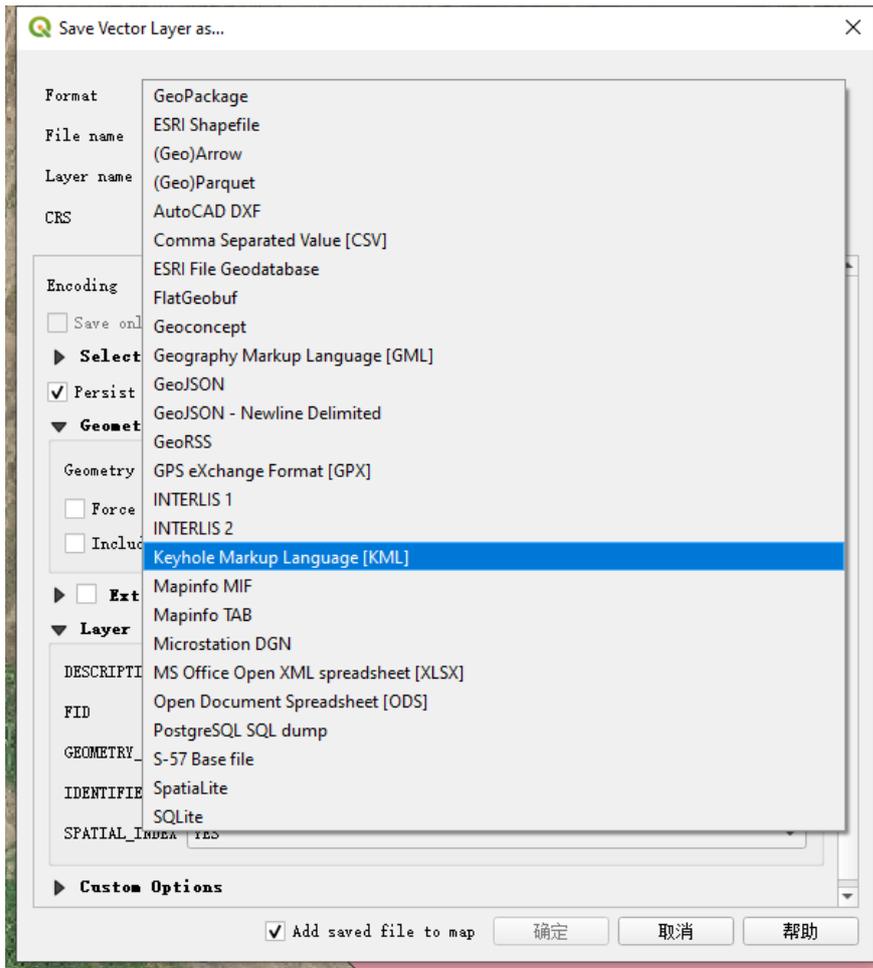




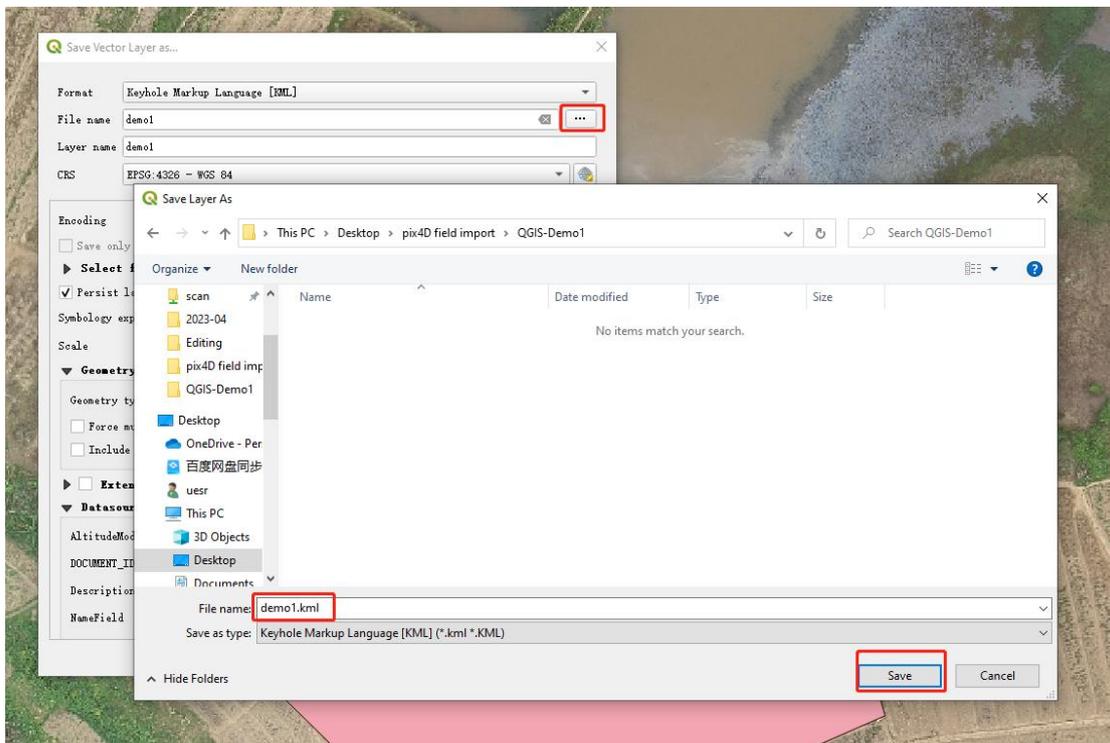
Save the features as... (from here, we can save the kml file that is allowed to upload to FMS)



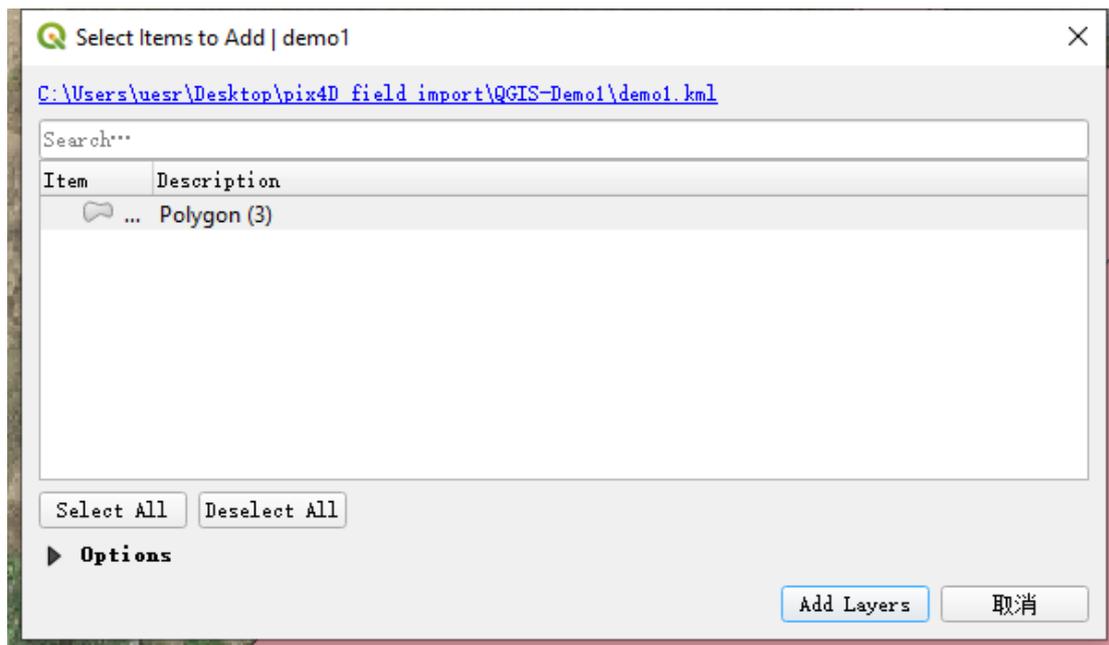
Choose the format as Keyhole Markup Language (KML)



Save the file to the path



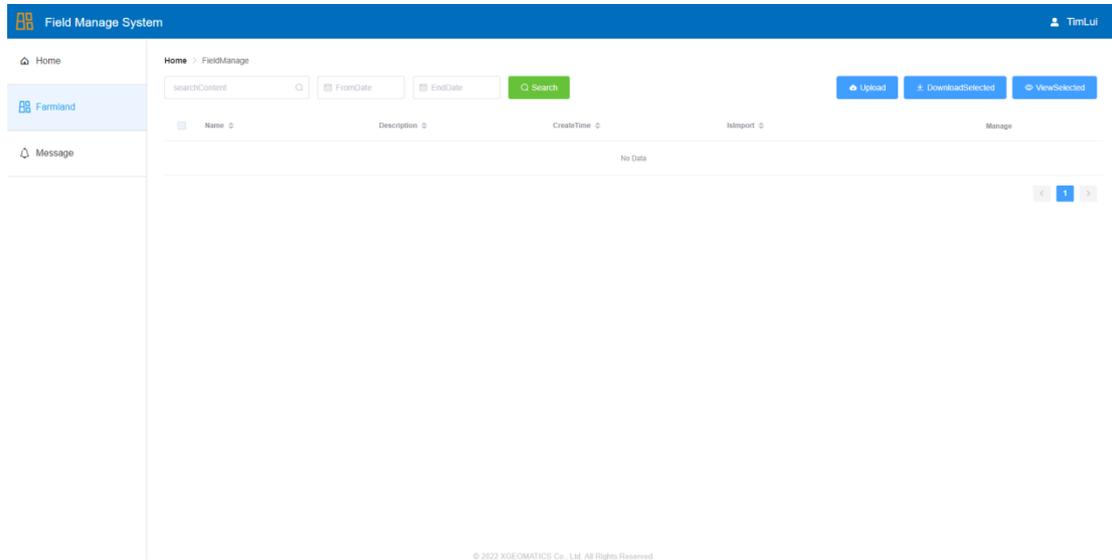
Select all polygons



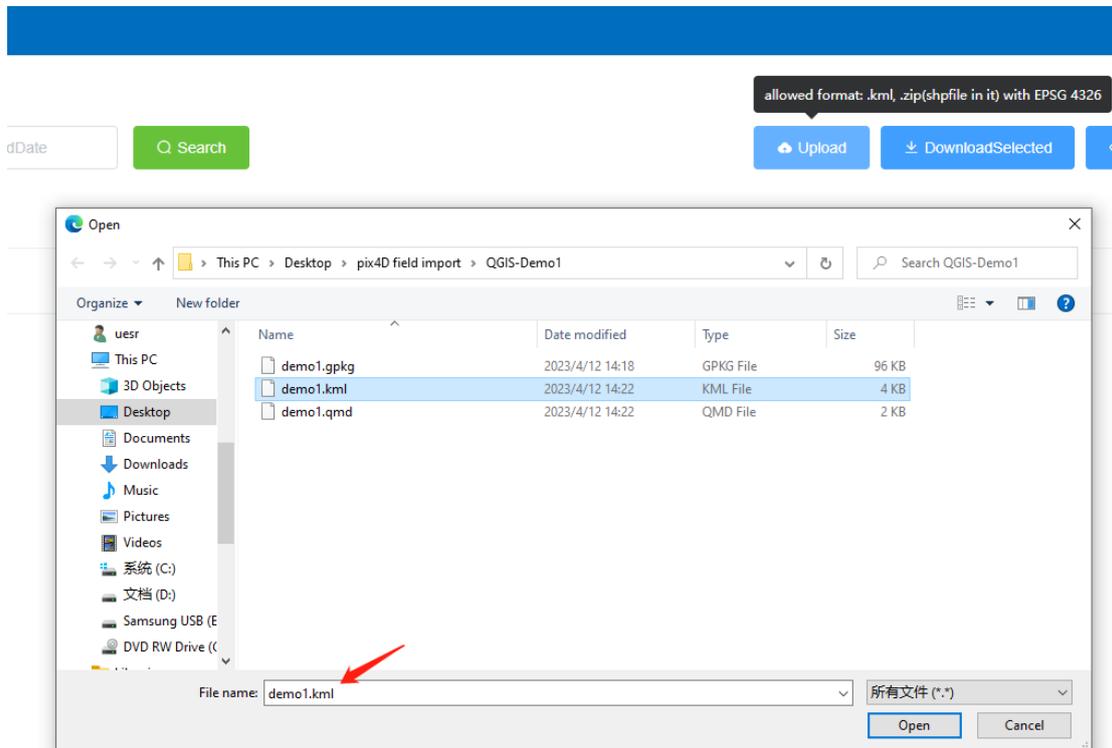
The KML file will be saved to the path and ready for FMS upload.

Upload KML to Field Management system

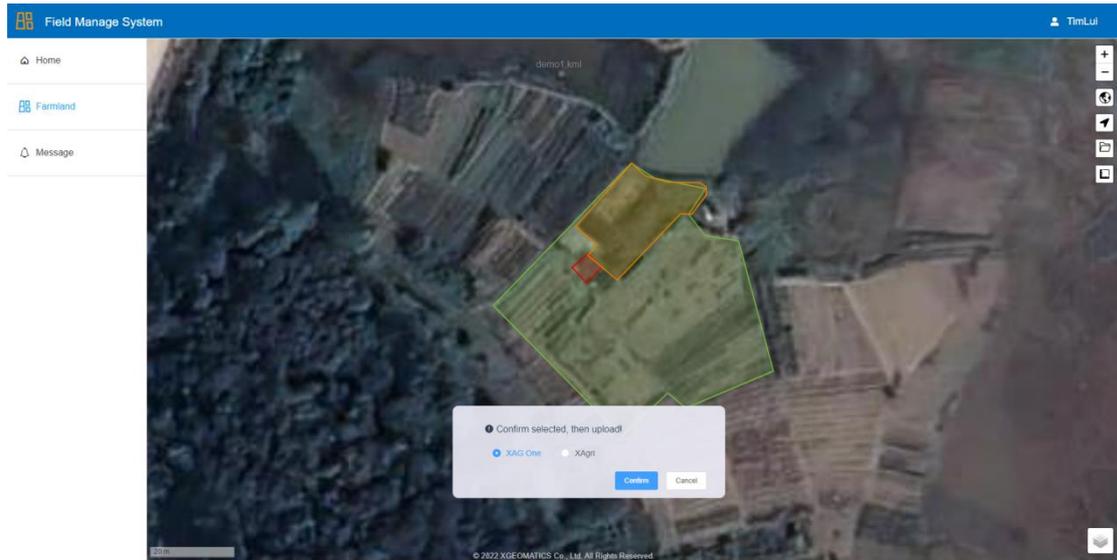
1. Login FMS



2. Upload the kml file

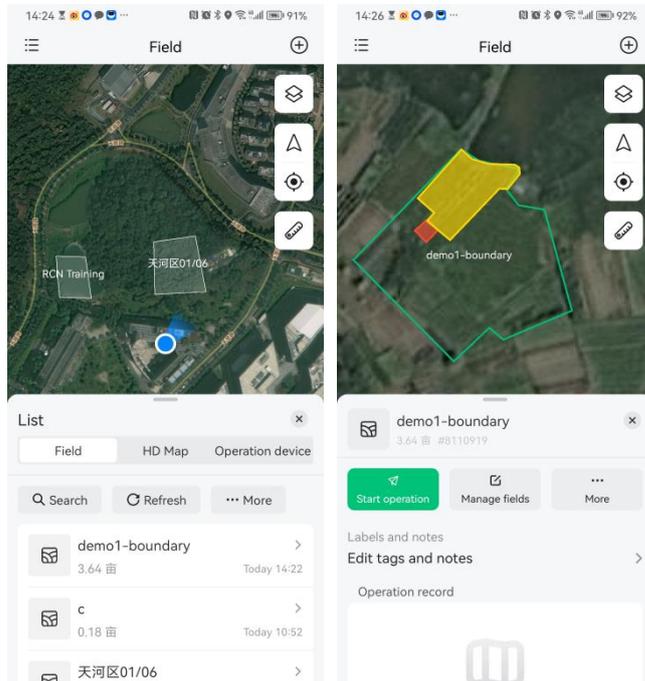


3. Upload the kml file to XAG one App



View and edit field on XAG One App

1. Open XAG One App and view the field



2. Users are allowed to edit field boundary



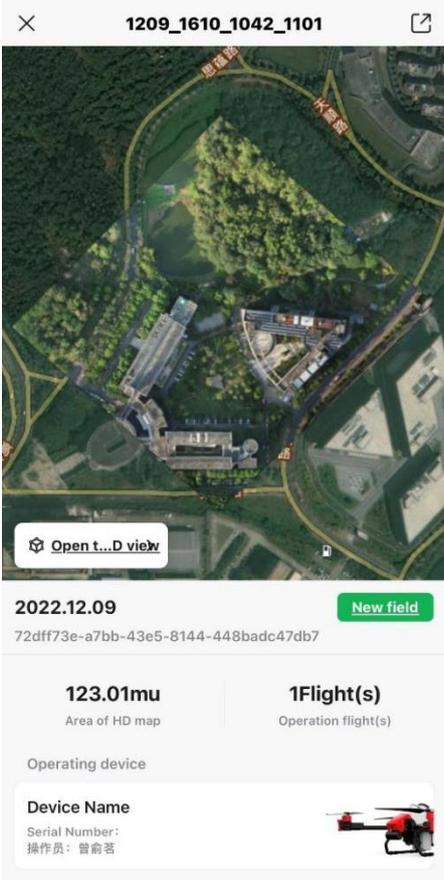
3. If you still have questions regarding FMS features, please contact XAG technical support.

Chapter 11

Real Terra

Introduction of Real Terra

Real Terra is a fast land surveying product developed by XAG itself, which has a powerful processor inside and can perform real-time stitching. The stitching of HD maps and 3D point cloud map can be completed upon the UAV lands. After uploading the result to cloud servers / LNT by 4G/ WIF, you can download the maps to XAG ONE APP for field mapping and mission planning. And the 3D point cloud map allows agricultural drones to perform digital terrain following operations in areas with complex terrain.



HD map in XAG ONE



3D point cloud map in XAG ONE

Hardware Parameters

Variants

	Real Terra 1	Real Terra 2
Photo		
Mountable drones	P40, V40	P100, V50
CMOS	1/2.3	1/2.3
Pixel	1200	1200
Image format	JPG	JPEG
Lens Information	FOV 112° 2.7mm/16.8mm	FOV 112° 2.7mm/16.8mm

Tips: There are two types of Real Terra 2 for P100 and V50 respectively. Their functions and parameters are the same, but they have a different structure to suit different drones.

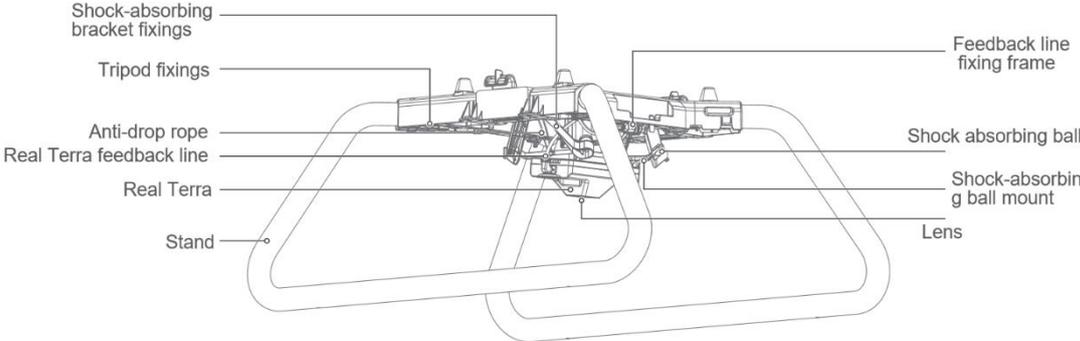


Real Terra will generate a high resolution map that allows user to draw field boundaries.

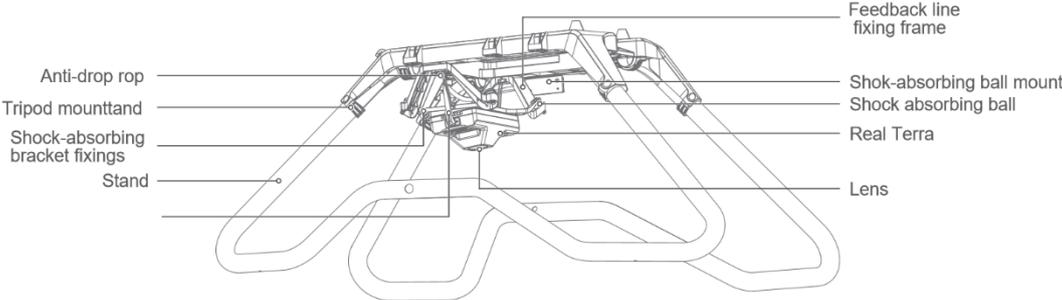


Structure

P100 Real Terra 2 Structure

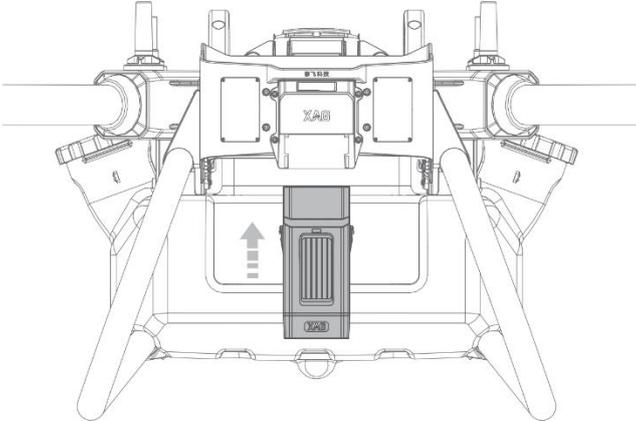


V50 Real Terra 2 Structure

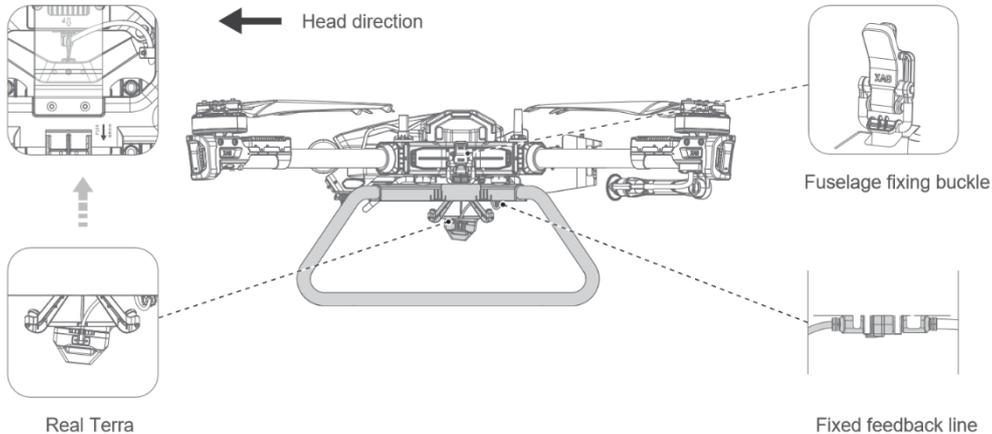


Schematic

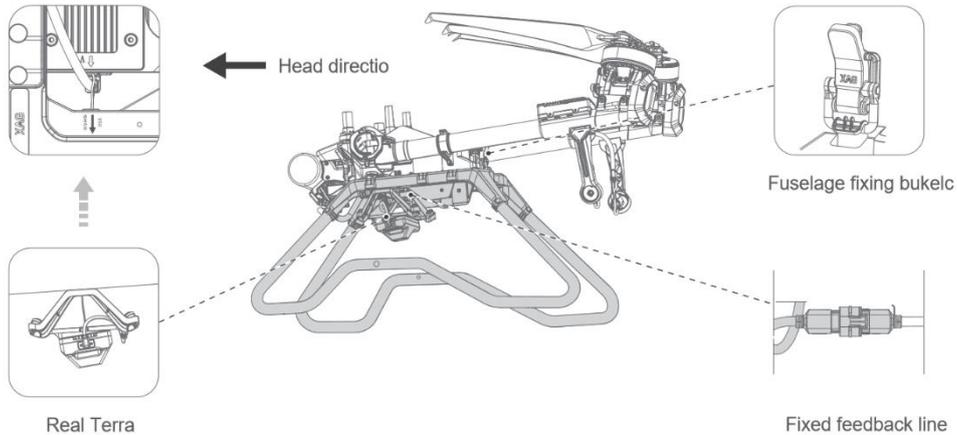
Schematic of Real Terra 1



Schematic of Real Terra 2(P100)



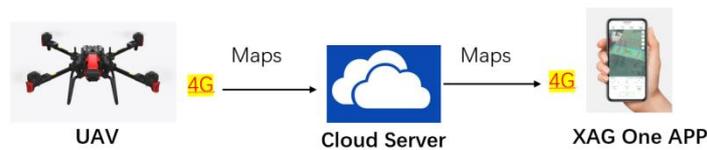
Schematic of Real Terra 2(V50)



Map Transfer

For Real Terra, there are three ways to transfer HD maps, 4G, LNT and RCN, same as the three operating modes of the drone. In 4G mode, the maps generated by Real Terra is uploaded to the cloud through the 4G network. XAG ONE APP can download maps on the cloud server and use it by agriculture drone. In LNT and RCN mode, the maps can be exported to the LNT or remote controller, then transfer to the XAG ONE APP.

4G mode



LNT mode



RCN mode



Tips for using Real Terra

- The flying height of Real Terra is fixed to 30m, and not to be changed.
- The largest area to use Real Terra 1 is 6.7 hectare/ Real Terra 2 is 13.3 hectare.
- The Real Terra does not save the photo, it just generates the HD maps/ 3D point cloud maps. You must connect the UAV with the RTK and ensure it has good signal when you use the Real Terra.

HD Map Usage

How to use the HD map (4G MODE)

- 1、 Follow the manual to install Real Terra to the V40/P40/V50/P100.
- 2、 Start mapping by XAG ONE APP.
- 3、 Wait for HD map to upload to cloud server.

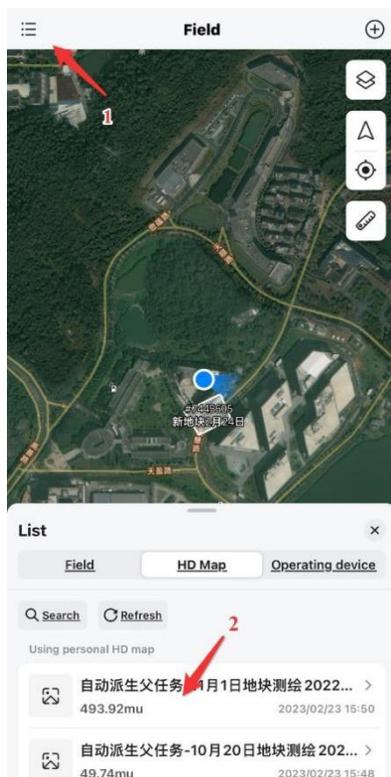
How to use the HD map (LNT MODE)

- 1、 Follow the manual to install Real Terra to the V40/P40/V50/P100.
- 2、 Start mapping by XAG ONE APP.
- 3、 Wait for HD map images to be transferred to the phone via LNT.

How to use the HD map (RCN MODE)

- 1、 Follow the manual to install Real Terra to the V40/P40/V50/P100.
- 2、 Start mapping by XAG ONE APP.
- 3、 Wait for HD map to be transmitted from the drone to the remote control and then to the phone.

View high resolution images in XAG ONE



Chapter 12

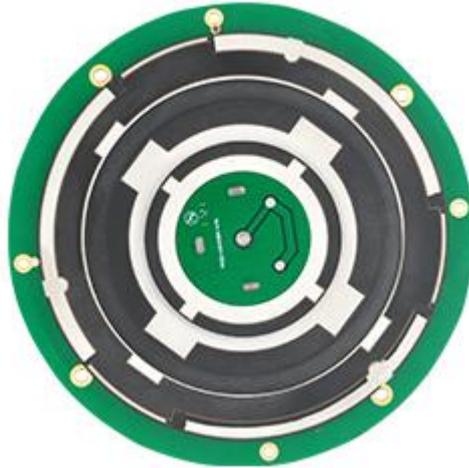
RTK Positioning

Portable RTK station (XRTK4)

Hardware

GNSS Antenna

The GNSS antenna is a precision tuned, stacked patch GNSS antenna that provides reliable and consistent positioning services across the full bandwidth of the antenna. Its superior positioning accuracy and powerful system compatibility makes it ideal to be integrated into various surveying and RTK applications.



RTK board

RTK board is all-constellation all-frequency RTK positioning module based on the high-performance high-precision SoC - NebulasII, which is developed by Unicore Communications. It supports multiple satellite signals, including BDS B1/B2/B3/B1C/B2a, GPS L1/L2/L5, GLONASS L1/L2, Galileo E1/E5a/E5b and QZSS L1/L2/L5. It has adopted narrowband anti-jamming technology.



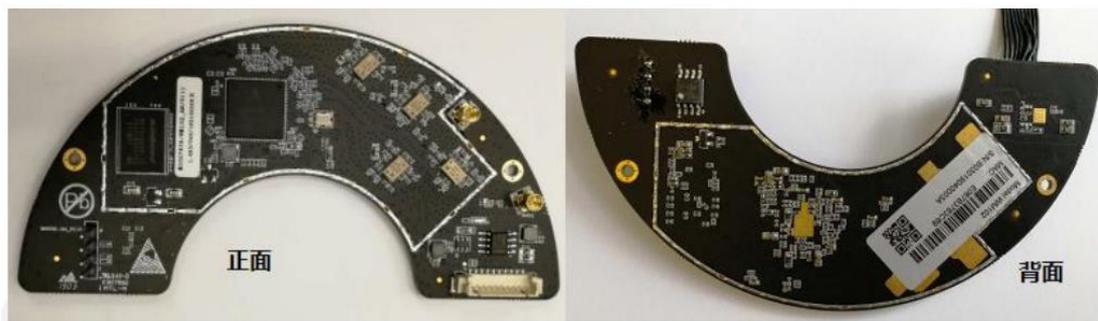
Button board

Button board allows user to press F1/F2/F3.



WIFI board

WIFI board is the printed circuit board (PCB) that Wi-Fi enabled system on chip (SoC) module developed by XAG, with full TCP/IP stack microcontroller capability.



Main board

Main board is the main printed circuit board (PCB) in general-purpose computing. It creates the union between various components, like CPU, RAM, Memory slots, button board and other various component so that it aims at RTK performance. It plays a vital role in data switched from one component to another, including processing network, RTK, WIFI data, etc.



Rod antenna

Rod antenna is for WIFI use, with the radio frequency of 2.4/5.8GHz. It converts electrical signals into electromagnetic waves and radiates them. Also, it converts electromagnetic waves from received beam into electrical signals.

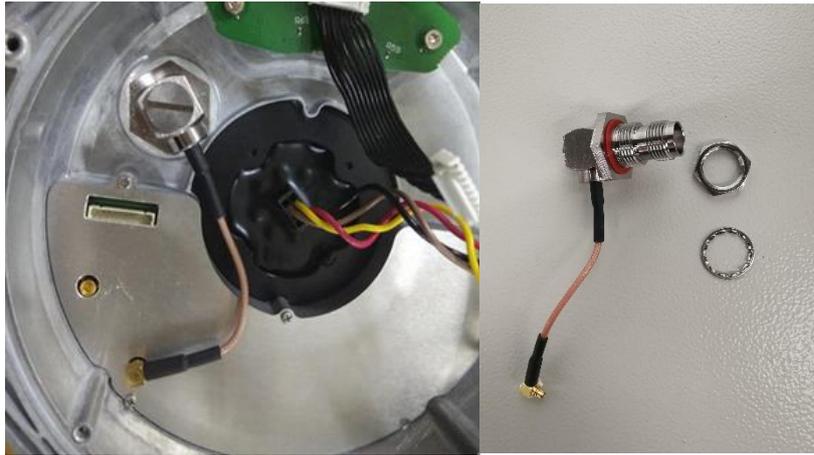


Other

1. 02-001-00569, seal rubber ring



2. 01-027-00803, RF connector



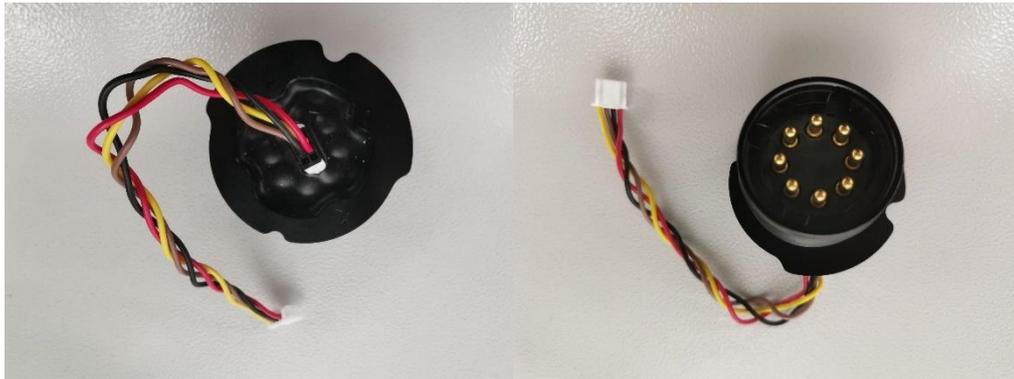
3. 02-001-03239, Fixture column waterproof gasket



4. 02-025-00079, Button film



5. Fixture column



Disassembly

- 1. Use large adjustable wrench to unscrew the hexagon nut, take out the platen.



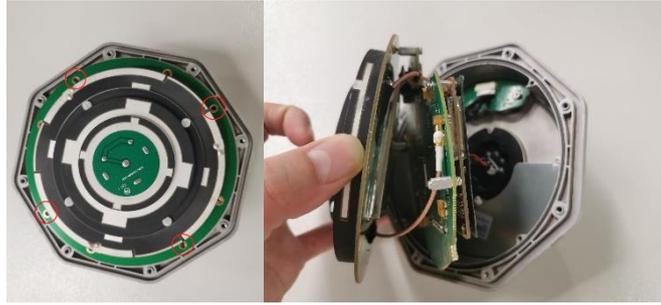
- 2. Unscrew counterclockwise to remove rob antenna



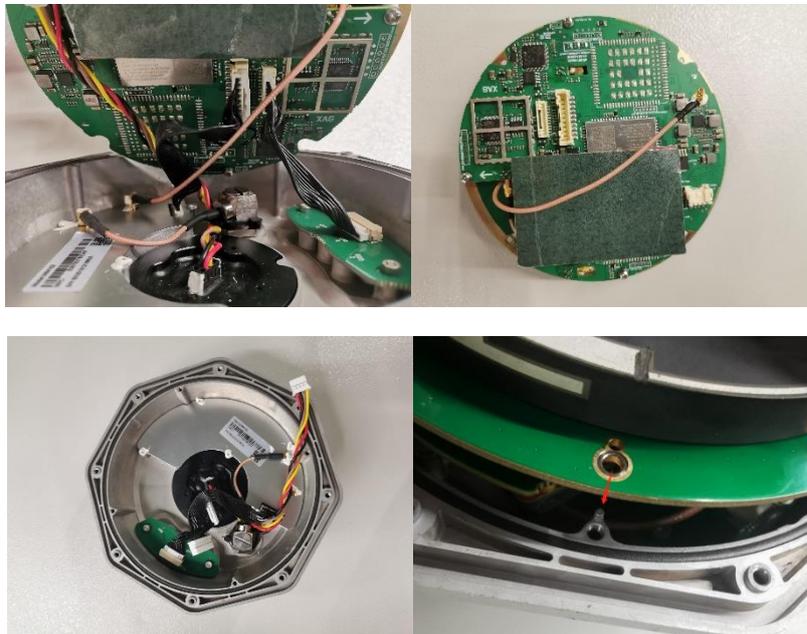
- 3. Remove upper case and rubber seal ring (blue)



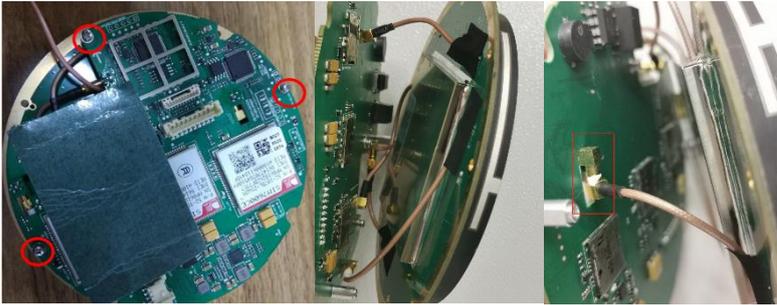
-
4. Remove the circuitry from bottom shell, unscrew 4 screws



5. Unplug flexible flat cable and RF connector pins
Please be aware of the aligning hole



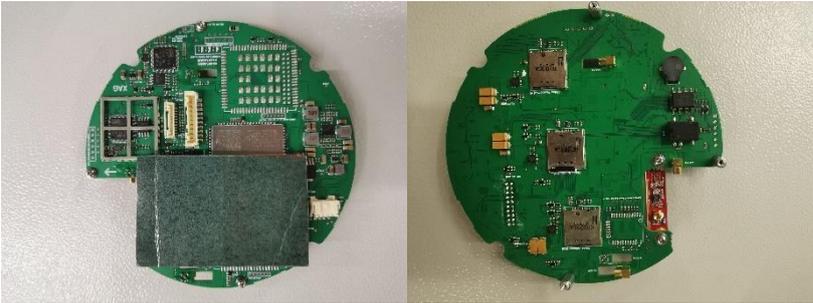
6. Remove GNSS antenna, unscrew 3 screws, unplug RF connector pin



the bottom and upper view of GNSS antenna



The bottom and upper view of main board with RTK module



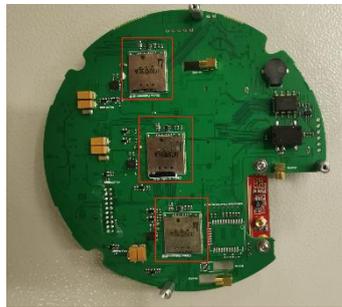
7. Separate RTK board and main board, unscrew 2 screws



RTK board



8. Remove sim card(s)



9. Remove button board, unscrew 2 screws



10. Remove RF connector, use wrench to unscrew the hexagon nut



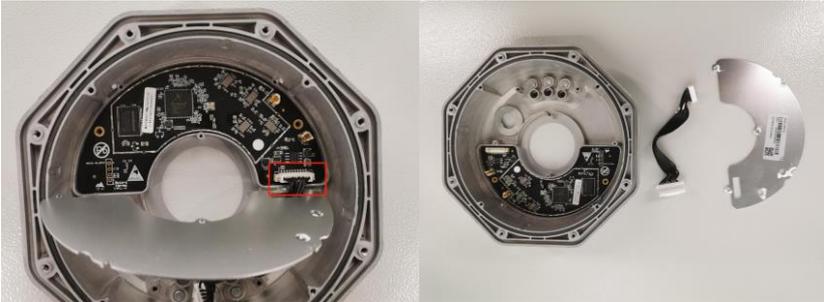
11. Remove GNSS fixture column and its gasket



12. Remove EMI shield, unscrew 5 screws



Remove FFC



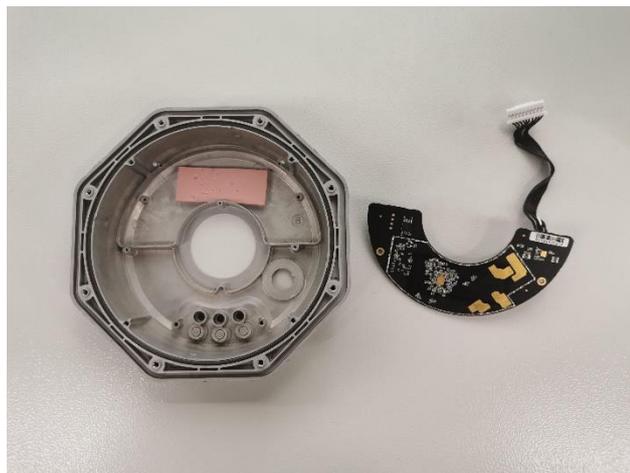
The view of EMI shield



13. Remove WIFI board, unscrew 2 screws

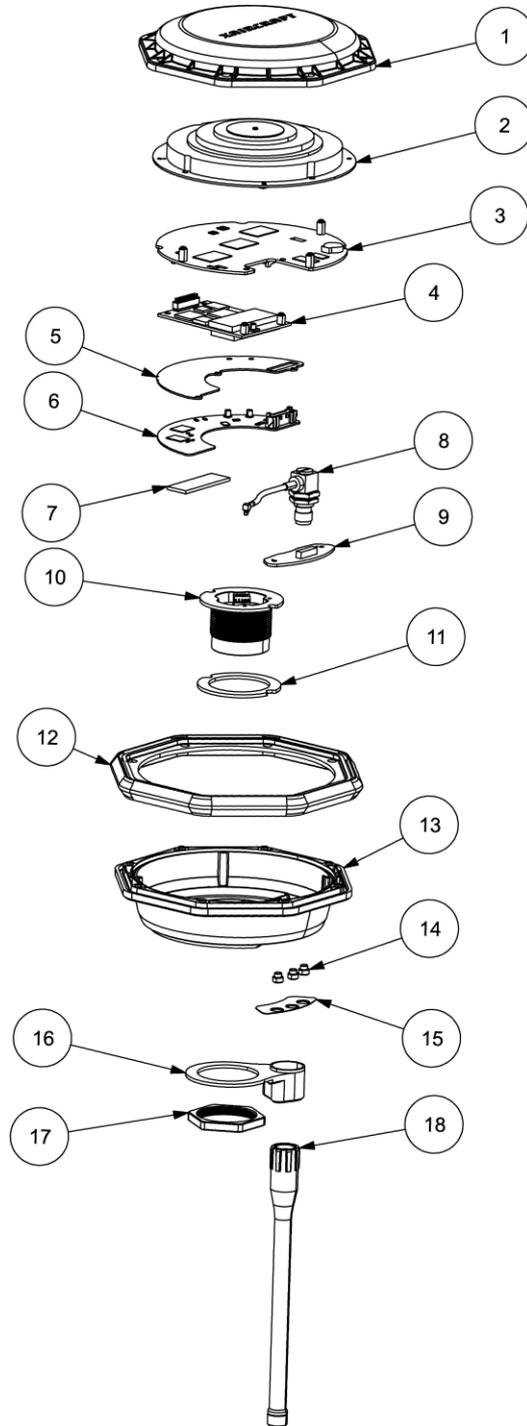


Note: The thermal conductive silicone pad pastes between the WIFI board and the bottom shield. It makes the WIFI board difficult to be removed from the bottom shell. In this case, we can use a heater to warm up the bottom shell for 1~15 minutes. Then plug on the cable, grab the cable, and slowly pull the WIFI board away from the bottom shell



Explosive view and Spare Part

The part list contains the exploded view of the RTK mushroom head as well as the associated part number. Due to the 4G compatibility, there are three versions of RTK mushroom head, including Chinese version (CN), English version (EN), and Japanese version (JP).



No.	Part name	(CN) 09-010-00034	(EN) 09-010-00037	(JP) 09-001-00013	Flexible Flat cable	Screw	Screw Qty

1	RTK upper shell	02-001-03238	02-001-03238	02-001-03238		02-004-00224	8
2	GNSS Antenna	01-003-00179	01-003-00179	01-003-00179		02-002-00999 02-004-00372 02-004-00418	3 3 4
3	mainboard	05-001-01682	05-001-01587	05-001-01666		02-004-00372	3
4	RTK board	05-001-00547	05-001-00547	05-001-00547		02-004-00372	2
5	EMI Shielding	02-002-04744	02-002-04744	02-002-04744		02-004-00418	3
6	WIFI board	01-036-00144	01-036-00144	01-036-00144	01-027-01006	02-004-00161	2
7	Thermal Conductive Silicone Pad	04-015-00119	04-015-00119	04-015-00119			
8	RF connector	01-027-00803	01-027-00803	01-027-00803			
9	Button board	05-001-00246	05-001-00246	05-001-00246	01-027-00278	02-004-00418	2
10	Fixture column	(申请保障料)	(申请保障料)	(申请保障料)	01-027-00826		
11	Fixture column waterproof gasket	02-001-03239	02-001-03239	02-001-03239			
12	shell seal ring	02-001-02349	02-001-02349	02-001-02349			
13	RTK bottom shell	02-002-08628	02-002-08629	02-002-08629			
14	cylinder button	02-002-02169	02-002-02169	02-002-02169			
15	Button film	02-025-00079	02-025-00079	02-025-00079			
16	platen	02-002-01926	02-002-01926	02-002-01926			
17	Hexagon nut	02-002-01790	02-002-01790	02-002-01790			
18	Rod Antenna	01-003-00183	01-003-00183	01-003-00183			

Troubleshooting

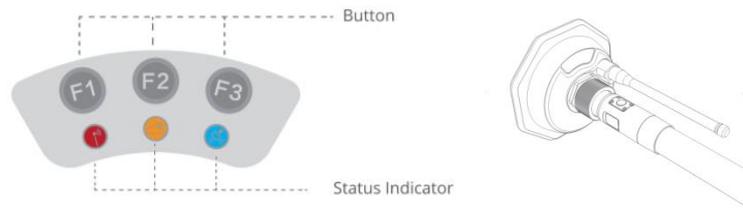
Scenario

Scenario	Causes	Possible Solution
Fail to turn on	Main board	Replace
	Fixture column	Replace
	Flexible Flat cable	Replace
Fail to pair	WIFI board	Replace
	Rob antenna	Replace
	RF connector	Replace
	Button board	Replace
RTK loss	RTK board	Replace
	GNSS antenna	Replace
	Main board	Replace
Network loss	SIM card	Replace or change another network provider
	Mainboard	Replace

Awareness

1. Grab your mushroom head properly. Never grab the rob antenna and move back and forth, which will result in the break of wire inside rob antenna
2. Don't stick the rover (mushroom head and rod) hard into the ground. The force may break the circuitry inside mushroom head.

Check RTK Light indicators



LED INDICATOR	ICON	Button	ILLUSTRATION	IMPLICATION
Wireless Communication Indicator 无线通信信号灯		F1	whether HDLS module can transmit and process data	Solid Red :OK Flash Red (slow) : Initializing WLAN Flash Red (rapid): Low battery
Cloud Communication Indicator 云通讯信号灯		F2	whether device can communicate with remote server (cloud or local network terminal)	Flash Yellow (single): not connected Flash Yellow (double) : cloud server connected Flash Yellow (triple): LNT connected
RTK Indicator RTK 信号灯		F3	related to RTK positioning	Blue Light Off: None Blue Light: RTK Blue Single Flash: Single Blue Double Flash: Float Blue Triple Flash: Fix



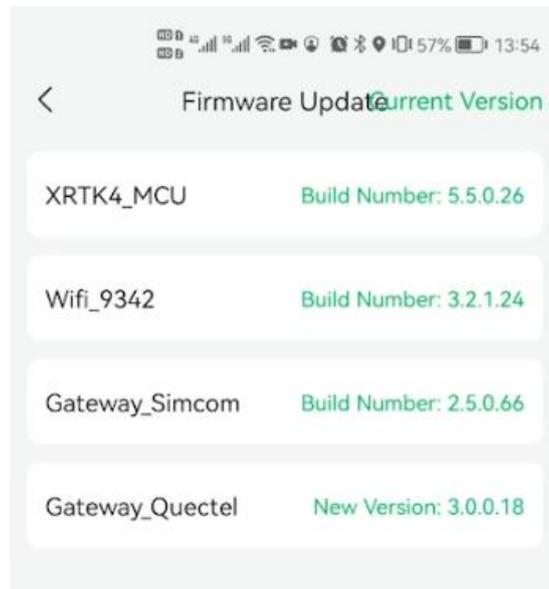
When using LNT networking mode, please make sure the XRTK4 has F2 triple flashing



Apply XAG App account Privilege for LNT networking mode

If you are going to use LNT networking mode and want to pair your RTK station with LNT. You must download and install the XLINK firmware to your RTK station using XAG Agri 2 App and ACS2 2020 remote controller.

Before firmware update, please be aware of that the app account must have LNT privilege to view and download the LNT relevant firmware. If your account is not able to update to the LNT relevant firmware, your account possibly doesn't have the LNT privilege. To solve this, please contact XAG technician for help. Provide your account ID when applying for privilege.



Check if XRTK4 has 4G SIM card inserted

All the RTK mushroom head has 4G Sim card inserted before shipment. Please do not remove 4G SIM card otherwise may cause the following issues:

- a. the RTK mushroom head may consistently stay offline during use.
- b. After credentials setting in RTK/LNT configuration, RTK will not connect to LNT, which means the RTK will not have triple light flashing.

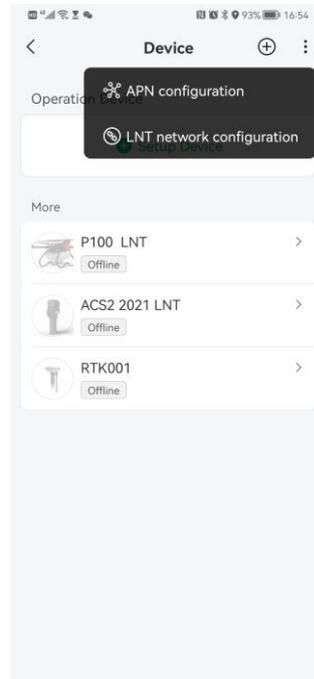
4G SIM card can be replaced by local SIM if the RTK station is used under 4G networking mode.

XRTK4 APN Setting (4G Network)

If XRTK4 is compatible with your local Telkom operator while it still can't access internet with 4G SIM card inserted, then you may need to modify APN setting.

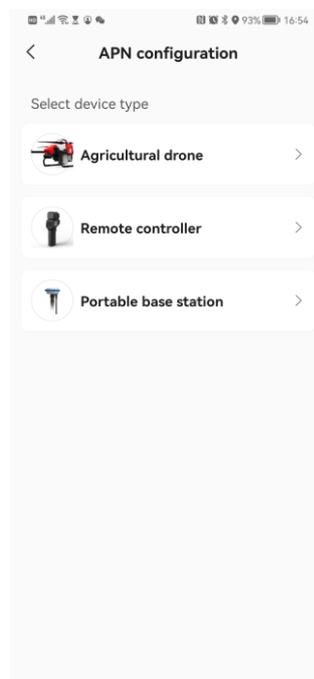
Step 1

Open XAG One App, go to Device



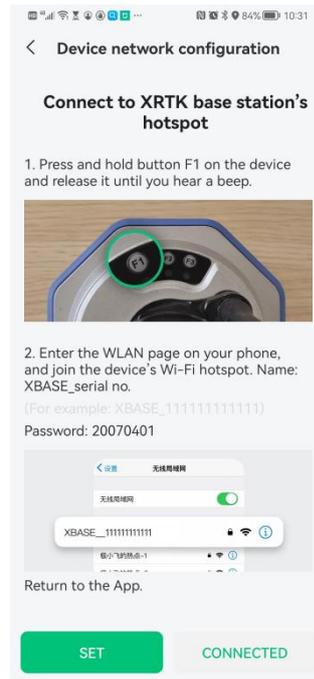
Step 2

Go to APN configuration



Step 3

Connect your smartphone to XRTK4 hotspot, and press CONNECTED

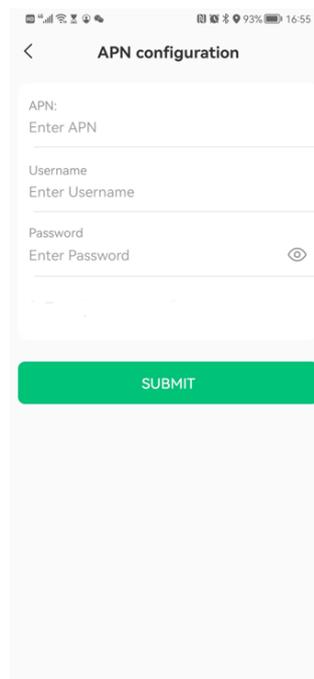


Step 4

Input APN, Username, and password.

Press SUBMIT

If you don't know the APN configuration information, please contact your local Telcom operator.

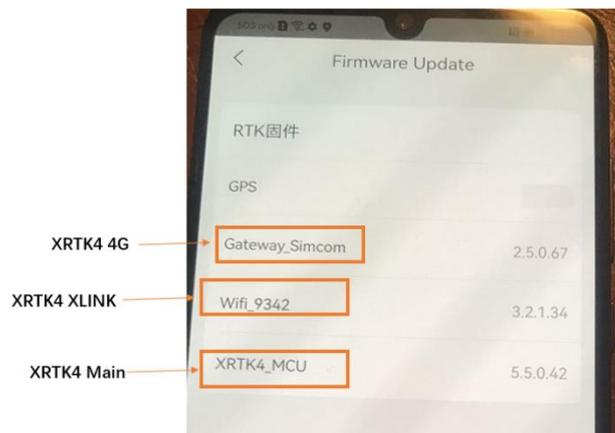


Check RTK firmware version before LNT networking mode configuration

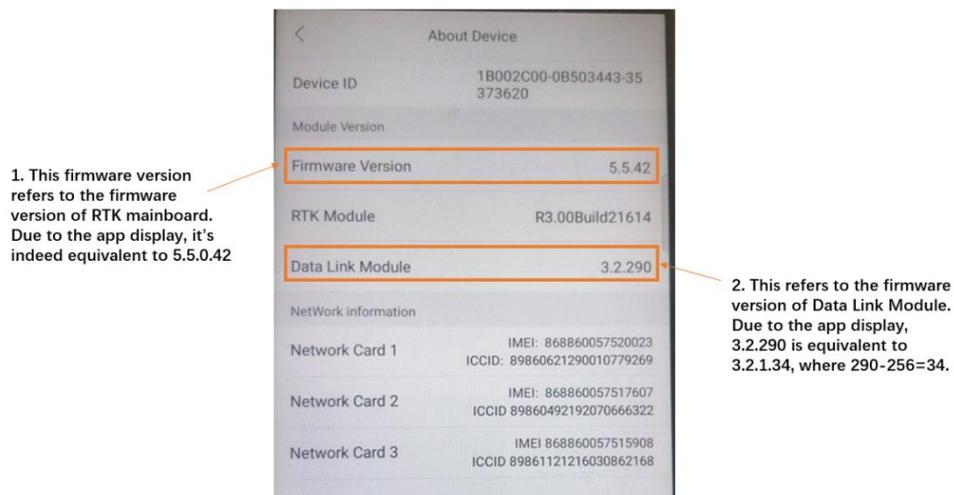
Please make sure the RTK firmware satisfies the minimum requirement of LNT network configuration. If not, please update RTK firmware before configuration.

Module	Description	Firmware version (minimum requirement of LNT network configuration.)
XRTK4 Main	Related to mainboard	V5.5.0.33
XRTK4 XLINK	Related to WIFI	V3.2.1.30
XRTK4 4G	Related to 4G	V2.5.0.67

RTK firmware version using XAG One App



Device information using XAG Agri 2 App

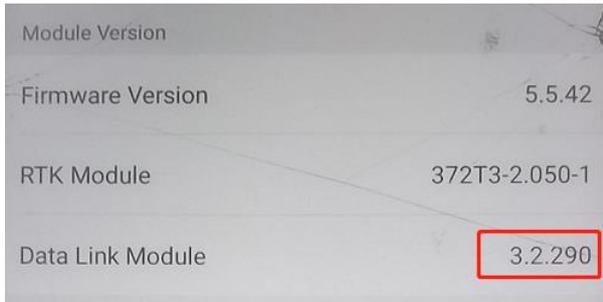


Optional: Revert XRTK4 to adapt again with XP2020

To revert XRTK4 to work again with XP2020, please check XRTK4 Data Link Module (XLINK) and do firmware downgrade if necessary.

Check Data Link Module

After the Data Link Module of XRTK4 station is upgraded to the version 3.2.XXX,



the XRTK4 station may encounter the issue as below:

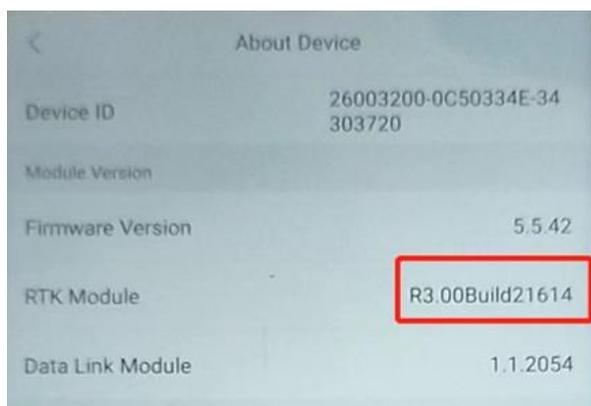
1. fail to use with XP2020.
2. take a long time to go into FIX mode.
3. UAVs (V40/P40/P100) or ACS2 2021 remote control fails to connect RTK or receive RTCM data.

The above issues may be due to the model of RTK module.

If your RTK module is **372T3-2.050-1**, your XRTK4 station is the old model. The above issue may occur.



if your RTK module is **R3.00Build21614**, your XRTK station is the new model. The above issue will not occur.



It's highly recommended to use RTK module **R3.00Build21614** in LNT network configuration.

XRTK4 Data Link Module Firmware Downgrade

If you are using the old RTK module 372T3-2.050-1 and having the above issues, you can revert the XRTK4 Data Link Module back to 1.1.XXXX, also called firmware downgrade from 3.2.XXX to 1.1.XXXX.

设备ID	27002E00-15505238-4B 333620
模块版本	
固件版本	5.5.42
RTK模块	372T3-2.050-1
数传模块	1.1.2054
网络信息	
网卡1	IMEI: ICCID:
网卡2	IMEI: ICCID:
网卡3	IMEI: ICCID:

Preparation

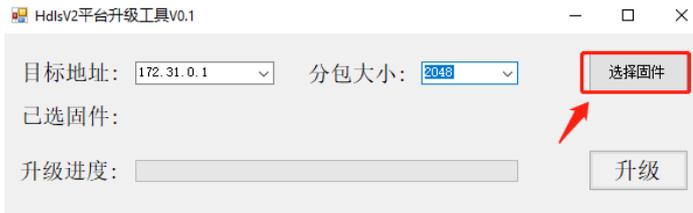
1. laptop, windows 10
2. 2-hdls_fwupdate.exe (software to install XRTK4 firmware)
3. xlinkhs_V1.1.2054_20220920.fw (XLINK Firmware)
4. XRTK4 station (Data Link Module version 3.2.XXX)

Procedure

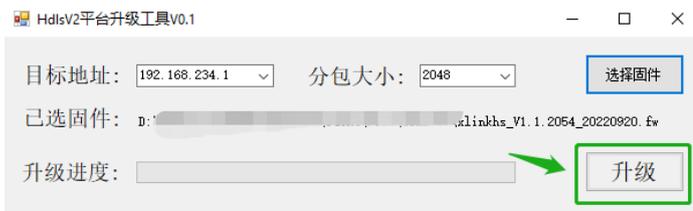
1. on XRTK4 station, long press F1 to enable the XRTK4 WIFI
2. connect laptop to XRTK4 hotspot
3. open 2-hdls_fwupdate.exe and input parameters (172.31.0.1 and 2048)



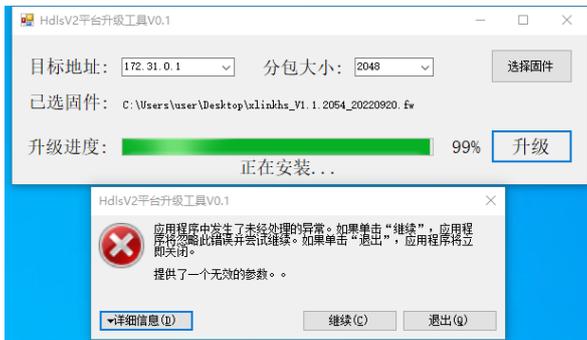
4. Choose firmware, xlinkhs_V1.1.2054_20220920.fw



5. update XLINK firmware



6. The tool will stop at 99% as the XRTK4 is restarting its WIFI module. Please ignore the warning. Wait for approximately 5 minutes.



7. Use remote controller (ACB1 or ACS2 2020) and XAG Agri 2 App to check XRTK4 station firmware version

< 关于设备

设备ID	27002E00-15505238-4B 333620
模块版本	
固件版本	5.5.42
RTK模块	372T3-2.050-1
数传模块	1.1.2054
网络信息	
网卡1	IMEI: ICCID:
网卡2	IMEI: ICCID
网卡3	IMEI ICCID

8. Test XRTK4 station with XP2020 or P30

XRTK4 Portable Station Firmware update

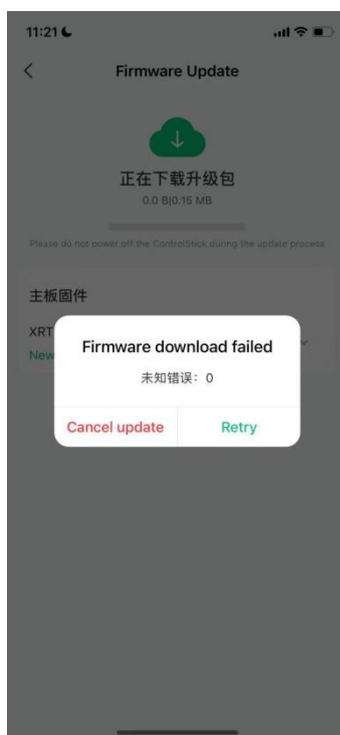
XRTK4 portable station firmware update can only use below method:

- i. Mesh network: ACS2 2020, XAG Agri 2 App
- ii. LNT network, Add XRTK to LNT, update XRTK on XAG One App

If the XRTK4 DATA Link module is above 3.XX.XXXX, its WIFI XLINK firmware can be updated locally without internet access. you can find it in the chapter of “firmware update”.

XRTK4 portable station **CANNOT** be updated under 4G networking mode (insert 4G SIM card inside XRTK4 module). The future version of APP will disable the firmware update interface of XRTK4 as its hardware does not support this feature.

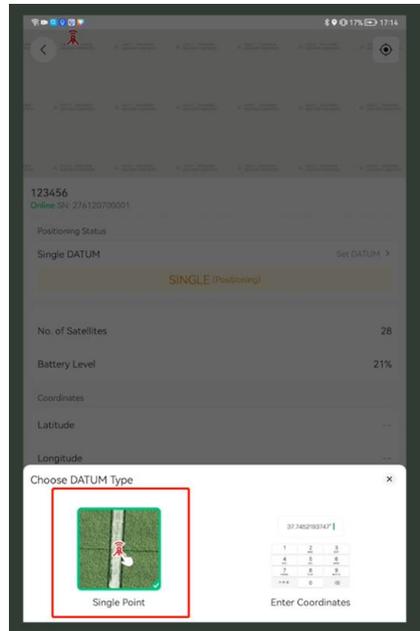
The below example is that users fail to update XRTK4 firmware.



Signal point debug

When using signal point positioning, please check the followings.

If you are not sure, please send the XAG technician the screen recording. The screen recording video should last for 5 minutes.



1. The RTK station ID should be displayed

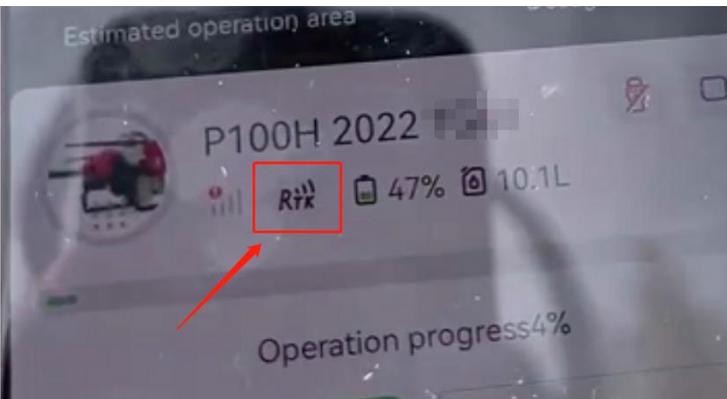
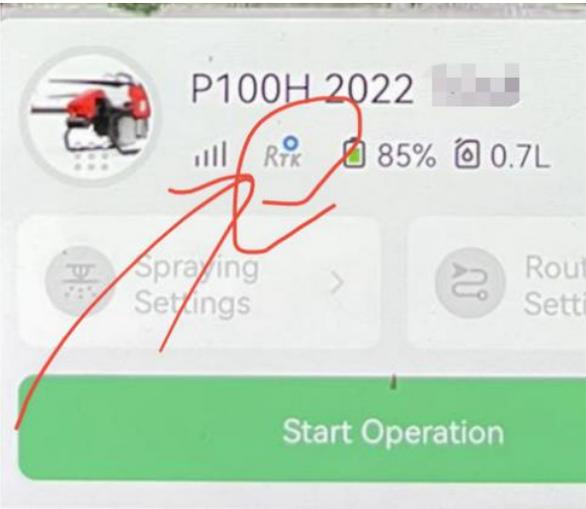
2. RTK goes into "FIX"

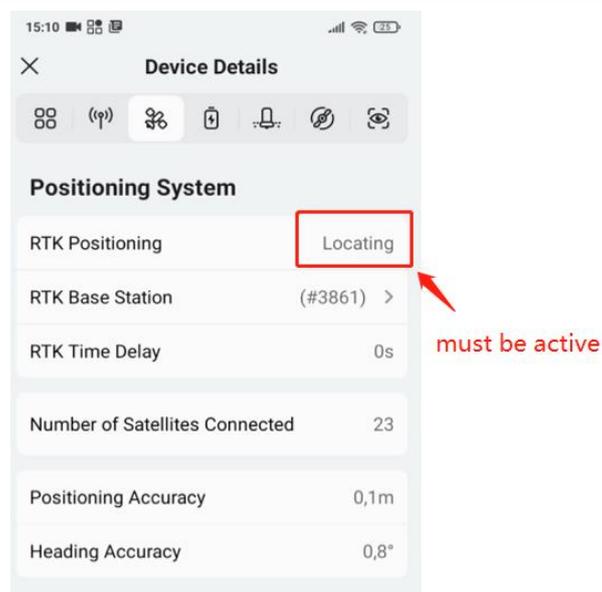
3. Number of satellites > 16

4. the five dots represent for the satellites provider, gps, glonass, beidou, stationinfo, receiverinfo. Among the green dot of gps, glonass and beidou, as least one of them must be in green. The green dot of stationinfo and receiverinfo, at least one of them must be green.

5. The coordinates of Latitude and longitude is displayed.

Check if UAV has RTK active

UAV – RTK status	Photo
Connected	 A screenshot of a UAV control interface. At the top, it says "Estimated operation area". Below that, the drone model "P100H 2022" is shown with a small icon of the drone. To the right of the icon, there is a red box around the "RTK" status indicator, with a red arrow pointing to it. Other indicators include a battery level of 47% and a volume of 10.1L. At the bottom, it says "Operation progress 4%".
Not connected	 A screenshot of a UAV control interface. The drone model "P100H 2022" is shown with a small icon of the drone. To the right of the icon, there is a red circle around the "RTK" status indicator, with a red arrow pointing to it. Other indicators include a battery level of 85% and a volume of 0.7L. Below the drone information, there are buttons for "Spraying Settings" and "Route Settings". At the bottom, there is a large green button labeled "Start Operation".



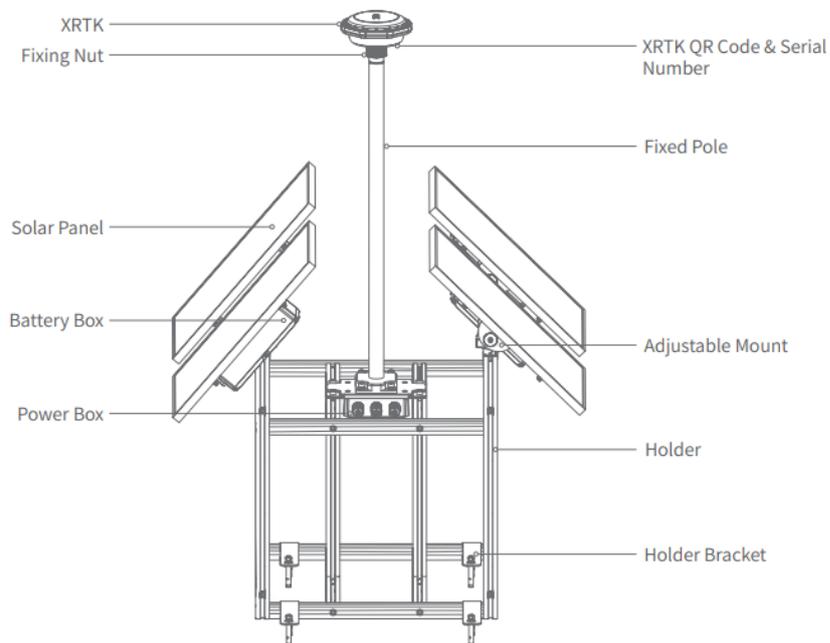
XRTK4 Factory Reset

To factory reset XRTK4, please press and hold the F2 and F3 button until you hear a long beep sound.



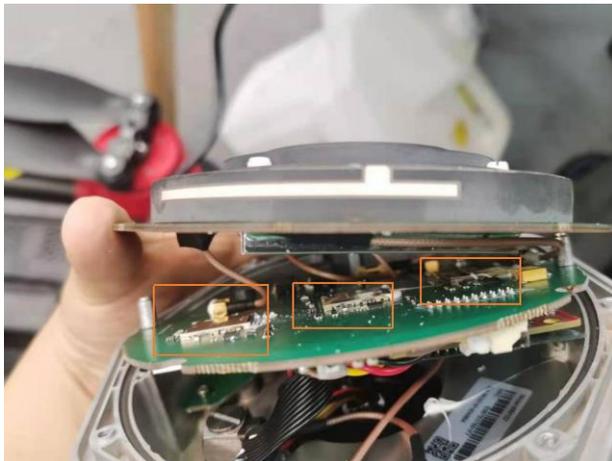
Fixed RTK Station

Overview



Insert SIM card into Mushroom head

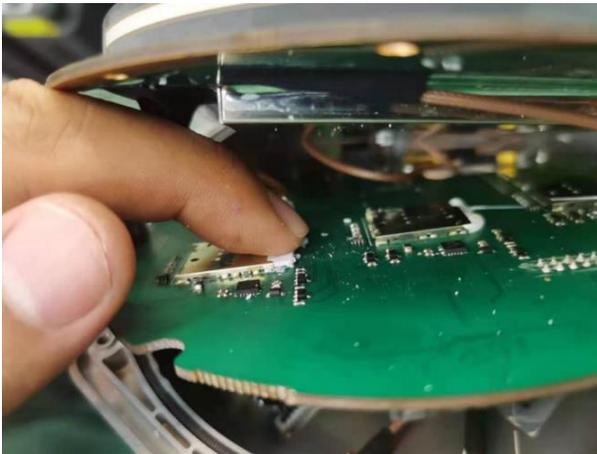
Remove the module and find the three SIM card slot



Slowly clean the white glue of the card slot with plastic tweezers



move the SIM card (with care and patience), insert your SIM card into the slot and close the head cover again



Install Base Station

Site Selection

To ensure the normal operation of the base station, site selection should be guided by the following principles:



-
- ① There should be no obstructions creating a shielding angle of over 15° around the level surface of the base station.
 - ② Keep a minimum of 100m distance from the objects that are likely to produce multipath effect, including trees, water bodies, beaches, waterlogged areas and metals.
 - ③ Keep a minimum of 100m distance from areas generating electromagnetic interference, such as microwave stations, radio towers, areas along the high-speed railway. The selected site should also be far from areas subject to vibration like those along the railway and highway.
 - ④ See that the 4G signal is normal, and no tall buildings, obstructions of the satellite signal, will be built around the base station.
 - ⑤ Make sure that no radio stations like microwave stations will be built around the base station in the future. The selected site should be far from areas with fragile geological structures, fault fracture zones and places being prone to landslide, settlement other local deformations, such as mining areas, oil and gas fields, groundwater funnel settlement areas, etc. In addition, flood-prone areas or places with great variation in water level should also be avoided.

Install Fixed Base Station Holder

When installing the holder for the fixed base station, ensure that the adjustable mount of the solar panel is facing 5 to 10 degrees clockwise from due south, and there is no obstruction.

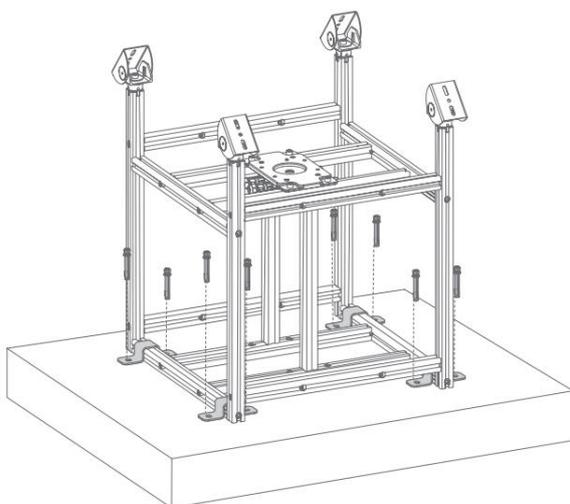
1. Drill and Install Directly

If the conditions are right, you may install directly the four brackets wherever possible on the ground by drilling holes for eight expansion bolts and secure the holder. This is the easiest as well as time- and cost-effective way to install the holder.

2. Build a Platform Before Installation

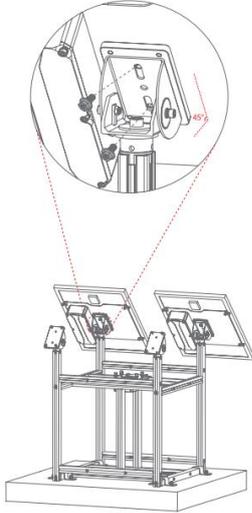
Build a concrete platform with dimensions of 1 x 1 x 0.15 m. Make sure the four brackets are properly installed on the platform after it hardens. Drill holes for the eight expansion bolts and secure the holder.

Keep the holder level as the bottom of it is anchored to the ground. Be careful with the drill and avoid causing damage to the brackets.



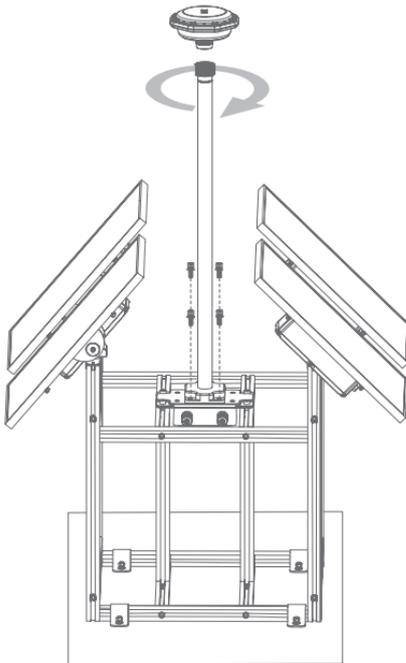
Install Solar Panels

Refer to the figure below and make sure the four solar panels are aligned with the screw holes on the adjustable mounts. Tighten the screws (two screws per panel) with a screwdriver. When this is done, adjust the angle of the solar panels to 45 degrees.



Install XRTK

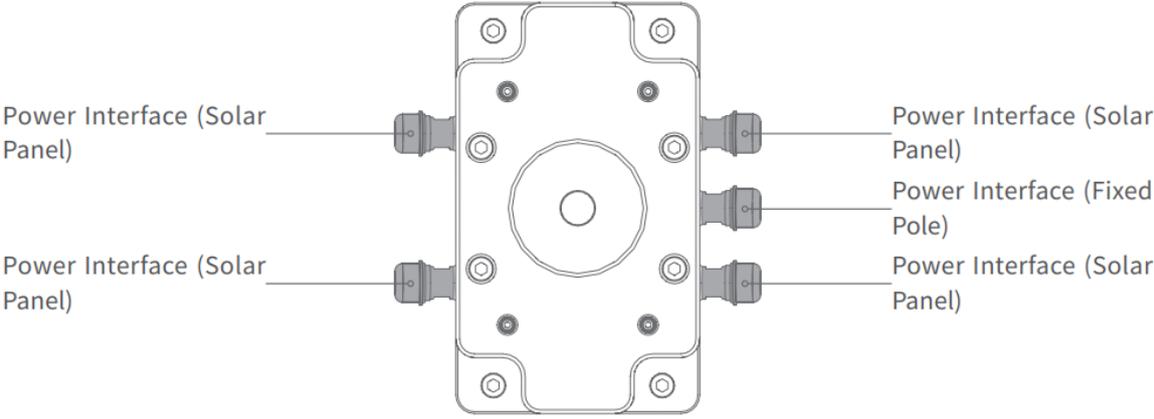
1. Make sure the fixed pole is erected vertically and its bottom is in line with the reserved hole on the holder. Tighten the four screws with a screwdriver.
2. Insert the XRTK slot into the top of the fixed pole, and tighten the fixing nut by rotating it counterclockwise.



Wiring Quick Guide

Refer to the power wiring guide below and connect the 4pin power cables of the four battery boxes to the

holder's power box respectively. After this, connect the power cable of the fixed pole to the power box.



Online Application

Base Station Erection Information	
Company	
Contact person	
Phone number	
Address	
Station Name	
QR code photo, close shot photo, distant view photo	
4 Photos of surrounding environment (Front, Rear, Left, Right)	

Below is the online application example:

Base station erection information(example)

Company: XAG

Contact person: Weichi

Phone number: +8612345678

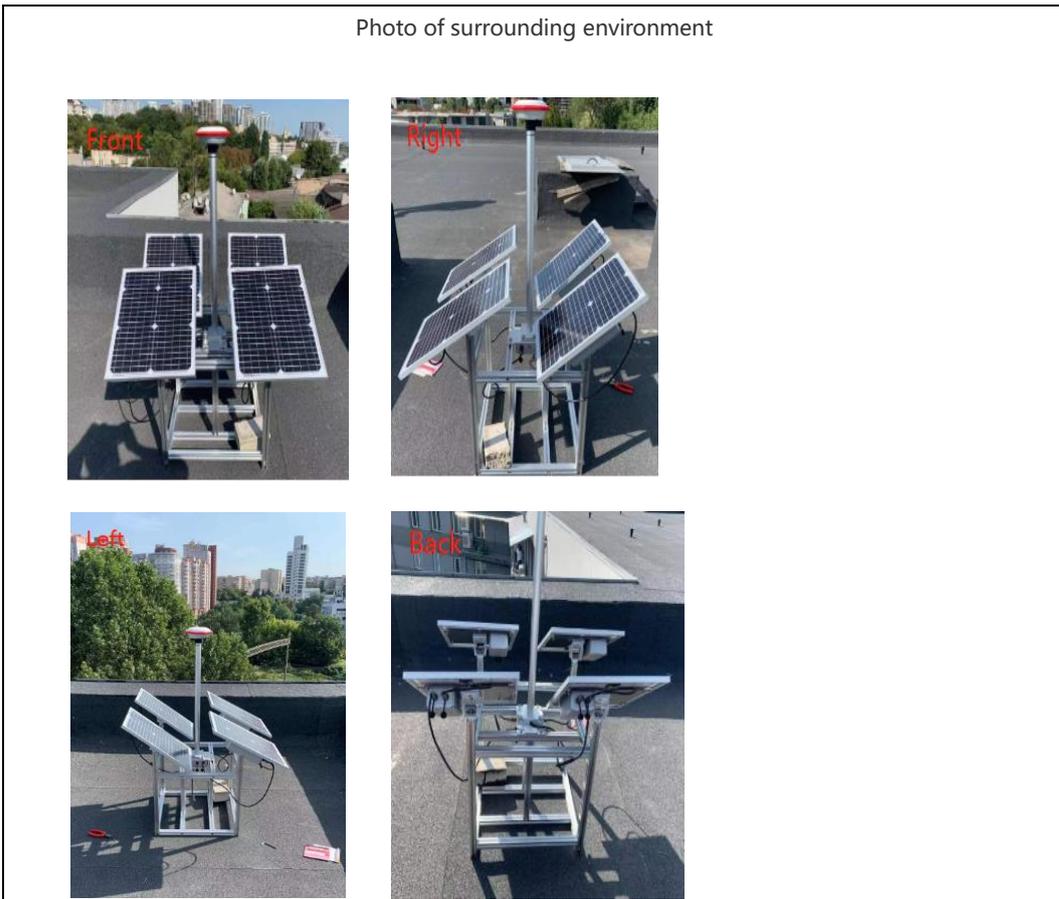
Address: XSpace, 115 Gaopu Rd, Guangzhou, P.R.C

Station name: CN GUANGZHOU 123(Country+City+Number)

QR code photo, close shot photo, distant view photo



Photo of surrounding environment



Once the application approved, your fixed station will be activated from XAG backend.



CORS – Provided by third party

Introduction

About Continuously Operating Reference Stations (CORS) Network

A Continuously Operating Reference Station (CORS) network is a network of RTK base stations that broadcast corrections, usually over an Internet connection.

The CORS network is a multi-purpose, multi-agency cooperative endeavor, combining the efforts of hundreds of government, academic, and private organizations.

The stations are independently owned and operated.

Each agency shares their GNSS/GPS carrier phase and code range measurements and station metadata with NGS, which are analyzed and distributed free of charge.

Application

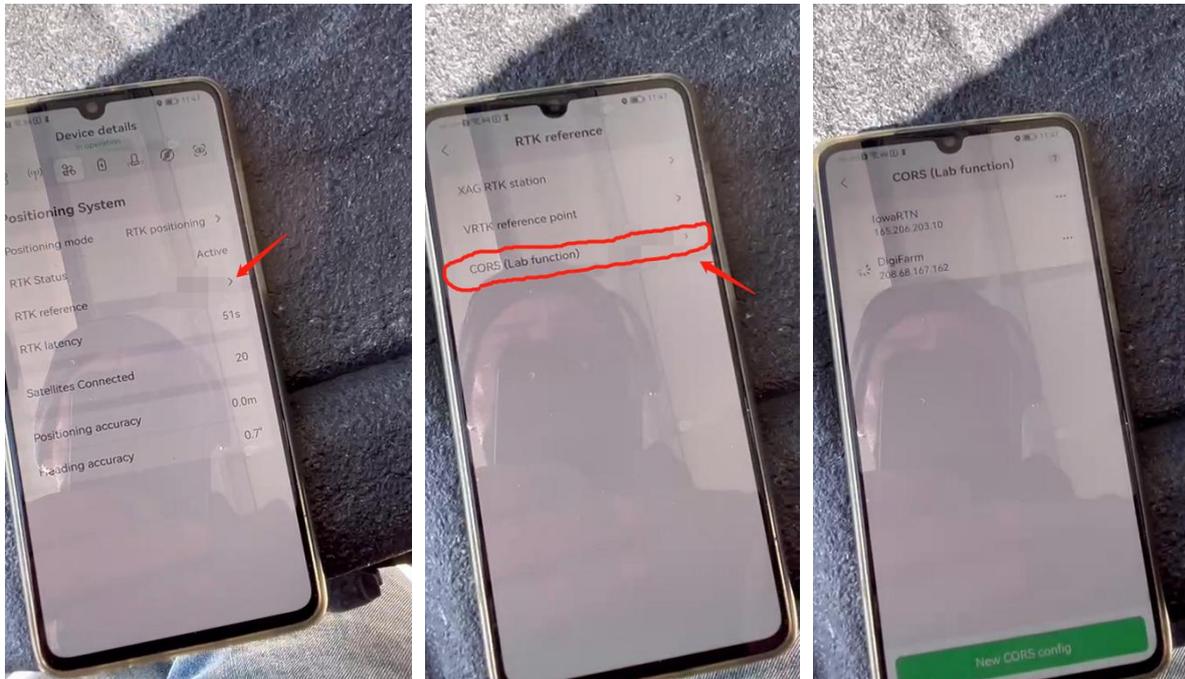
The idea behind is to provide a common positioning platform in defined accuracy for the survey, mapping and monitoring of large infrastructure projects – as irrigation, railroad, canals, dams, smart cities, drainage planning along with management of revenue maps and state boundary management.

Reference: [CORS Network \(kerala.gov.in\)](http://kerala.gov.in)

Configure CORS on App

On the App, go to “device details”, “Positioning system”, “RTK reference”, CORS, choose the wanted CORS or create a new one.

CORS only support RTCM32 MSM4 protocol.

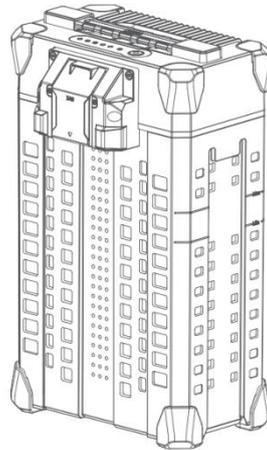


Chapter 13

Power Supply

B13960S Smart Battery

Overview

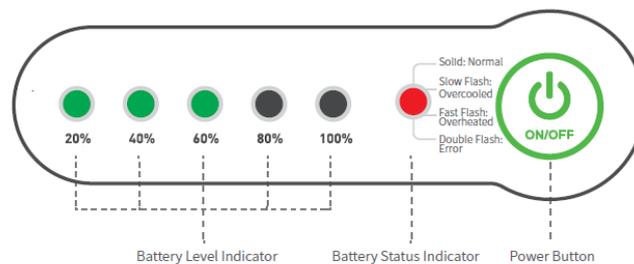


B13960S is the smart battery that has 13 lithium packs, with approximately 960Ah.

To protect your battery, please

- do not overcharge or over-discharge
- do not use or store in cold weather, below 10 Celsius degrees

On/Off operation



How to turn on the battery? (2 long presses):

- In the shutdown state, connect to the load and press the power button for at least 1 second
- Wait for all power lights to flash at the same time then release the power button
- Press and hold the power button again for at least 1 second until the battery beeps and the status indicator lights up

How to turn off the battery? (2 long presses):

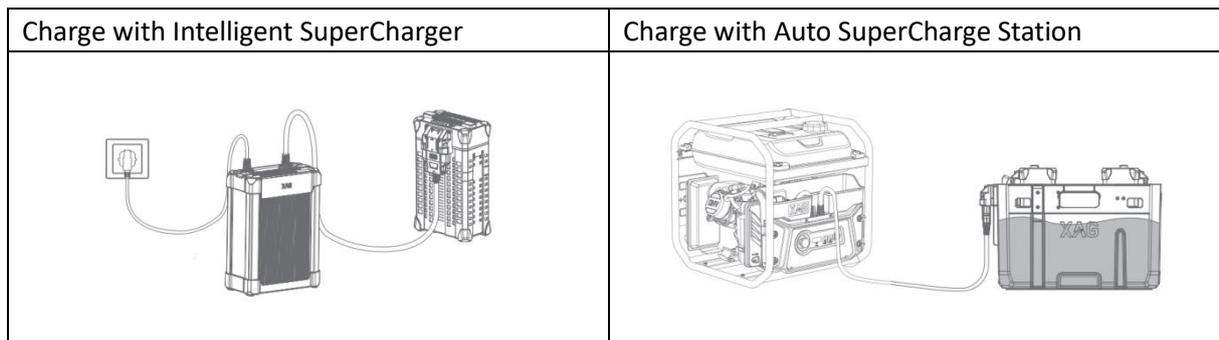
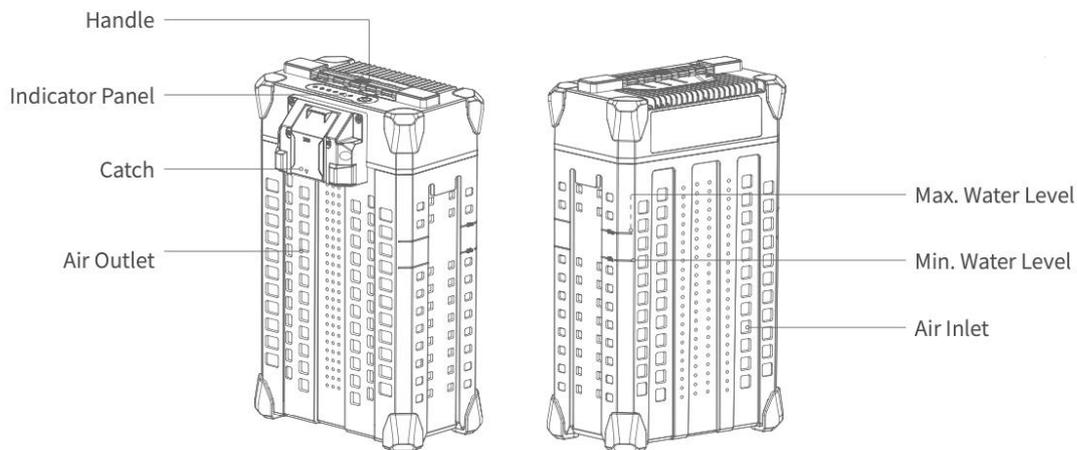
- In the power on state, long press the power button for at least 1 second
- Wait for all power lights to flash at the same time then release the power button
- Press and hold the power button again for at least 1 second until the battery beeps and the status indicator goes out

Introduction

The B13960S intelligent battery (hereafter referred to as “the battery”) has a capacity of 20000mAh at a voltage of 48.1V. The metal shell and rubber caps protect the battery, and 13 high energy battery plate cells and advanced power management system allow it to provide power to an aircraft.

This intelligent battery contains 13 high-capacity lithium polymer batteries and integrates BMS module. It can monitor voltage, current, temperature and others status information in real time. During the use of battery, BMS can give real-time feedback to the UAV flight control. When the battery is insufficient or out of work, the BMS system will actively send an emergency stop command to ensure safety.

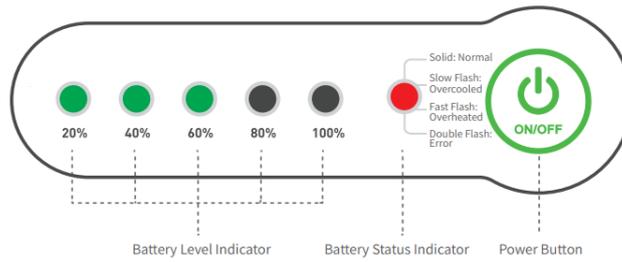
The B13960S smart battery is composed of head shell, mother board, partition plate, battery cell, tail plug, lower shell, etc.



Battery Compatibility

The B13960S Smart Battery is compatible with XAG's 2021, 2022 and 2023 agricultural UAV and vehicle.

Check Battery Status



Check Battery Level

When the battery is OFF, short press once to check the battery level.
When the battery is ON, the Battery Level Indicators keep solid.

LED Behaviour	Description
1 Light Flash	0%–10%
1 Light Solid	10%–30%
2 Lights Solid	30%–50%
3 Lights Solid	50%–70%
4 Lights Solid	70%–90%
5 Lights Solid	90% 100%

LED Behaviour	Status	Description
2 Lights Double Flash	Fault Lock	Battery locked for the low battery, please contact tech support to unlock the device.
3 Lights Double Flashing	Remote Lock	Battery locked remotely, please contact tech support to unlock the device.
4 Lights Double Flashing	Anti-dismantling Lock	Failed to verify cell identification, please contact tech support to help check.
2/3 Alternate Flashing Lights	Over current Protection	Protection triggered by overcurrent, please contact tech support to unlock the device.
2/4 Alternate Flashing Lights	Dual-battery Power on Disabled	Dual-battery power on disabled, voltages of both batteries should be roughly equal before use.

LED Behaviour	Status	Description
Red Light Solid	Normal	Normal
Flashing Red Light (rapid)	Overheated	Protection triggered. Charging/Discharging not allowed
Flashing Red Light (slow)	Overcooled	Charging protection triggered for low temperature. Please keep the battery above 10°C
Red Light Double Flashing	Failure	Stop using immediately

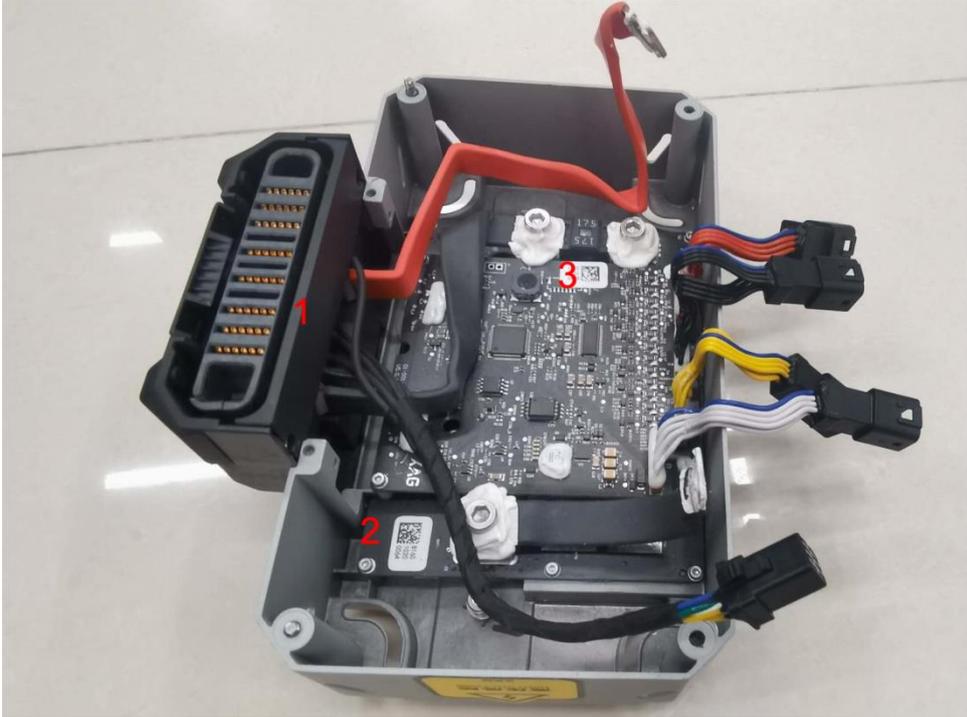


B13960S status indicator: Anti-dismantling lock will disable the use of battery. The battery cannot be used if the battery cell or motherboard is replaced without battery tool activation. Technically, repair staff need to contact XAG technical support team when replacing battery head or mother board. Battery cells are not allowed to be replaced due to safety concerns.

Battery Parts and Serial Numbers

The major modules of a B13960S' include the battery head and battery cell. The BMS is installed in the battery head, including

- 1: the battery socket, no serial number
- 2: the interface board (lower layer). It has a serial number beginning with B160
- 3: the main control board (upper layer). It has a serial number beginning with B159



The battery cell module consists of 13 cells. The module has a serial number beginning with 615 or 6242.



Changing Battery Parts

Every XAG battery has a unique Serial Number with a QR code printed beside the led indicators. Together with the serial numbers of the main board, interface board and the battery cell module, these 4 SNs are bounded as a combination in the battery management system. To change any parts of the battery, it needs to unbind the original and get a new combination.

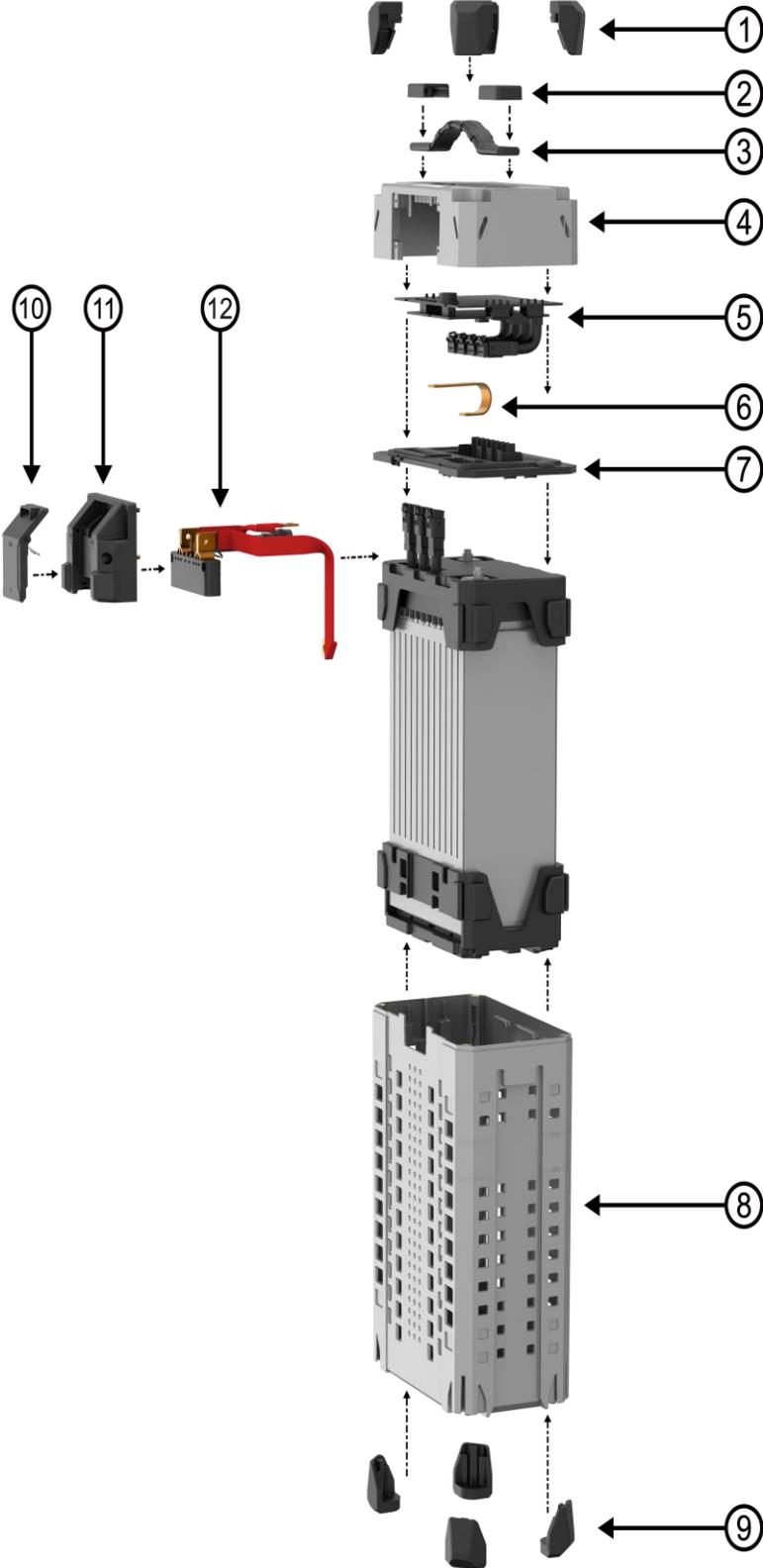
If you need to change any one of the 4 parts of the battery, please provide the following combination data to the tech support of XAG for recombination. After that, you are required to use the battery tool and software to activate the battery (please look up “Activate Battery”).

NO	PART	OLD SERIAL NUMBER (旧序列号)	NEW SERIAL NUMBER (新序列号)
1	Head (battery serial number, start from 129) 电池序列号		
2	Bottom Board (Start from B160) 功率板		
3	Up Board (Start from B159) 主板		
4	Cell (Start from 615) 电芯		

Data sheet available on the google drive mentioned in Appendix of this manual

Hardware

The below exploded view diagram shows the components of B13960S battery.



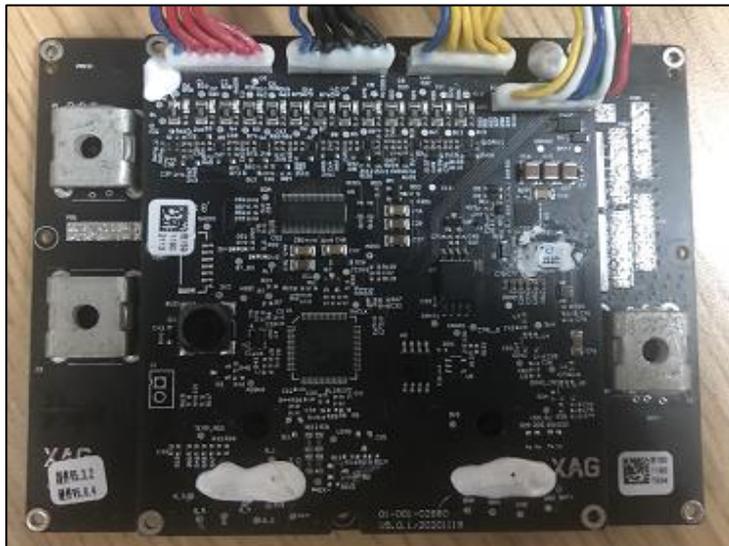
No.	Part number	Part name
1	02-001-00976	B13860S,B13960S Battery Corner Rubber Pad (Bottom)
2	02-001-06891	B13860S,B13960S Battery Handle Bracket
3	02-001-03656	B13860S,B13960S Battery Handle
4	02-002-07478	B13960S Battery Top Casing
5	14-004-00072	B13960S Battery Motherboard
6	02-002-07223	B13960S Negative Power Outlet Cord
7	02-001-06622	B13960S Battery Middle Deck
8	02-001-06621	B13960S Battery Bottom Casing
9	02-001-02795	B13860S,B13960S Battery Corner Rubber Pad (Bottom)
10	14-004-00028	B13960S Battery Clip Kit
11	14-004-00027	B13960S Battery Outlet Socket Housing
12	01-027-01895	B13960S Battery Outlet Socket

Battery Motherboard

Battery motherboard consists of a mainboard and a power board.

Mainboard

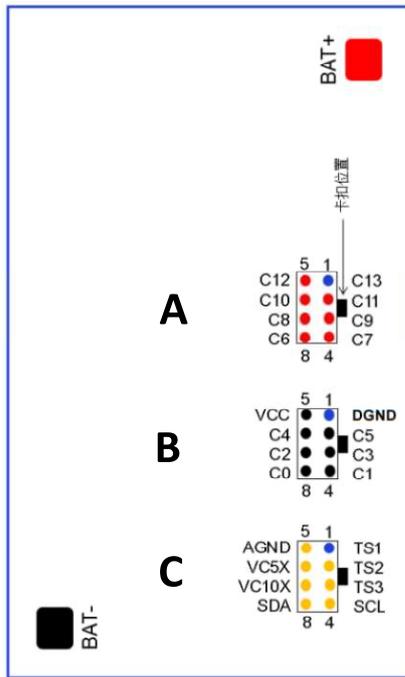
The mainboard is physically attached to the power board. It is placed inside the battery head, used for collecting battery information, outputting, and controlling battery status. The mainboard has added nano coating technology to increase its waterproof performance and encryption authentication technology for safety concerns. After replacing the battery cell or mainboard, it is necessary to activate the power software system before use.



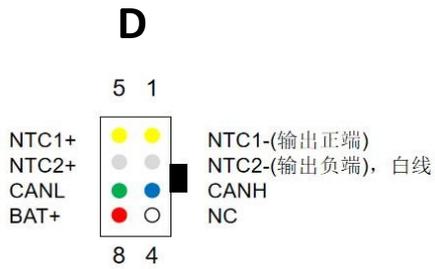
Battery mainboard

On the top of the mainboard, there are 4 plugs from left to right in sequence. The functions of each plug will be shown as below:

1. Red 8 pin terminal – cell voltage detection for battery cell 6~13
2. Black 8 pin terminal – cell voltage detection of battery cell 1~5
3. Yellow 8 pin terminal – NTC (Negative Temperature Coefficient) Temperature detection and encrypted communication between battery cell and BMS
4. White 8 pin terminal – communication line between BMS and UAV's flight control



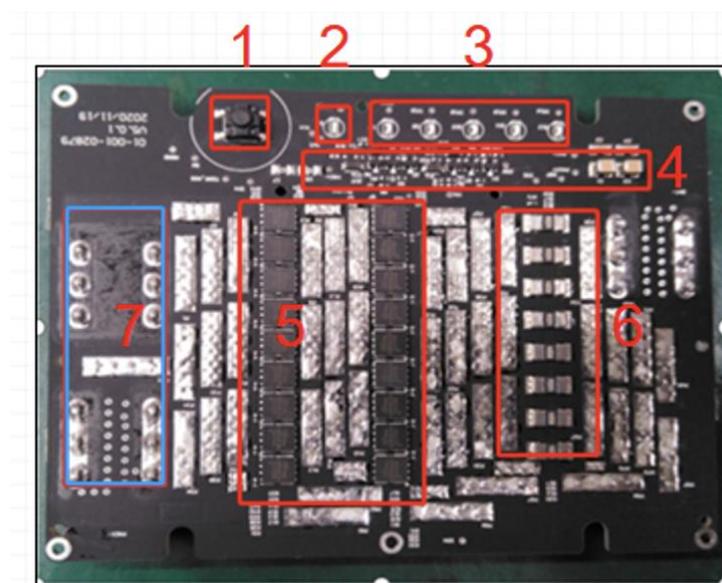
颜色与实际线材颜色对应
视角参考如下：



Definition of mainboard cell interface

Power board

The power board is used for computation, the indication display, logic output (I/O), etc.



structural of power board

The highlighted area in the above picture are the major components of the power board.

1. Power button

-
2. Status indicator (normally solid red)
 3. battery indicator
 4. MOSFET control circuit. In general, MCU controls PWM waveform, and controls switching state of MOS via gate driver.
 5. MOSEFT, control output on/off
 6. Current sampling circuit (output current is sampled from both ends of the resistor). The sampling resistance is a resistance with a very small value, generally less than 1 ohm. There will be voltage when there is current flowing through it. The voltage at both ends is converted into voltage by an operational amplifier. After the voltage is amplified, ADC is used for sampling and then connected to MCU. MCU knows how much the current is.
 7. One flat plate fuse is added to the battery power board. The specification: 175A/57V is connected in series at the negative end of the battery output.



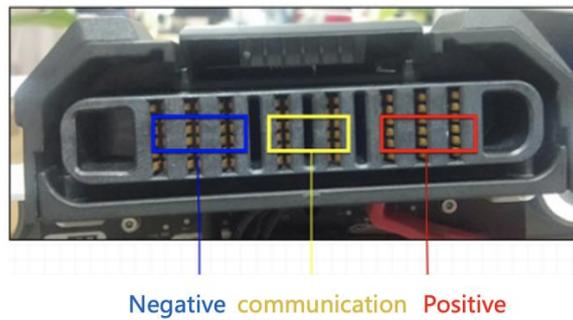
Battery plug

The battery plug is the interface for electricity transmission, charging and discharging, and the communication signal.

battery plug



battery plug ports



Disassemble Guide

1. Remove the battery head shell

Step 1: Remove the 4 anti-collision rubber pads above the smart battery.



Step 2: Remove 4 screws from the upper shell of the smart battery

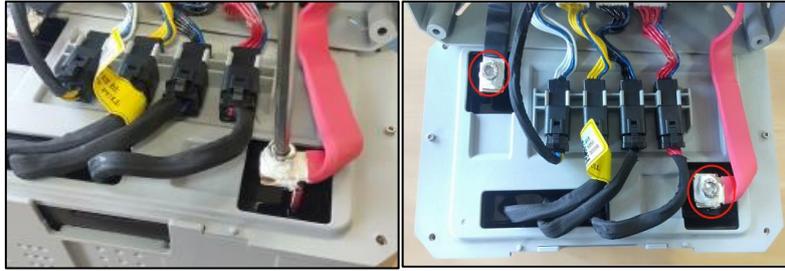


2. Remove the connecting wire

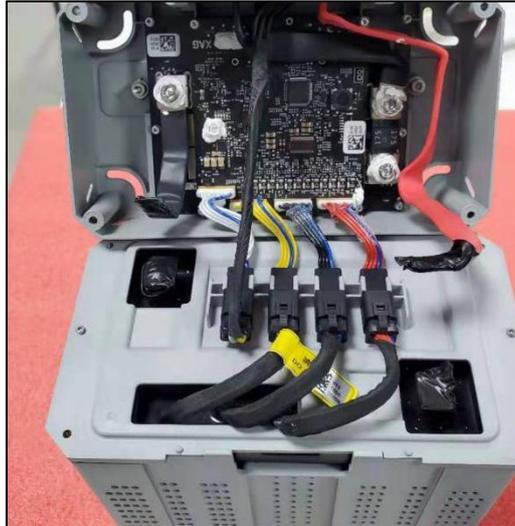
Step 1: remove two screws at the positive and negative terminal.

During the positive and negative terminal removal:

- ① do not make contact between positive and negative terminal. Otherwise, it will result in short circuit.
- ② wrap the exposed metal from terminal connector with insulating tape if necessary



Step 2: Remove 2 cell sensor wires, 1 temperature sensor wire and 1 signal wire connecting the battery cell and BMS intelligent battery management system.



Caution:

When removing the core detection cable, the removal sequence must be red cable(6-13S) → black cable(1-5S) → yellow cable (NTC temperature detection and encrypted communication) white cable

3. Remove the battery plug

Step 1: Remove the 4 screws on the battery plug female holder.



Step 2: Remove one screw on the positive and negative copper terminal.

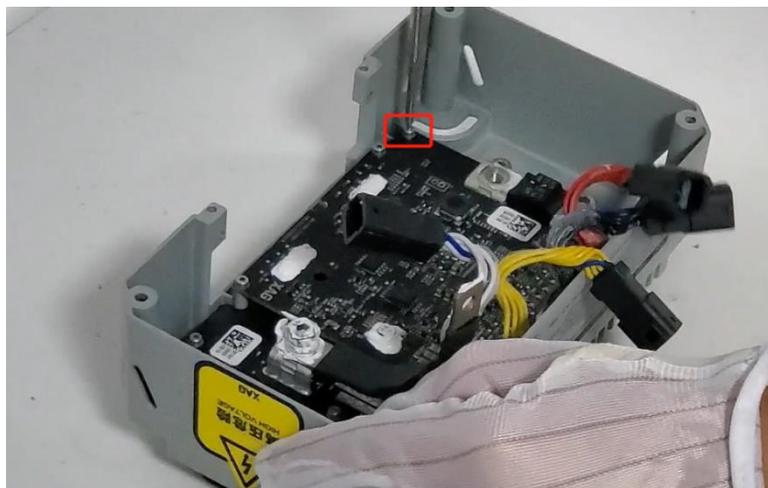


Step 3: Remove the battery plug

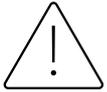
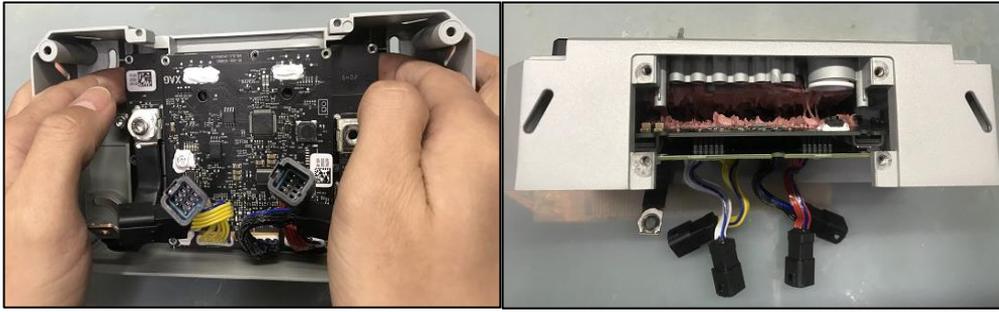


4. Remove the battery mainboard

Step 1: Remove the 14 screws on the mainboard and power board.



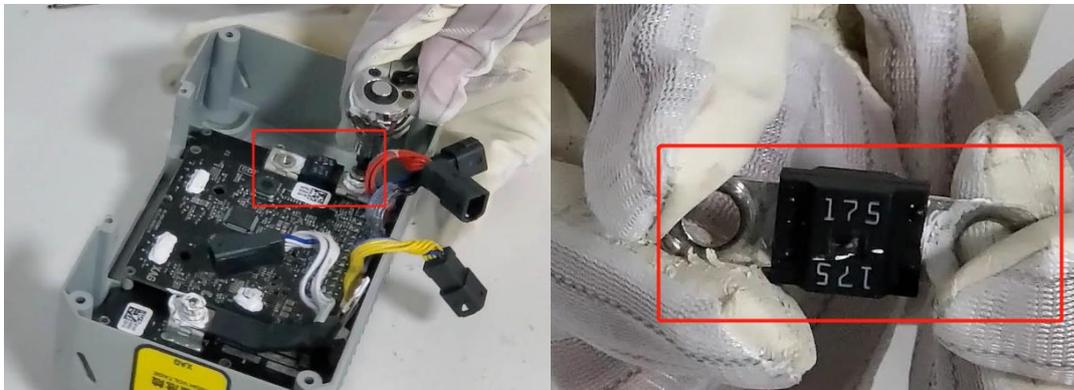
Step 2: Remove the mainboard and slowly buckle up both ends of the power board with two fingers. Naturally separate the power board from the head shell from top to bottom.



Caution:

When removing the main board, it is forbidden to pull out the connecting wire directly by hand.

Step 3: Remove the fuse.



5. Disassembly the battery plug

Step 1: Remove the fixing screws of the battery plug case

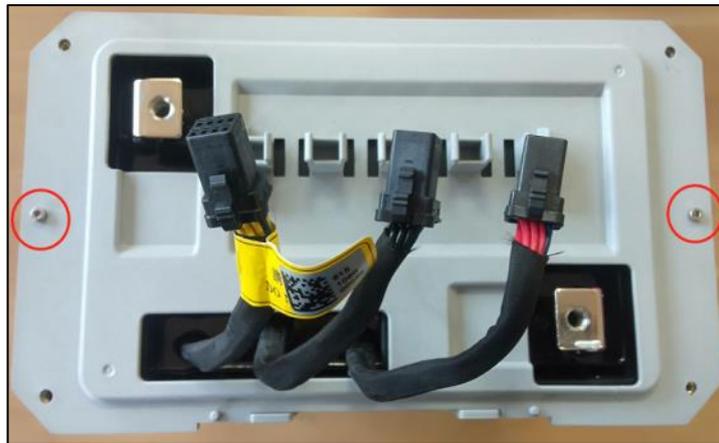


Step 2: Remove the battery plug case



6. Remove the battery cell

Step 1: Remove the two screws on the battery separator.



Step 2: Hold the lower shell with two hands, and the upper part of the shell contacts with the table. Lift the bottom of the shell upward to keep a certain angle to ensure that the battery pack can come out of the shell. When the external dimension of the shell can meet the holding distance, take out the battery with one hand and place it vertically.



Please note the following content:

1. It is forbidden to pull the connecting wire on the electric core directly by hand, pay attention to prevent scratching during taking the electric core

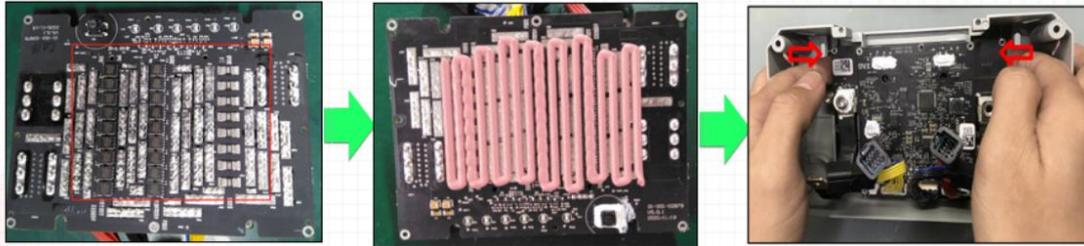


2. Insulating materials, such as foam / anti-static leather, shall be prepared and laid on the work bench.
3. The workbench shall be kept clean.

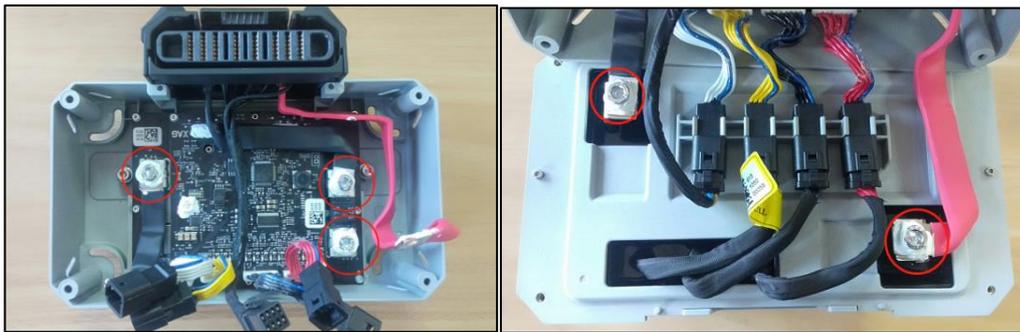
Assembly Guide

Precautions for battery assembly

1. The thermal conductive silicone grease on power board is used for heat dissipation. It is strictly prohibited to connect electricity, and anti-static measures shall be taken.



2. it is forbidden to lift the board by dragging or pulling the connecting wire.
3. It is forbidden to make contact between the positive and negative terminals, which will result in short circuit.
4. After tightening the screws on the positive and negative terminals, it is necessary to apply silica gel to seal the terminal contact (but don't seal the screw teeth);



5. Before assembling the cell, check that the wire is intact, the QR code sticker is complete and identifiable, and the appearance of the cell is free of deformation and bulge.
6. Assembling sequence that connecting cables in the battery head, from a to f.
 - a) white signal cable
 - b) yellow signal cable
 - c) back signal cable
 - d) red signal cable
 - e) negative terminal
 - f) positive terminal



Practical Use

During operation

1. Check the battery plug regularly during daily use. Clean it if necessary.
2. If liquid is found on the battery during use, please clean it with a dry cloth in time to avoid short circuit.
3. Before the flight, please check whether the firmware version of the battery is the latest version on the app. If there is a new version, please update it before operation. Each firmware update is to solve some known problems, so please make sure to update it.
4. During operation, please try not to over drain the battery. For practical use, make sure more than 2 lights illuminated green in minimal (i.e., 30%).

5. During operation, avoid the battery temperature exceeding 70 degrees for continuous operation. Continuous high-temperature operation will shorten the life span of the battery, and in serious cases, it will lead to smoke, explosion, etc.;

Completion of Work

1. Do not plug and unplug the battery when the battery is turned on, otherwise the plug interface will ignite and damage the battery plug.
2. After each sortie operation, the battery shall be charged in time to avoid over-discharge.
3. If it needs to be stored for a long time, the battery needs to be charged and discharged every 90 days to maintain the health of battery cell.
4. Please use the standard charger provided by XAG for charging. The customer shall be responsible for battery accidents, flight faults and other problems caused by charging with a charger not provided by XAG.
5. The battery is flammable and explosive. Please do not sit on the battery, place heavy objects above the battery or squeeze the battery.
6. Please keep away from inflammables, explosives, or gases when charging.

Properly Dispose of Batteries

1. It is not recommended to send the battery back to the factory in case of fire, smoking, water soaking, deformation of electric core and other faults, and the battery shall be scrapped in a timely manner. The treatment method is to completely soak the battery with saline water for more than 72 hours (pour 250g salt every 10 liters of water) and ensure that the battery is completely discharged before drying and scrapping.
2. When soaking in saline water, it shall be placed in an open outdoor place, and there shall be no flammable, explosive and other dangerous goods around.
3. When discarding batteries, do not use metal or conductive containers to soak batteries.
4. When discarding the battery, be sure to completely submerge the battery with saline water. Failure to completely submerge the battery will cause the battery to be unable to complete discharge.
5. When discarding batteries, please abide by local laws and regulations. Do not arbitrarily discard batteries to jointly protect the natural environment.

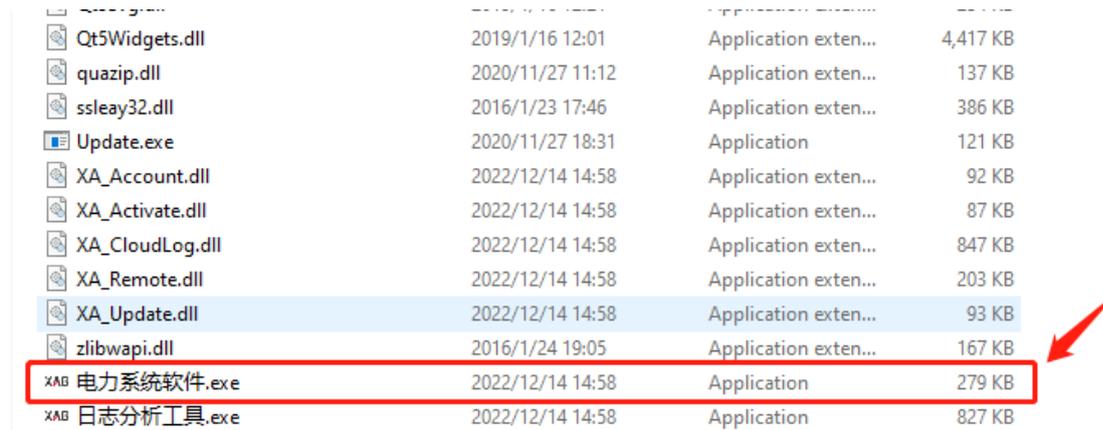
Battery Tool Kit

Software update

Please download the battery tool kit, download link: please refer to Appendix II

XAG battery tool kit is displayed in Chinese by default. Before use, we need to change this software to English and update to the latest version.

Open the battery tool kit software.



File Name	Modified	Type	Size
Qt5Widgets.dll	2019/1/16 12:01	Application exten...	4,417 KB
quazip.dll	2020/11/27 11:12	Application exten...	137 KB
ssleay32.dll	2016/1/23 17:46	Application exten...	386 KB
Update.exe	2020/11/27 18:31	Application	121 KB
XA_Account.dll	2022/12/14 14:58	Application exten...	92 KB
XA_Activate.dll	2022/12/14 14:58	Application exten...	87 KB
XA_CloudLog.dll	2022/12/14 14:58	Application exten...	847 KB
XA_Remote.dll	2022/12/14 14:58	Application exten...	203 KB
XA_Update.dll	2022/12/14 14:58	Application exten...	93 KB
zlibwapi.dll	2016/1/24 19:05	Application exten...	167 KB
XAG 电力系统软件.exe	2022/12/14 14:58	Application	279 KB
XAG 日志分析工具.exe	2022/12/14 14:58	Application	827 KB

Login without account (无账号登录)



XAG
极飞科技

请输入极飞账号

请输入密码

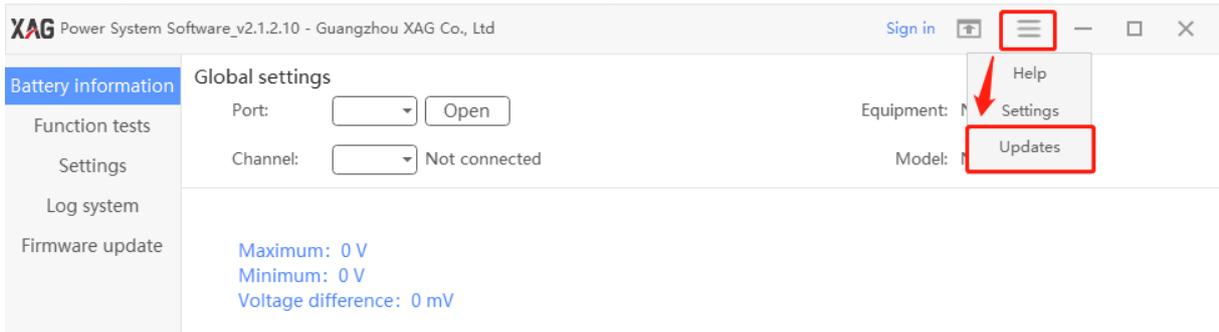
请输入验证码

记住密码

Update software to the latest version. Make sure your computer have access to internet



Depending on the software version, some users may see the different views.



Language Change

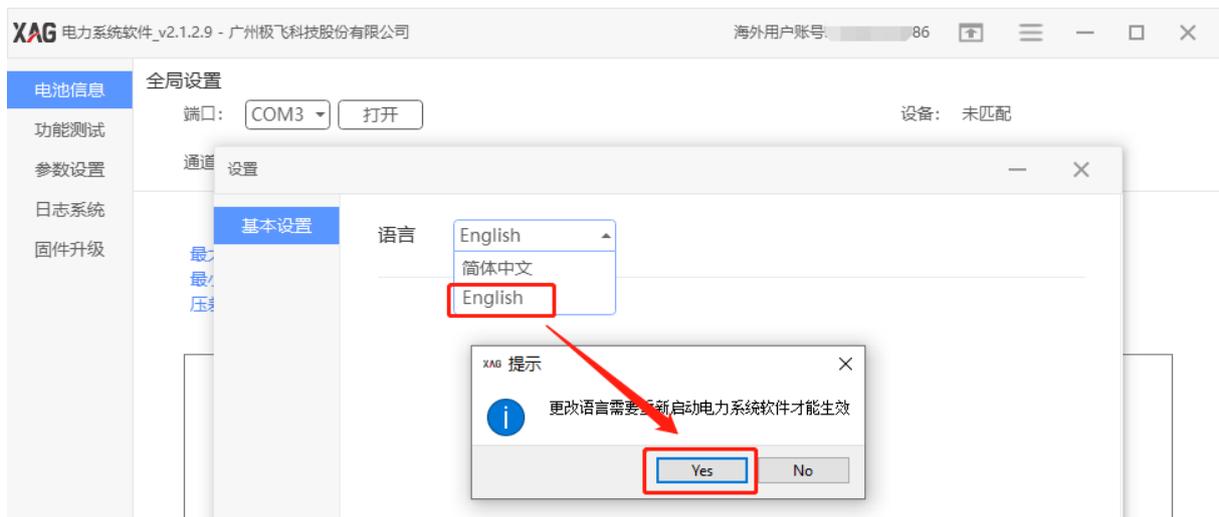
After update, login without account again, and go to setting (设置)



Change language (语言) to English



Press Yes to Confirm



Register or Login account

Register account

If you have an account, you can ignore this step.

The image displays two screenshots of the XAG registration process. The left screenshot shows the registration form with the XAG logo and Chinese text '极飞科技'. The form includes fields for 'Please enter XAG account No.', 'Please enter password', and 'Please ente...' (partially obscured). A 'Verification Code' button is highlighted with a blue box. Below it, there is a 'Remember password' checkbox and a 'Register' button circled in red. A red arrow points from the 'Register' button to the 'Sign in' button. At the bottom, there is a 'Log in without an account' button. The right screenshot shows the verification step with the XAG logo and Chinese text '极飞科技'. It includes fields for 'Please enter your name', '+ 1 | Enter phone number', 'Enter Verification code' (with a red 'Get Verification code' link), and 'Please enter a Password'. A red link 'Already have an account? Login Here' is visible. A red 'Register' button is at the bottom.

Login account

Input account ID and password, get verification code. Press sign in.

The image shows a screenshot of the XAG login process. The XAG logo and Chinese text '极飞科技' are at the top. The phone number field is filled with '86 - 15800166604'. The password field is masked with dots. The 'verification code' field is highlighted with a red box and labeled '验证码'. Below it, there is a 'Remember password' checkbox (checked) and a 'Register' button. A red arrow points from the 'verification code' field to the 'Sign in' button. At the bottom, there is a 'Log in without an account' button.

Hardware Setup

Preparation

Battery tool part number: 09-013-00001

If you don't have this tool kit, please ask your sale representative.



B13960 cable adapter: 05-002-01152

If you don't have this tool kit, please ask your sale representative.

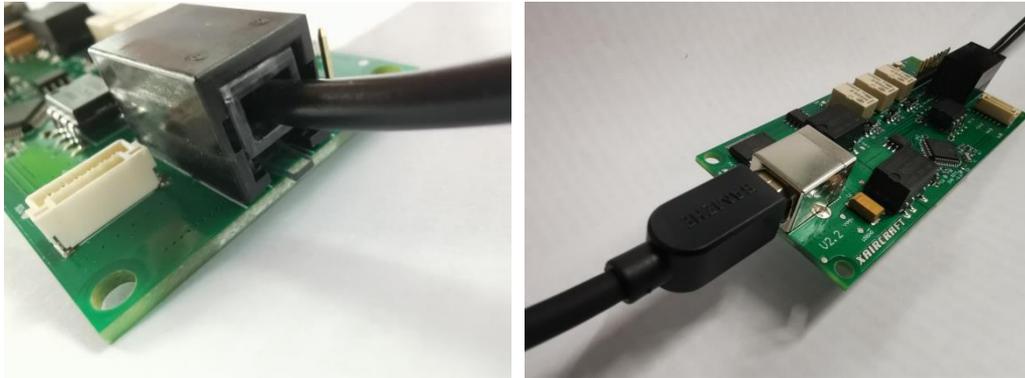


Tool Setup

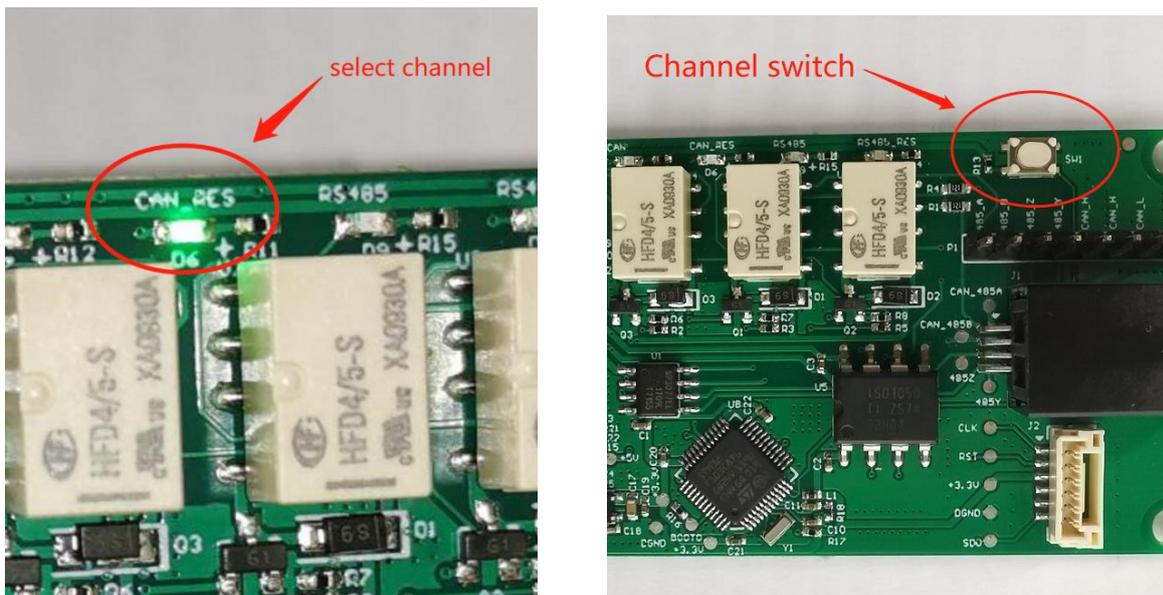
Connect your batter tool kit to laptop and B13960S battery. Make sure your battery tool kit software is running on your laptop.



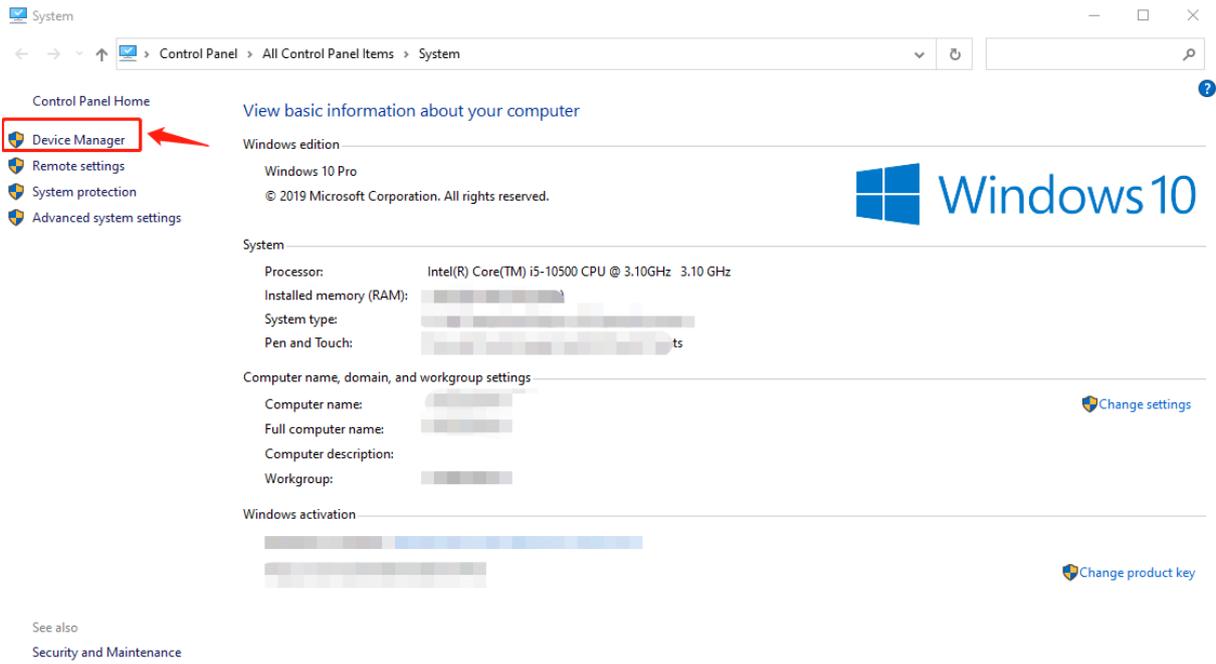
Make sure the cable adaptors are well connected.



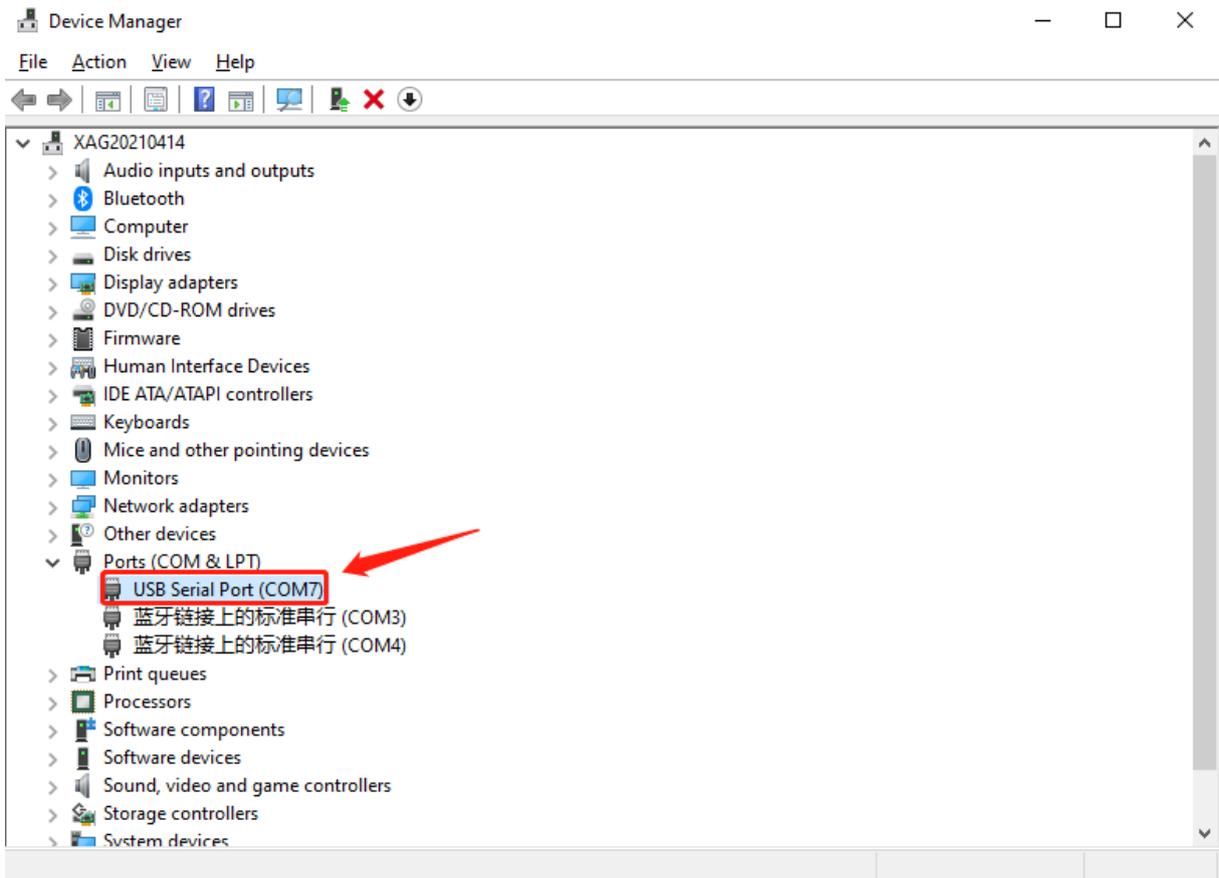
Make sure that the "CAN_RES" light must illuminate in green. If not, please press the channel switch button to select "CAN_RES" channel.



On laptop, go to device manager to check the available COM port



From here, we can know that the available COM port is COM7



Select Port 7 and Channel CAN under Global setting

XAG Power System Software_v2.1.2.9 - Guangzhou XAG Co., Ltd 海外用户账号 36

Battery information Global settings

Function tests Port: COM3 Open Equipment: Not matched

Settings Channel: CAN Not connected Model: Not matched

Log system

Firmware update

Maximum: 0 V
Minimum: 0 V
Voltage difference: 0 mV

XAG Power System Software_v2.1.2.9 - Guangzhou XAG Co., Ltd

Battery information Global settings

Function tests Port: COM3 Open Equipment: Not matched

Settings Channel: COM3 Not connected Model: Not matched

Log system COM4

Firmware update COM7

Maximum: 0 V
Minimum: 0 V
Voltage difference: 0 mV

XAG Power System Software_v2.1.2.9 - Guangzhou XAG Co., Ltd

Battery information Global settings

Function tests Port: COM7 Open Equipment: Not matched

Settings Channel: CAN Not connected Model: Not matched

Log system RS485

Firmware update CAN

Maximum: 0 V
Minimum: 0 V
Voltage difference: 0 mV

Press "Open"

XAG Power System Software_v2.1.2.9 - Guangzhou XAG Co., Ltd 海外用户账号: 13925119386

Battery information Global settings

Function tests Port: COM7 Open Equipment: Not matched

Settings Channel: CAN Not connected Model: Not matched

Log system

Firmware update

Maximum: 0 V
Minimum: 0 V
Voltage difference: 0 mV

Make sure channel status display in "Connected"

XAG Power System Software_v2.1.2.9 - Guangzhou XAG Co., Ltd 海外用户账号: 13925119386

Battery information Global settings

Function tests Port: COM7 Close Equipment: Not matched

Settings Channel: CAN Connected Model: Not matched

Log system

Firmware update

Maximum: 0 V
Minimum: 0 V
Voltage difference: 0 mV

Turn on your battery B13960S



Once connected, check the battery tool kit software on laptop, you shall be able to see the following.

XAG Power System Software_v2.1.2.9 - Guangzhou XAG Co., Ltd

Battery information

Global settings

Port: COM7 Close

Channel: CAN Connected

Equipment: P series battery V5

Model: B13960S

Cell No.	Voltage (V)
1	3.917
2	3.914
3	3.916
4	3.915
5	3.914
6	3.917
7	3.922
8	3.920
9	3.917
10	3.921
11	3.923
12	3.923
13	3.920

Maximum: 3.923 V
Minimum: 3.914 V
Pressure: 9 mV

Serial No.: 129112204692
Time: 2022-12-12 10:52:35
Version: 0x0D66 Design: 20000 mAh Actual: 19900 mAh
Voltage: 50.939 V
Current: 0.016 A
Power: 0.8 W
Battery level: 70.6 % (14049 mAh)
Cycle: 2 Times
Free space: > 65535 s [18.20 h]

Cell temperature: 24.8 °C 25.9 °C 24.6 °C [Temperature difference: 1.3 °C]
PCB temperature: 25.8 °C
MOS temperature: 23.1 °C
Plug anode temperature 23 °C
Plug cathode temperature: 23 °C

> Flight control communication interrupted

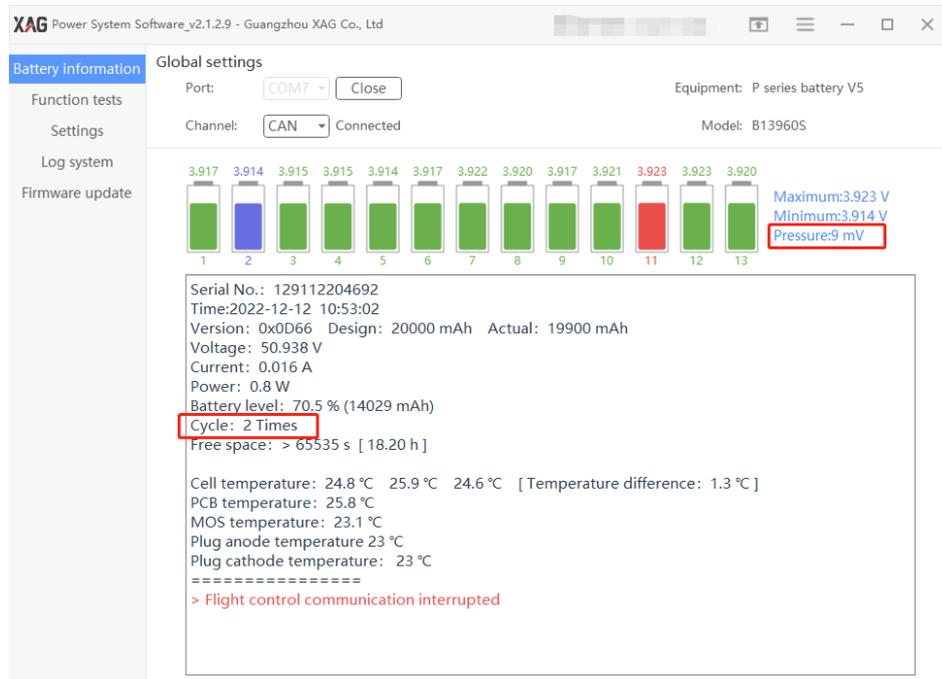
If it does not work, please install the driver ft232_all.exe, download link please refer to Appendix II.

Name	Date modified	Type	Size
Power system software	2022/12/14 15:11	File folder	
ft232_all.exe	2021/11/5 11:41	Application	2,016 KB

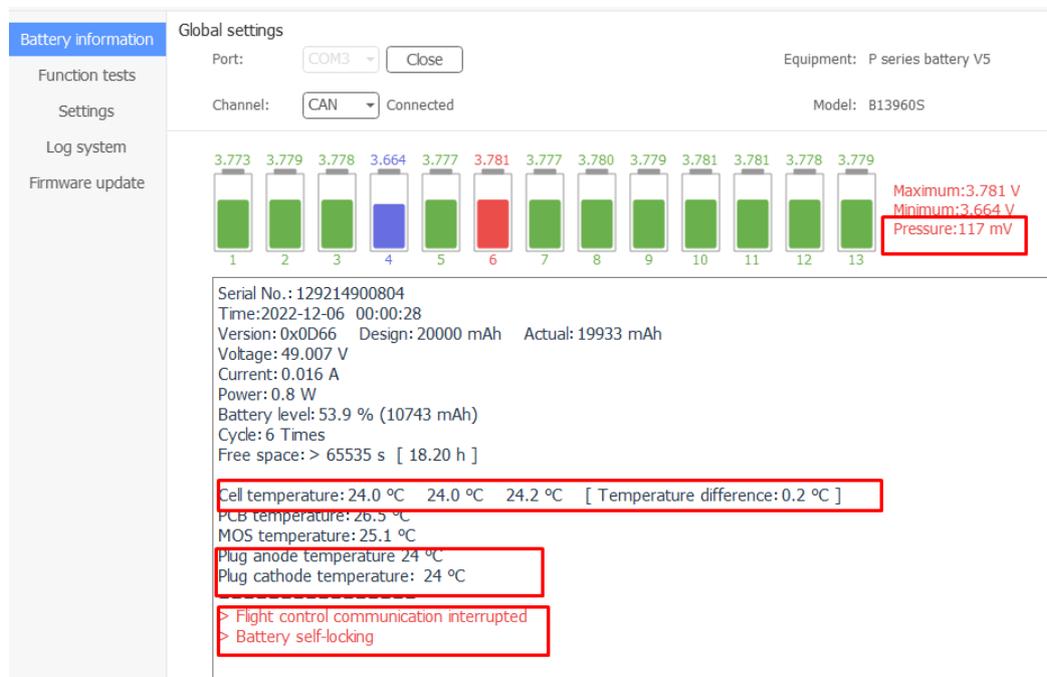
Battery Information

Check if the pressure difference is below 30mV.

In this case, the pressure difference is 9mV, which is good.

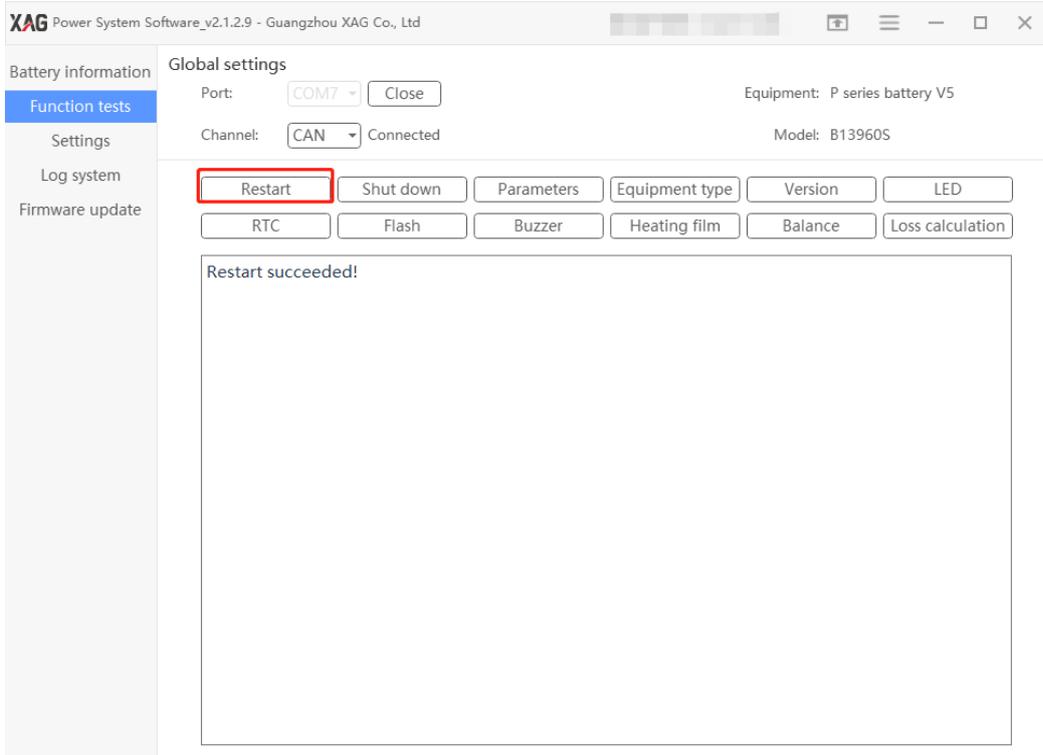


The below example shows the pressure difference is 117mV, which is not good. Please discharge and charge the battery twice and test again.

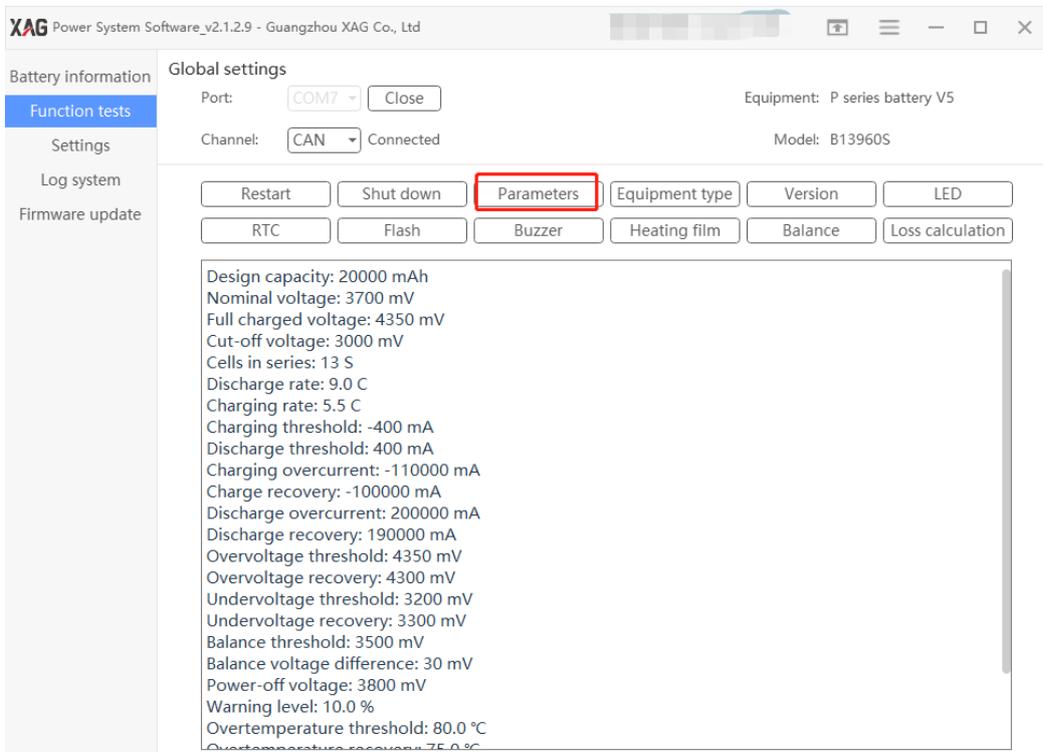


Function Tests

Restart



Parameter



Equipment Type

XAG Power System Software_v2.1.2.9 - Guangzhou XAG Co., Ltd

Battery information

Global settings

Port: COM7 Close

Equipment: P series battery V5

Channel: CAN Connected

Model: B13960S

Restart Shut down Parameters **Equipment type** Version LED

RTC Flash Buzzer Heating film Balance Loss calculation

Name: Smart Battery
Firmware: B13960S

```
{  
  "TYPE_ID": "7",  
  "MODEL_ID": "66",  
  "DEV_ID": "5B003C000250324E31353020"  
}
```



Version

XAG Power System Software_v2.1.2.9 - Guangzhou XAG Co., Ltd

Battery information

Global settings

Port: COM7 Close

Equipment: P series battery V5

Channel: CAN Connected

Model: B13960S

Restart Shut down Parameters Equipment type **Version** LED

RTC Flash Buzzer Heating film Balance Loss calculation

Name: Smart Battery
Firmware: B13960S

```
{  
  "TYPE_ID": "7",  
  "MODEL_ID": "66",  
  "DEV_ID": "5B003C000250324E31353020"  
}
```



LED

XAG Power System Software_v2.1.2.9 - Guangzhou XAG Co., Ltd

Battery information

Global settings

Port: COM7 Close

Equipment: P series battery V5

Channel: CAN Connected

Model: B13960S

Restart Shut down Parameters Equipment type Version LED

RTC Flash Buzzer Heating film Balance Loss calculation

Name: Smart Battery
Firmware: B13960S

```
{  
  "TYPE_ID": "7",  
  "MODEL_ID": "66",  
  "DEV_ID": "58",  
}
```



RTC

XAG Power System Software_v2.1.2.9 - Guangzhou XAG Co., Ltd

Battery information

Global settings

Port: COM7 Close

Equipment: P series battery V5

Channel: CAN Connected

Model: B13960S

Restart Shut down Parameters Equipment type Version LED

RTC Flash Buzzer Heating film Balance Loss calculation

FlashNormal!

Capacity: 5.000 MB

Free space: 2.566 MB

Flash

The screenshot shows the XAG Power System Software interface. The title bar reads "XAG Power System Software_v2.1.2.9 - Guangzhou XAG Co., Ltd". On the left sidebar, "Function tests" is selected. The main area is titled "Global settings" and shows "Port: COM7" and "Channel: CAN Connected". Below this are several function buttons: Restart, Shut down, Parameters, Equipment type, Version, LED, RTC, Flash (highlighted with a red border), Buzzer, Heating film, Balance, and Loss calculation. The central display area shows the results of the Flash test: "FlashNormal!", "Capacity: 5.000 MB", and "Free space: 2.566 MB".

Buzzer

The screenshot shows the XAG Power System Software interface. The title bar reads "XAG Power System Software_v2.1.2.9 - Guangzhou XAG Co., Ltd". On the left sidebar, "Function tests" is selected. The main area is titled "Global settings" and shows "Port: COM7" and "Channel: CAN Connected". Below this are several function buttons: Restart, Shut down, Parameters, Equipment type, Version, LED, RTC, Flash, Buzzer (highlighted with a red border), Heating film, Balance, and Loss calculation. The central display area shows the results of the Buzzer test: "Buzzer Test:", "1、 If the buzzer beeps, it is normal.", "2、 If the buzzer does not beep, it is abnormal.", and "Buzzer test complete!".

Heating Film

The screenshot shows the XAG Power System Software interface. The title bar reads "XAG Power System Software_v2.1.2.9 - Guangzhou XAG Co., Ltd". On the left, a sidebar contains "Battery information", "Function tests" (highlighted), "Settings", "Log system", and "Firmware update". The main area is titled "Global settings" and includes "Port: COM7" with a "Close" button, "Channel: CAN" with a "Connected" status, "Equipment: P series battery V5", and "Model: B13960S". A row of buttons includes "Restart", "Shut down", "Parameters", "Equipment type", "Version", "LED", "RTC", "Flash", "Buzzer", "Heating film" (highlighted with a red box), "Balance", and "Loss calculation". Below the buttons, a text box contains the instruction: "See that current calibration precedes the heating test!".

Balance

These balance lights are displayed in mainboard.

The screenshot shows the XAG Power System Software interface. The title bar reads "XAG Power System Software_v2.1.2.9 - Guangzhou XAG Co., Ltd". On the left, a sidebar contains "Battery information", "Function tests" (highlighted), "Settings", "Log system", and "Firmware update". The main area is titled "Global settings" and includes "Port: COM7" with a "Close" button, "Channel: CAN" with a "Connected" status, "Equipment: P series battery V5", and "Model: B13960S". A row of buttons includes "Restart", "Shut down", "Parameters", "Equipment type", "Version", "LED", "RTC", "Flash", "Buzzer", "Heating film", "Balance" (highlighted with a red box), and "Loss calculation". Below the buttons, a text box contains the instruction: "Balance Test: All balance lights on the battery flash in turn. If one of the lights is off, something must be wrong. Balance test completed!".

Loss Calibration

XAG Power System Software_v2.1.2.9 - Guangzhou XAG Co., Ltd

Battery information

Global settings

Port: COM7 Close

Equipment: P series battery V5

Channel: CAN Connected

Model: B139605

Restart Shut down Parameters Equipment type Version LED

RTC Flash Buzzer Heating film Balance Loss calculation

Loss rating: 99.50 分

SOH: 995 (0.1%)

Dynamic SOH: 1000 (0.1%)

No. of cycles: 2 Times

Discharge overcurrent times: 0 Times

Charging overcurrent times: 0 Times

Over temperature charging times: 0 Times

Overtemperature discharge times: 0 Times

Low temperature charging times: 0 Times

Low temperature discharge times: 0 Times

Cell overvoltage L0 times: 0 Times

Cell overvoltage L1 times: 0 Times

Cell overvoltage L2 times: 0 Times

Cell undervoltage L0 times: 0 Times

Cell undervoltage L1 times: 0 Times

Cell undervoltage L2 times: 1 Times

Cell voltage difference L0 times: 1 Times

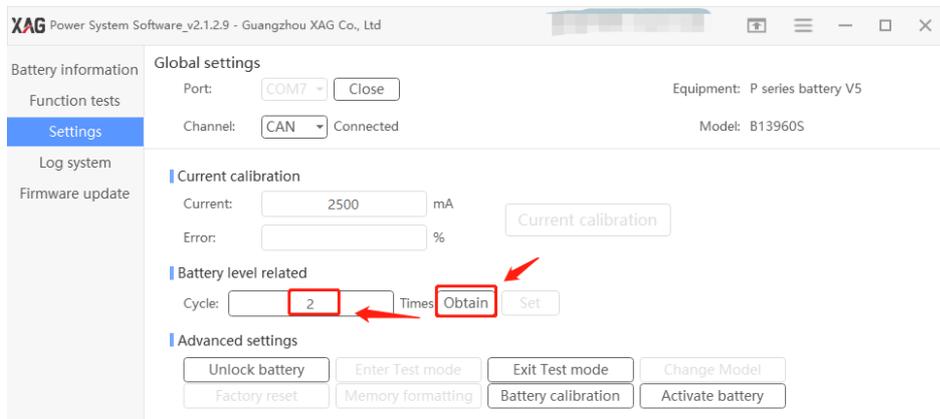
Cell voltage difference L1 times: 0 Times

Cell voltage difference L2 times: 0 Times

Power-up times: 79 Times

Obtain cycles

User can find out the exact number of cycles used. The cycle is calculated through the existing battery log stored in mainboard.



Unlock Battery

Faulty Lock

Battery can be locked if abnormal charge or discharge happens. In this case, there are two methods to unlock the battery.

Led indication: Two leds of the battery level indicators double flash, battery cannot be used.

Unlock Method 1: Remote unlock

Requirement: An UAV can get online via sim card or RCN mode with internet access.

Procedure:

1. Put the locked battery in the UAV and turn on, wait until it is online.
2. Contact the tech support in XAG, provide the SNs of the battery and the UAV to unlock the battery remotely.

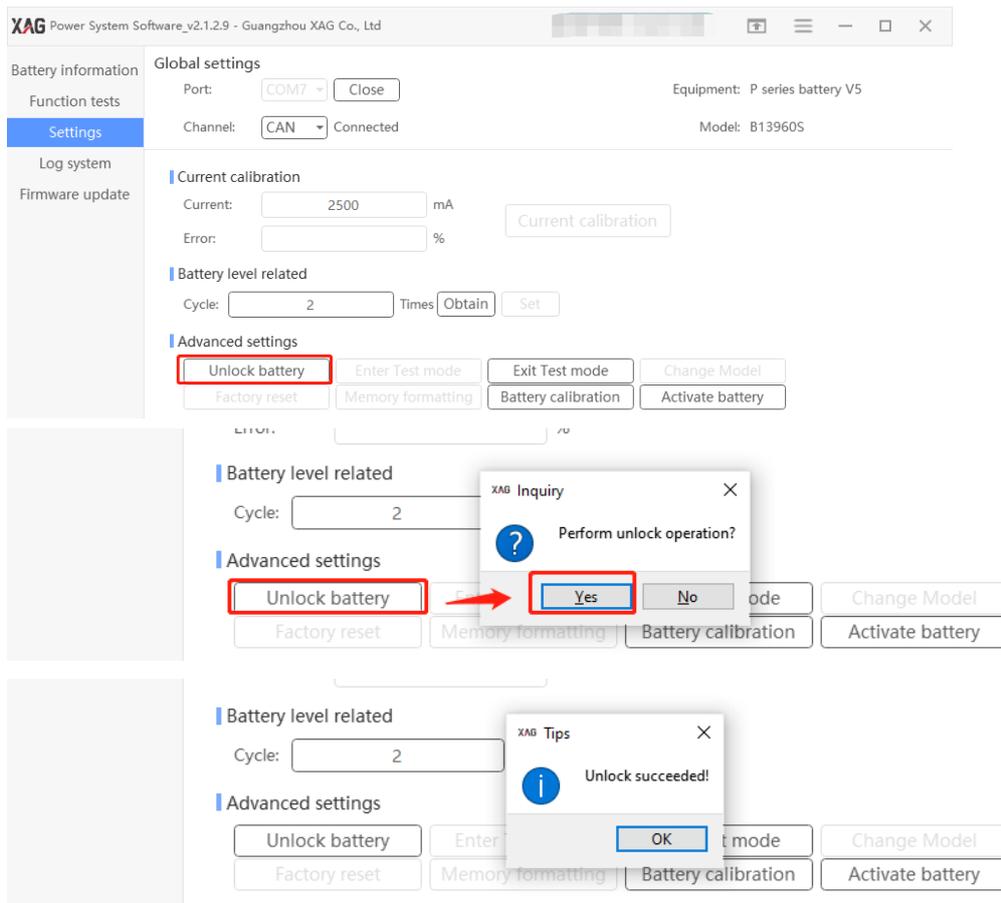
Note: Authorized account which can see and perform "Remote operation" in the battery tool software, can perform remote unlock by itself with the tool.

Unlock Method 2: Manual unlock

Requirement: battery tool kit and software

Procedure:

1. Connect the battery to the battery tool and PC, open the software in the PC
2. Unlock the battery by step by step as following:



Cloud Lock

Batteries purchased from non-official overseas distributors will be locked due to geo-fence mechanism, which is called “cloud lock”. In this case, only remote unlock can be performed.

Led indication: three leds of the battery level indicators double flash, battery cannot be used.

Unlock Method: Remote Unlock

Requirement: 1. Authorization from the sales representative. 2 an UAV which can get online via sim card or RCN mode with internet access

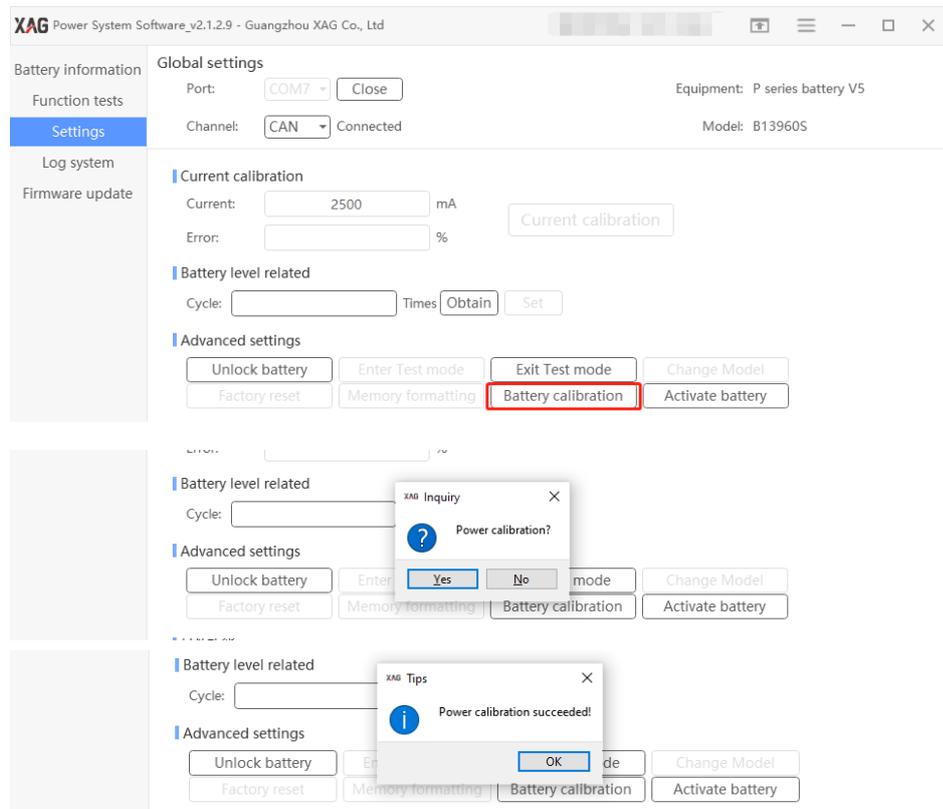
Procedure:

- i. Make a claim to XAG sales representative who will authorize the back-end technical support to disable “Cloud lock”.
- ii. Put the locked battery in the UAV and turn on, wait until it is online.
- iii. Contact the tech support to unlock the battery remotely.

Note: Authorized account which can see and perform “Remote operation” in the battery tool software, can perform remote unlock by itself with the tool.

Battery calibration

After the replacement of mainboard or lithium cell, the battery reading could be inaccurate. In this case, users can do battery calibration.

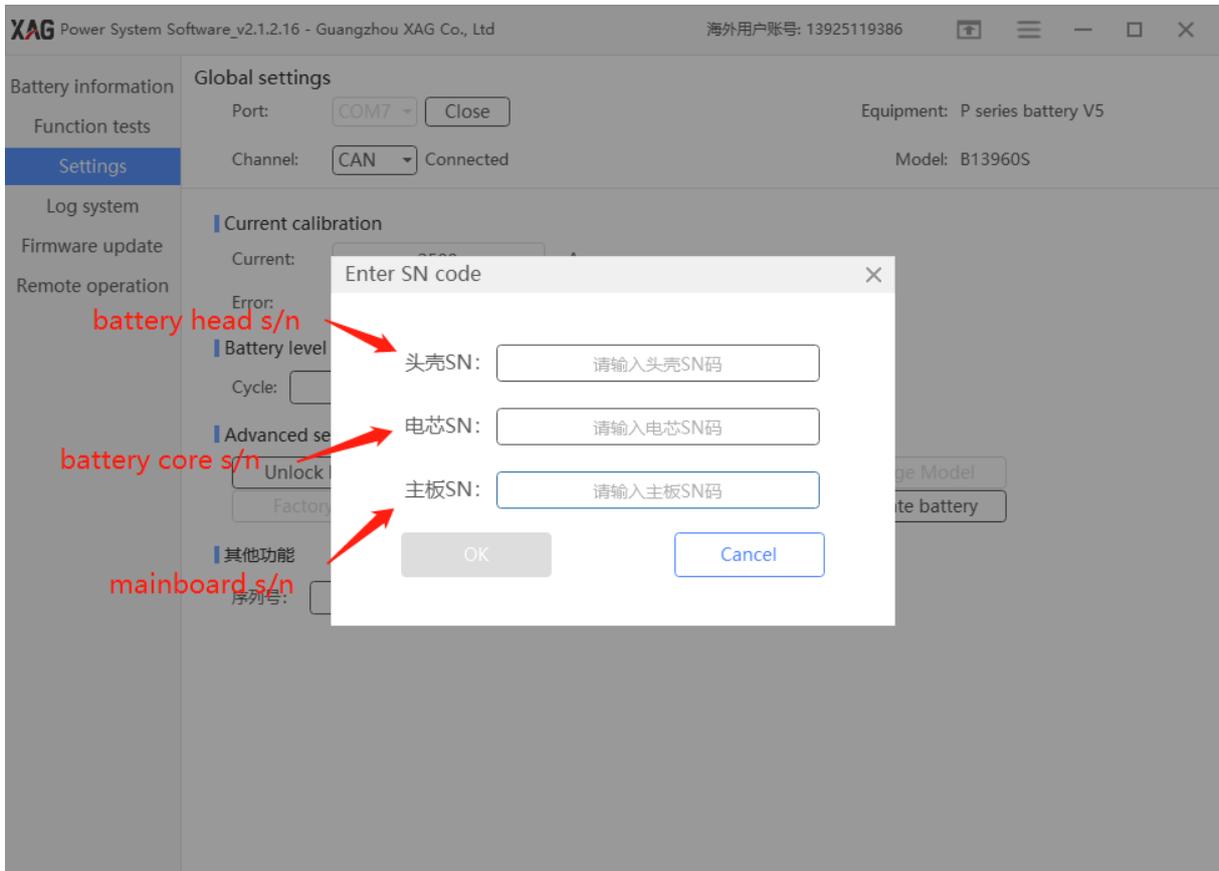
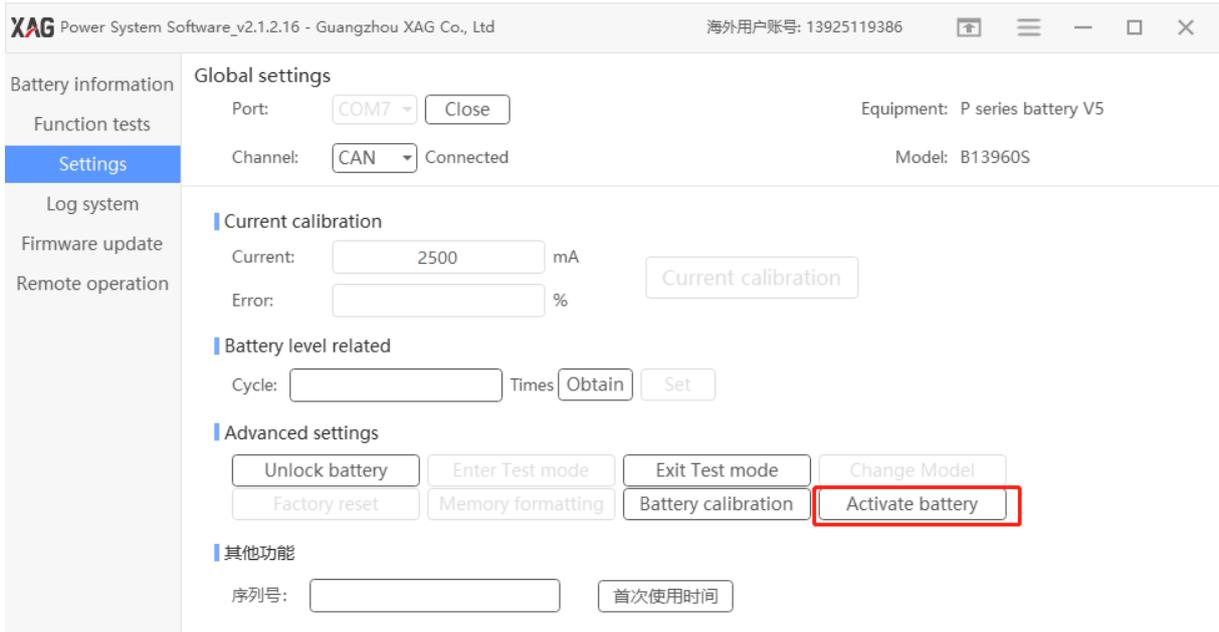


Activate Battery

When the battery head or other parts are replaced, you need to activate the battery.

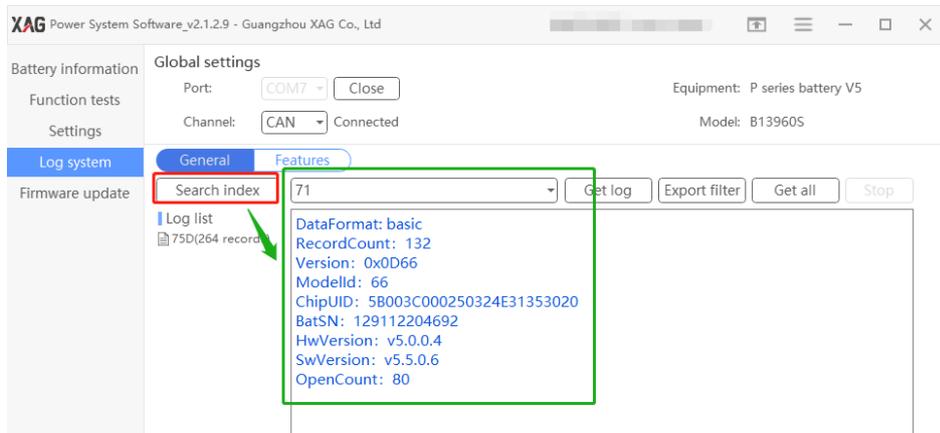
Procedure

- i. Make a claim with the XAG technical support team.
- ii. Provide XAG technical support three s/n (the old battery head s/n, the new battery head s/n, the battery cell s/n, new mainboard s/n)
- iii. Wait for the technical support to recombine the SNs of battery parts from the backend server
- iv. Connect laptop to internet
- v. Open battery tool software
- vi. Connect battery to the battery tool software
- vii. Go to setting, activate battery, fill out the information and press OK

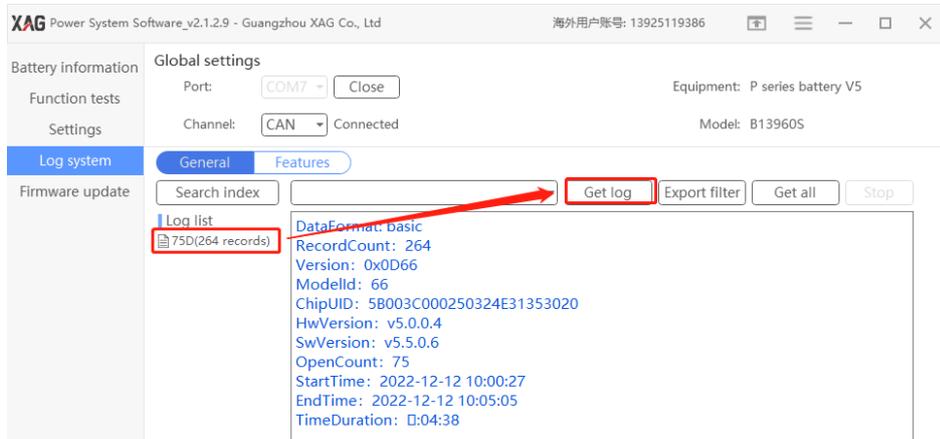


Log system

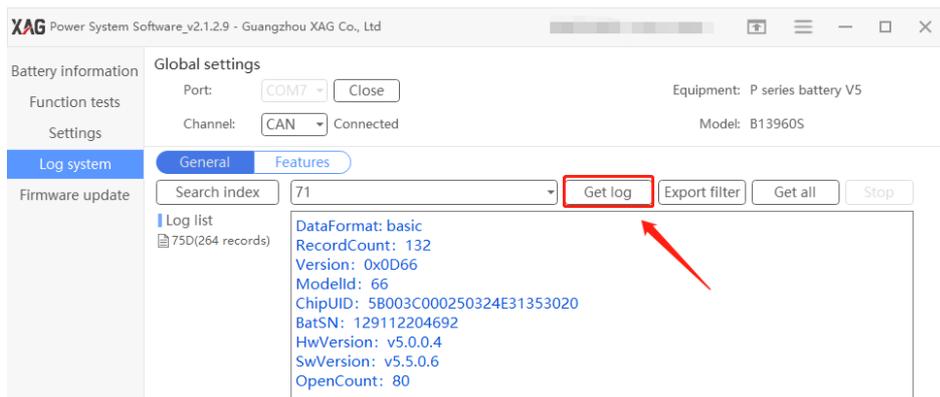
Press “search index”



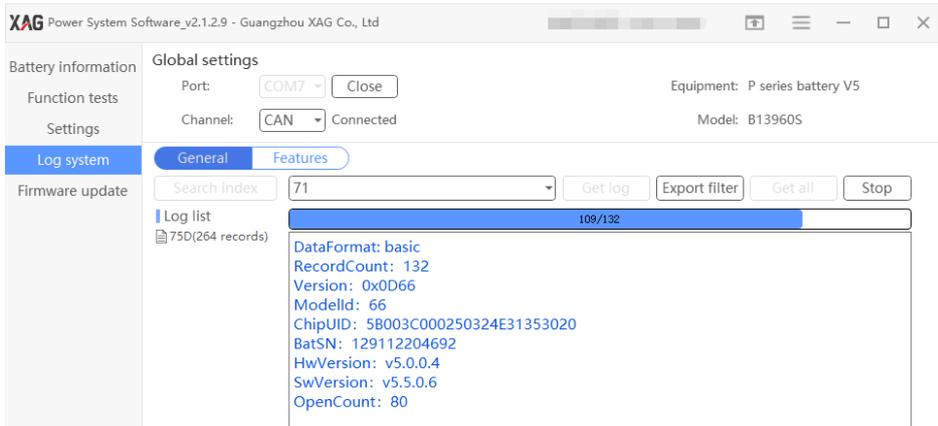
Then press log list and get log



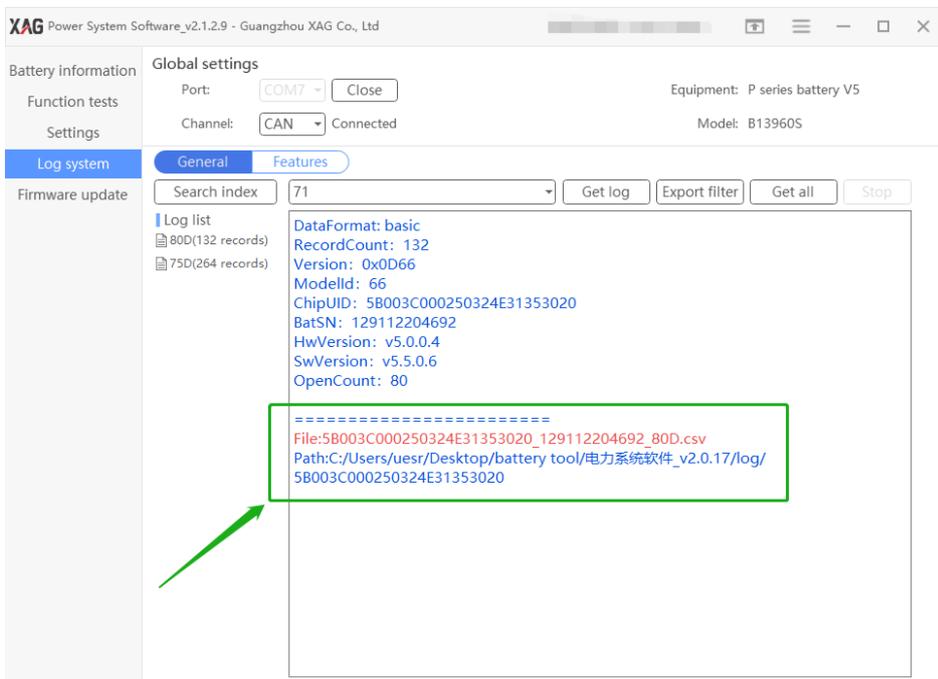
Get log



Wait for log exporting



Log is saved to the below path.

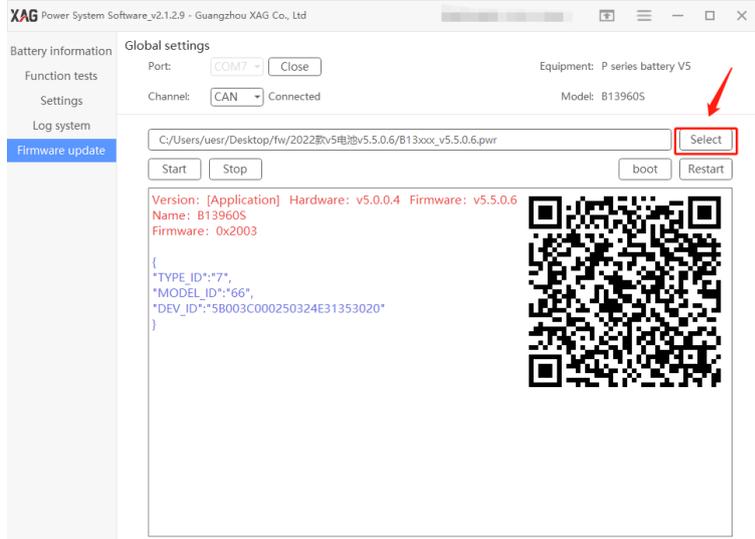


Forward the log to XAG technical support staff

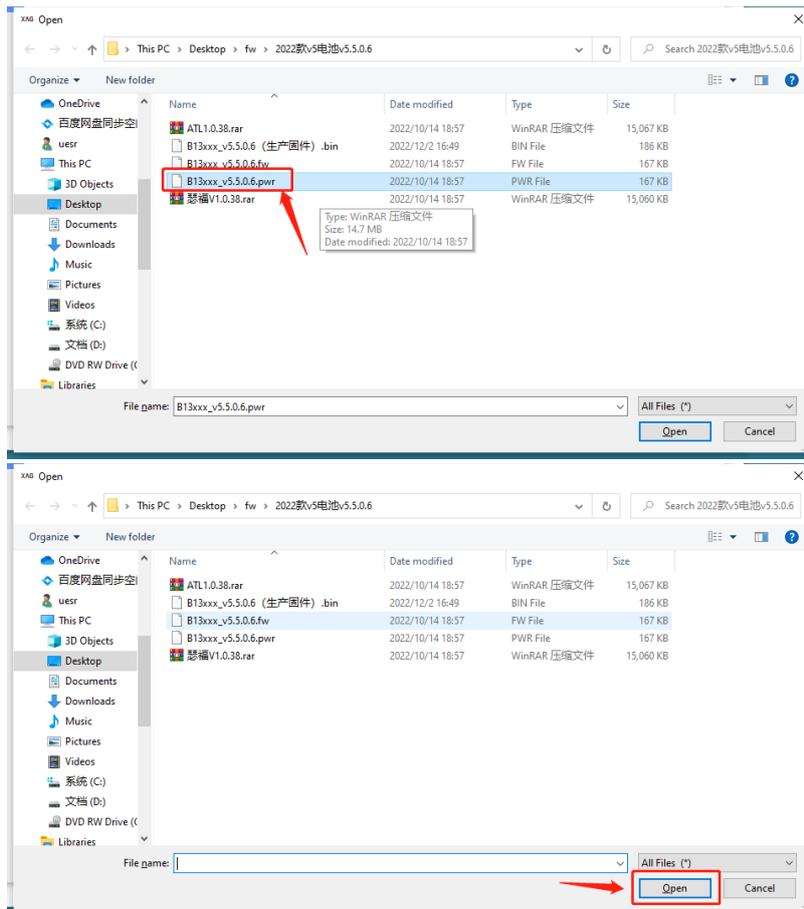
Firmware Update

Select the firmware file

Please download battery firmware (2022 款 v5 电池 v5.5.0.6) , please refer to appendix II



Choose the battery firmware file



Press start and Yes

XAG Power System Software_v2.1.2.9 - Guangzhou XAG Co., Ltd 海外用户账号: 13925119386

Battery information
Function tests
Settings
Log system
Firmware update

Global settings
Port: COM7 Close
Channel: CAN Connected
Equipment: P series battery V5
Model: B13960S

C:/Users/uesr/Desktop/fw/2022款v5电池v5.5.0.6/B13xxx_v5.5.0.6.pwr Select

Start Stop boot Restart

Version: [Application] Hardware: v5.0.0.4 Firmware: v5.5.0.6
Name: B13960S
Firmware: 0x2003

```
{  
  "TYPE_ID": "7",  
  "MODEL_ID": "66",  
  "DEV_ID": "5B003C000250324E31353020"  
}
```

XAG Remind
Firmware is up to date. Do you want to continue?
Yes No

Wait for the update completed

XAG Power System Software_v2.1.2.9 - Guangzhou XAG Co., Ltd

Battery information
Function tests
Settings
Log system
Firmware update

Global settings
Port: COM7 Close
Channel: CAN Connected
Equipment: P series battery V5
Model: B13960S

C:/Users/uesr/Desktop/fw/2022款v5电池v5.5.0.6/B13xxx_v5.5.0.6.pwr Select

Start Stop boot Restart

79%

Update completed

Version: Not detected
Name: B13960S
Firmware: 0x2003

```
{  
  "TYPE_ID": "7",  
  "MODEL_ID": "66",  
  "DEV_ID": "5B003C000250324E31353020"  
}
```

XAG Tips
Upgrade succeeded!
OK

detection.

- 3) Check whether there is an open circuit and loose contact between battery plug and connecting wire of mainboard.
- 4) If the mainboard circuit is abnormal, the cross-testing method can be used to detect the mainboard.

Troubleshooting2. Two battery level lights are flashing and the power light(red) double flashing

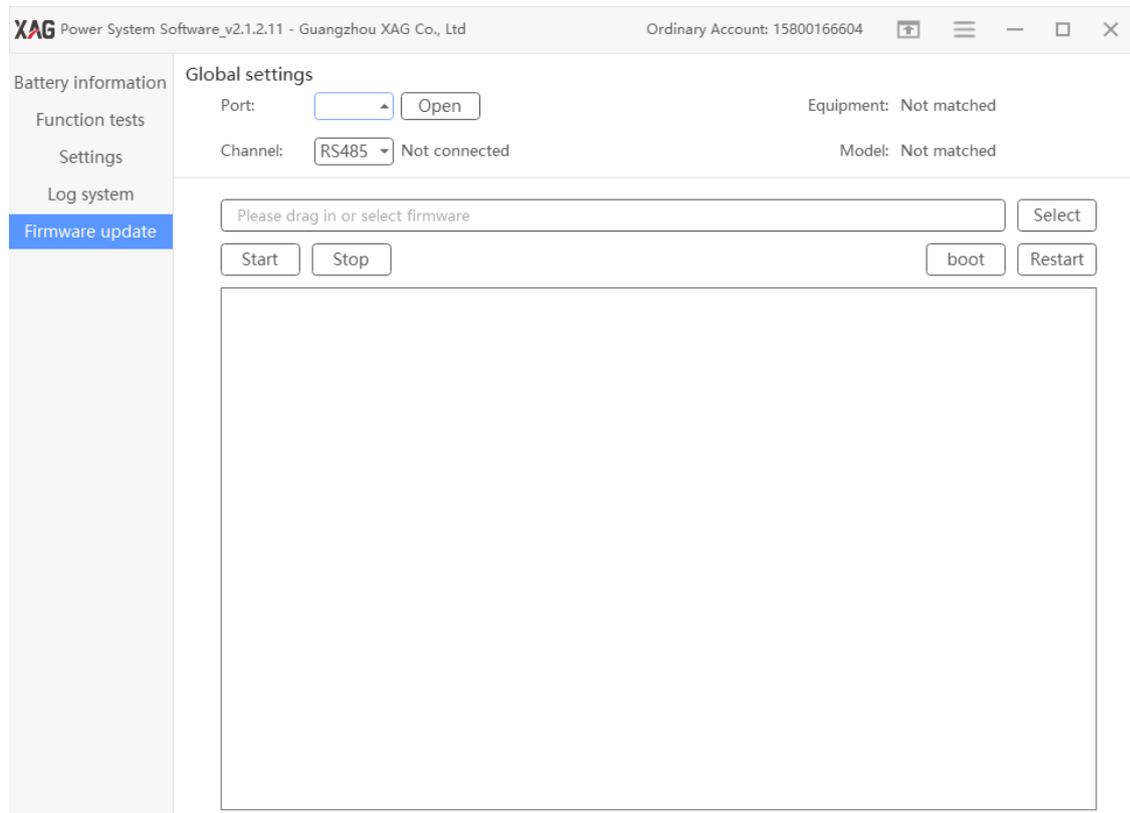
Troubleshooting methods: The battery locking state is usually caused by abnormal use of the battery. The battery failure causes the battery protection locking. Use the battery tool to unlock. If unable to unlock the battery, analyze the following specific reasons:

- 1) Connect the battery to the computer and use the battery tool software to check the battery information for abnormalities such as large pressure difference, large temperature difference and low cell voltage.
- 2) Use the battery tool software to check the battery information data. If there are obvious abnormalities, replace the main board kit and battery cell respectively with the replacement method to judge the fault point (first, check whether the main board kit and battery cell have external deformation, liquid corrosion, component falling off and other poor appearance)
- 3) If there are no obvious abnormalities in the battery data shown by the battery tool software, it is necessary to use the high-power electronic load instrument to test whether the battery is abnormal.

Troubleshooting3. The battery light is running

Troubleshooting methods: Battery upgrade failed

- 1) Turn on the battery, connect to the computer, and use the battery tool to upgrade
- 2) The faulty battery can be plugged into the drone to start up, the firmware can be copied into the flight control for upgrading and troubleshooting, and the firmware can get from the XAG technicians.



Troubleshooting4. charging fault

Troubleshooting methods:

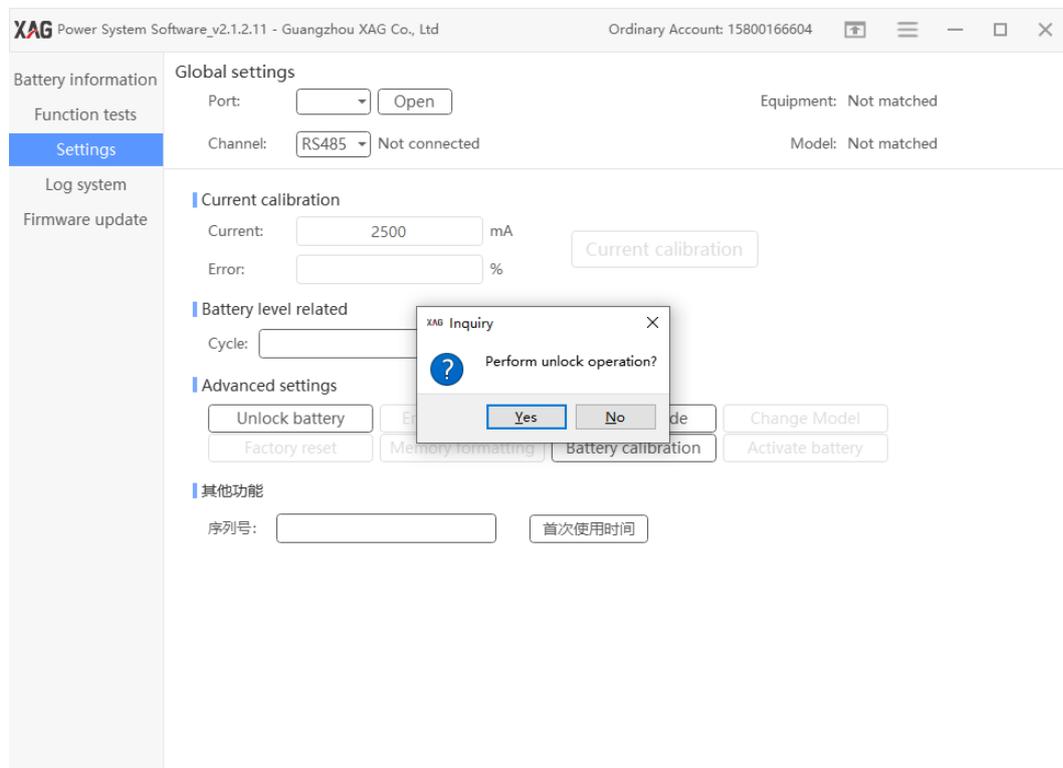
- 1) Check the charging port for dirt, deformation and poor communication caused by liquid inlet;

- 2) Abnormal cells, such as abnormal cell temperature or differential pressure;
- 3) The battery mainboard is filled with liquid, which is caused by circuit failure (troubleshooting by replacement method);
- 4) If the battery is locked, contact XAG technicians to unlock it or use the battery tool;
- 5) If the temperature of the newly flown battery exceeds the set value, the motherboard will protect the battery and prohibit charging. It is necessary to cool the battery in time.

Troubleshooting5. Battery lock

Troubleshooting methods: The battery lock is generally locked when the power is too low and can only be used after unlocking.

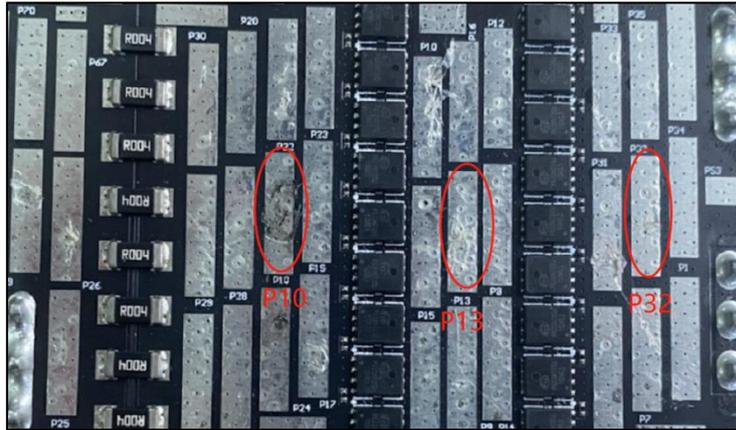
- 6) Contact XAG technicians to unlock it;
- 7) Use the battery tool to unlock it with the computer
- 8) The battery is locked due to poor battery cell or defected motherboard. At this time, it cannot be unlocked successfully



Troubleshooting6. Power on after the battery is plugged in

Troubleshooting methods: There is output voltage when the battery is plugged into the drone, it is normally the MOS tube of the power board breaks down to form a path. If the mainboard circuit control fails, check whether the power board MOS tube is burned, and determine the cause of the fault through appearance.

- 1) Use a multimeter to measure whether the resistance values of P13 and P32 are normal. If the resistance value is 0, it indicates that the MOS tube of this path is faulty (or replace the mainboard for detection)
- 2) Use a multimeter to measure whether the resistance values of P13 and P10 are normal. If the resistance value is 0, it indicates that the MOS tube of this path is faulty (or replace the mainboard for detection)



- 3) Measure the CHG and DSG test points on the mainboard without power-on. There should be no voltage. If there is voltage, the mainboard is faulty (or replace the mainboard for detection);



Troubleshooting7. Abnormal temperature sensor

Troubleshooting methods:

- 1) NTC resistance in the cell is abnormal, replace the cell.
- 2) Main board liquid inlet corrosion or poor detection circuit.
- 3) Loose connection terminal or poor contact.

Troubleshooting8. Unable to unlock the battery

Troubleshooting methods: When the battery cannot be unlocked with the battery software tool

- 1) Replace the mainboard for detection due to liquid corrosion and abnormal circuit.
- 2) The battery cell is abnormal and large voltage difference, replace the battery cell for detection.

Troubleshooting9. Battery plug temperature abnormal

Troubleshooting methods:

- 1) Check whether the battery plug has such appearance problems as liquid inlet corrosion, melting head and serious wear. Or replace the battery plug for detection.
- 2) The mainboard is in poor condition. Connect the temperature sensor in the battery plug to the mainboard detection circuit. Check whether the detection circuit works abnormally due to damaged components.

Troubleshooting10. Four battery level light are flashing, and the battery cannot be activated

Trouble shooting methods: The battery cannot be activated with the battery tool after replacing the mainboard or cell

- 1) Upgrade the battery's firmware to the latest and then use the power system software to activate.
- 2) Check whether the computer network and battery tool communication are normal.
- 3) Check the mainboard and the appearance of cell's connecting wire or re-plug it.
- 4) Replace the mainboard or battery cell

Troubleshooting11. Battery alarm description on APP during flight

Troubleshooting methods:

Low voltage of battery cell

If the single voltage is lower than 3.2V, alarm will be given, and it is required to return for charging in time.

High discharging current

When the battery detection current exceeds the set value, an error will be reported; It can be checked as follows:

- 1) Check whether the propeller is correctly installed, whether each propeller is deformed or damaged, and if there is no obvious deformation, test by replacing the propeller.
- 2) Check whether the motor is normal, whether the motor base is horizontal, whether the boom and its fixing parts are deformed, and whether the propeller plane is in the right angle.
- 3) Check whether the voltage of each battery cell is unbalanced and whether the battery power is sufficient.
- 4) Reduce dosage in plateau areas
- 5) Reduce the density of dosage

The temperature sensor of battery cell is abnormal

- 1) NTC of battery cell is abnormal
- 2) Mainboard is abnormal

The plug not secured

- 1) The battery is not plugged in or the battery plug is poor;
- 2) The battery tail plug aging

BMS abnormal

The plug connecting the battery cell and the mainboard is loose or the BMS circuit is faulty;

Battery cell abnormal

The load voltage difference of the battery cell caused by cell attenuation is large.

Battery discharge

The battery will be locked when the single voltage of the battery is lower than 3.1V.

Inspection after repair or maintenance

Appearance inspection

- 1) Confirm that all components of the product are installed correctly
- 2) Parts shall be assembled in place without missing assembly and there is no deformation in appearance.
- 3) Shake the product slightly and there shall be no abnormal sound inside.

Function inspection

- 1) Use the "Power System Software" to connect the battery to check whether the battery information (differential pressure, temperature, firmware version) is normal.
- 2) If the mainboard or battery cell is replaced, calibrate the electric quantity.

-
- 3) If the firmware version is too low and needs to be upgraded to the latest firmware for use
 - 4) Charge and discharge test after the above items are normal (check whether the battery can be fully charged and whether the discharge is normal)

Visual inspection

If you see battery bulge, deformation, chemicals leakage or physical damage, please stop using the battery immediately and contact Xcare team.



You can soak the battery into salt water to eliminate the risk of fire.

As the battery case has holes for cooling, please inspect if dust or impurities go inside the battery case

Cleaning

Please remove the battery case and clean the lithium pack if necessary.



Storage

This storage guide can apply to the products, including B13960S smart battery, XRTK4 portable station battery bar, ACS2 remote controller battery, UPS backup battery.

Lithium-ion battery are fire hazards, so How should we store the lithium batteries?

In general, Lithium-ion batteries (Li-ion) should not be stored for longer periods of time, either uncharged or fully charged. The best storage method, as determined by extensive experimentation, is to store them at a low temperature, not below 0°C, at 40% to 50% capacity. Storage at 5°C to 15°C is optimal. Since lithium batteries self-discharge, it is recommended that they must be recharged every 12 months.

We can further divide it into short-term storage and long-term storage.

Short-term storage: Store the battery in a dry place with no corrosive gases and a wet temperature between 10°C-30°C, higher or lower temperature will cause the metal parts of the battery to rust or the battery to leak.

Long-term storage: As long-term storage will cause the battery activity passivation and accelerate the self-discharge rate, the ambient temperature should preferably be between 10°C -30°C, in addition, it is necessary to do a charge/discharge cycle every 3 months to maintain its activity and recovery performance.

For safety concerns, please do not charge the battery full but maximum 80%. Charge 60% to 70% of the battery charge and place in a dry environment. Cooler temperatures and less charge are conducive to maintaining the life of the battery, but too little charge cannot be, because the battery will be self-discharge in storage, once the battery slowly run out of power, it will seriously shorten the battery life.

Some may ask, should the battery be removed from the device when not in use for a long period of time?

Yes. There is also a small current flowing through the shutdown device, causing a complete discharge, which can damage the battery over time, and in the worst case scenario, destroy the device along with it.



To help you understand better about the storage of lithium batteries, we've summarized a list of prohibitions

1. Do not charge the battery under fire or extreme heat. Do not use or store the battery near a heat source (such as a fire or heater). If the battery leaks or emits a peculiar smell, immediately move it away from the open flame.
2. When the battery swells up, leaks, etc., stop using it immediately
3. Do not put the battery in water or get it wet
4. Do not throw the battery into the fire or heat the battery
5. Do not connect the battery directly to a wall socket or car cigarette lighter socket

-
6. Do not short-circuit the positive and negative poles of the battery with wires or other metal objects. It is forbidden to transport or store the battery with necklaces, hairpins or other metal objects.
 7. Do not knock, acupuncture, step on, modify, or expose the battery to the sun, and do not place the battery in a microwave or high-voltage environment.
 8. Do not hit, throw, or subject the battery to mechanical shock
 8. Use a regular matching lithium battery charger to charge the battery, do not use inferior or other types of battery chargers to charge the lithium battery.
 9. Do not disassemble the battery in any way
 10. Do not mix the battery with metal objects, lest the metal objects touch the positive and negative electrodes of the battery, causing a short circuit, damaging the battery or even causing danger.
 11. Do not use with primary batteries (such as dry batteries) or batteries with different capacities, models, and varieties.
 12. Do not use the battery if it emits peculiar smell, heat, deformation, discoloration or any other abnormal phenomenon. If the battery is in use or charging, it should be removed from the electrical appliance or the charger immediately and stop using it.
 13. In the transportation process, pay attention to moisture-proof, moisture-proof, avoid squeezing, collision, etc., to avoid battery damage.
 14. Do not use or place the battery under high temperature (in the hot sun or in a very hot car), otherwise it may cause the battery to overheat, catch fire or function failure, and shorten its life.
 15. Do not store in places with strong static electricity and strong magnetic fields, otherwise it is easy to damage the battery safety protection device and bring insecurity.
 16. If the battery emits peculiar smell, heat, discoloration, deformation, or any abnormality during use, storage, or charging, immediately remove the battery from the device or charger and stop using it.
 17. Discarded batteries should be covered with insulating paper to prevent fire and explosion.

Lithium battery Storage Checklist

Before storing, remove the battery from the device

Charge or discharge the battery to 3.8V (use the charger set in "storage mode" or use a voltmeter to check V).

Use insulating materials (such as plastic, electrical tape) to protect the battery terminal.

Put the battery in a fireproof bag/container.

"Lithium-ion battery only" storage area

Room temperature and no heat source

Dry and well-ventilated place

Remove all combustible materials (wood, carpet, gasoline is prohibited, ceramic or cement surfaces are recommended).

There must be an ABC or water fire extinguisher nearby. And know its location

Emergency treatments

Thermal runaway begins when the heat generated within a battery exceeds the amount of heat that is dissipated to its surroundings

Scenario 1 — Temperature is high, but no fire

In case of smoke, turn off the power supply in time, let it cool naturally. During the cooling process, please observe whether the heating of the battery is relieved. If not, please put the battery in clean water for cooling.

Scenario 2 — Battery smoking

Take out the battery in time and put it in clean water for cooling (soaking).

Scenario 3 — The battery suddenly smokes during charging

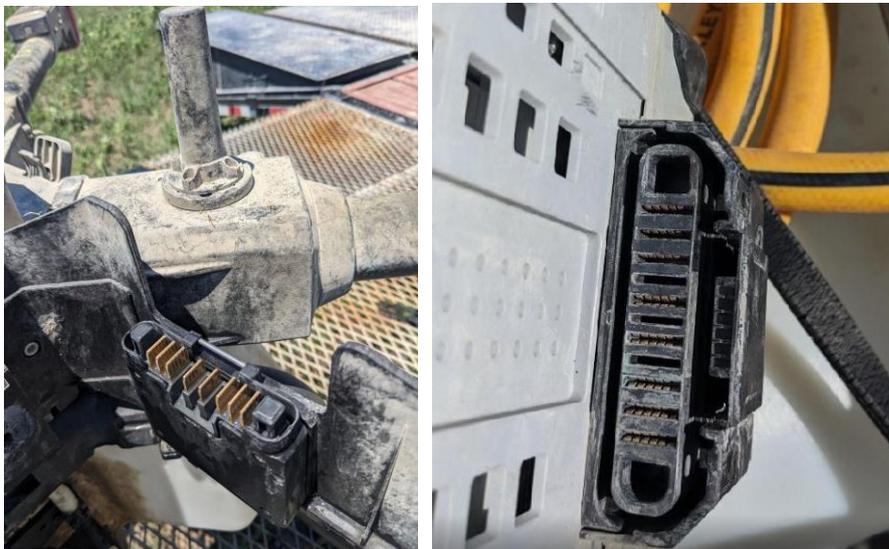
If the battery suddenly smokes during charging, please cut off the main power supply of the charger immediately and remove the battery on the premise of ensuring the safety of personnel. If personnel cannot get close to the battery, please abandon the equipment, and directly use clean water jet or fire extinguisher to cool down and extinguish the fire.

Scenario 4 — The drone crashed in flight, resulting in battery smoke

Take out the battery on the premise of ensuring the safety of personnel. If personnel cannot get close to it, please abandon the equipment, and directly use a clean water jet or fire extinguisher to cool down and extinguish the fire. When it is determined that the battery temperature has decreased and there is no danger, proceed to the next step.

Cleaning

It's very important to clean the battery plugs on both battery and drone. Please use electronics cleaner to clean the metal parts of plug.

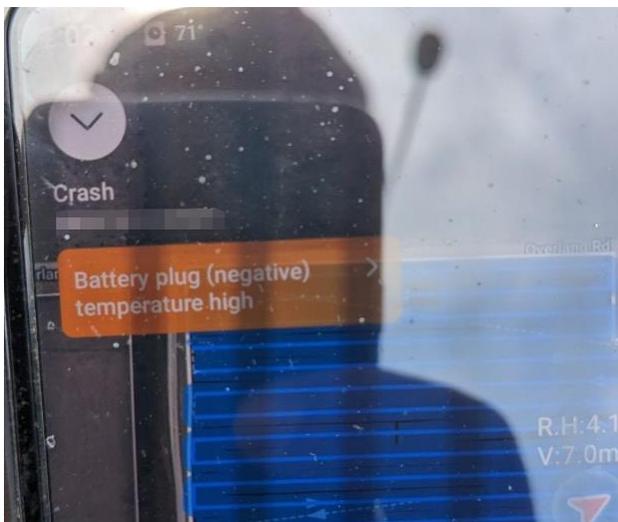


Recommended electronics cleaner

This is the only cleaner the US customer was using prior, advised not to use acidic cleaners and to use soap, water and brush to clean the surfaces.



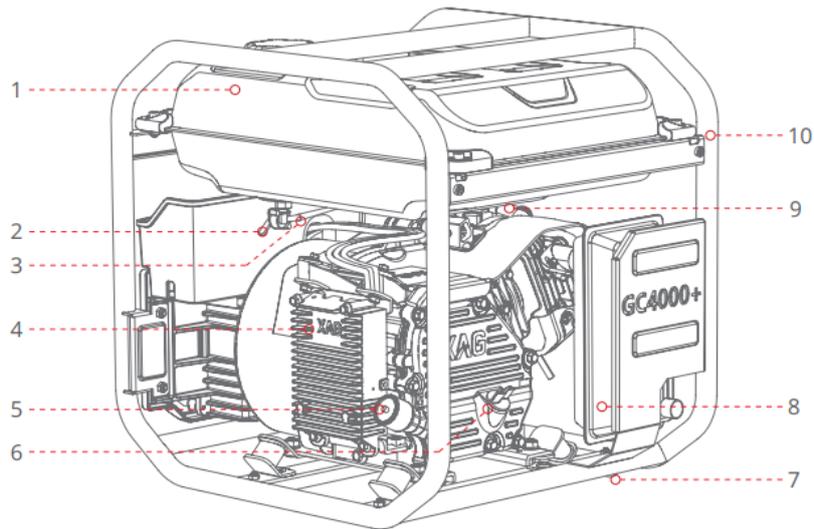
Without battery plug cleaning, you may see the issue of “battery plug (negative) temperature high”.



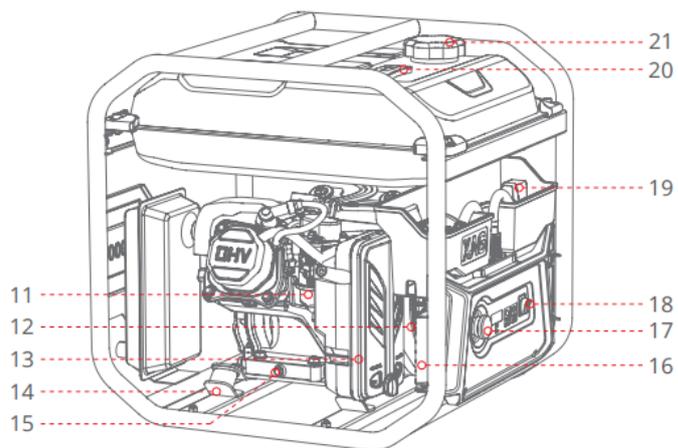
GC4000+ Auto Super Charger Station

Overview

Auto Super Charger Station is required to maintain and service after a certain period. During maintenance and service, make sure auto super charger station is turned off.



1. Fuel Tank
2. Fuel Switch
3. Fuel Tube
4. Generator Control
5. Oil sensor
6. Engine Oil Gauge
7. Shock-Absorbing Block
8. Muffler
9. Spark Plug
10. Frame



11. Carburetor
12. Generator Fairing
13. Air Filter
14. Generator Cushion
15. Engine Oil Drain Screw
16. Charge Controller
17. Emergency Stop switch
18. ON/OFF Button
19. Charge Port
20. Fuel Observation Window
21. Fuel filler cap

GC4000+ The Super Charger Station Maintenance Guide

Item	Action	Service Notes
Engine Oil	Inspect	Inspect engine oil level every time before use
	Change	The 1 st service should be taken placed after 20 accumulated operation hours. The 2 nd and the reset of service should be taken place every 50 hours accumulated operation hours.
Air Filter	Inspect	Inspect air filter every time before use
	Clean	Clean air filter for every 50 accumulated operation hours
Spark plug	Change	Change for every 500 accumulated operation hours
Air Valve	Adjust	Adjust air value for every 500 accumulated operation hours. You may ask help from engine technician.
Oil Tank and filter	Clean	Clean the oil tank and its filter for every 2 years
Oil tube	Change	Change if it's worn out.

In addition, if you are unsure of repair and maintain super charge station by yourself, you can feel free to take your super charge station to any motorcycle repair workshop or any workshop repairing engines.



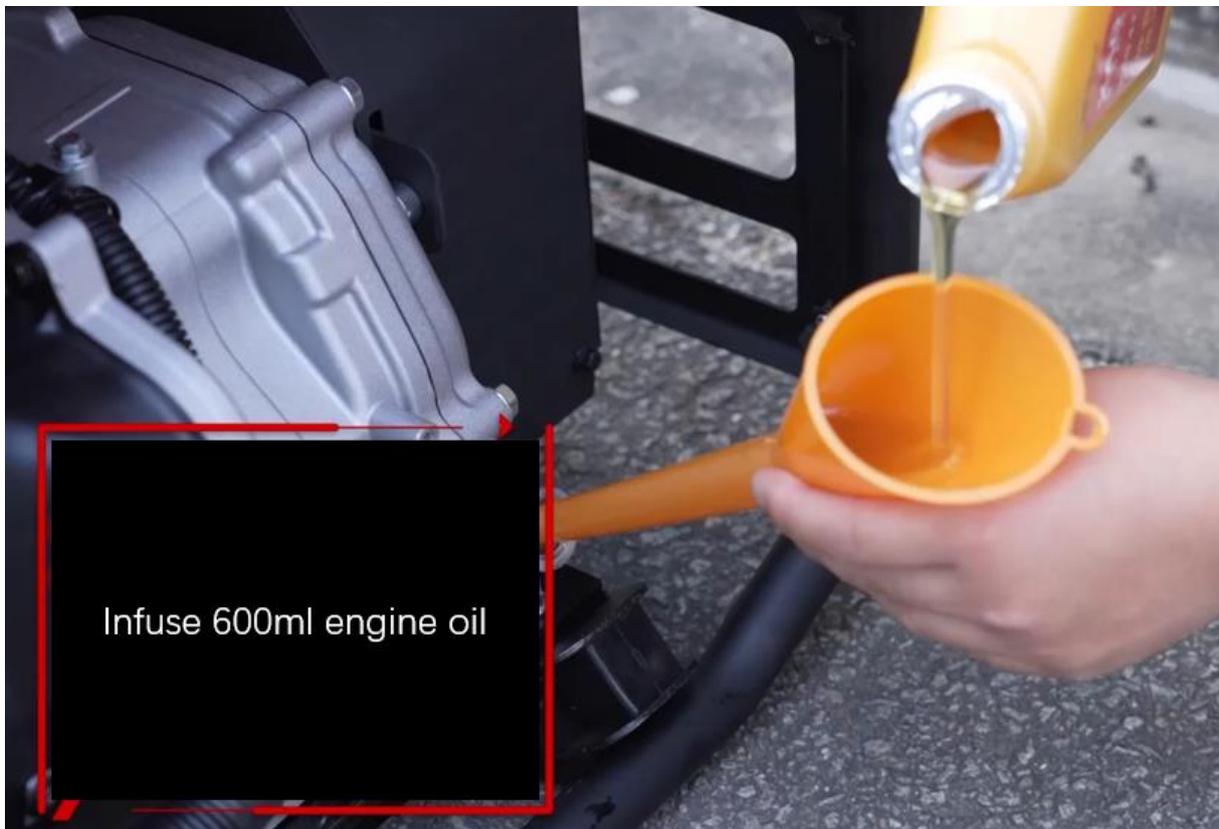
Oil Change

Please select 10W-40 engine oil



For each service, infuse 600ml engine oil.

Super charge station may be malfunction if infusion volume is not equal to 600ml.





The 1st service should be taken placed after 20 accumulated operation hours.
The 2nd and the reset of service should be taken place every 50 hours accumulated operation hours.

Inspect the remaining engine oil level



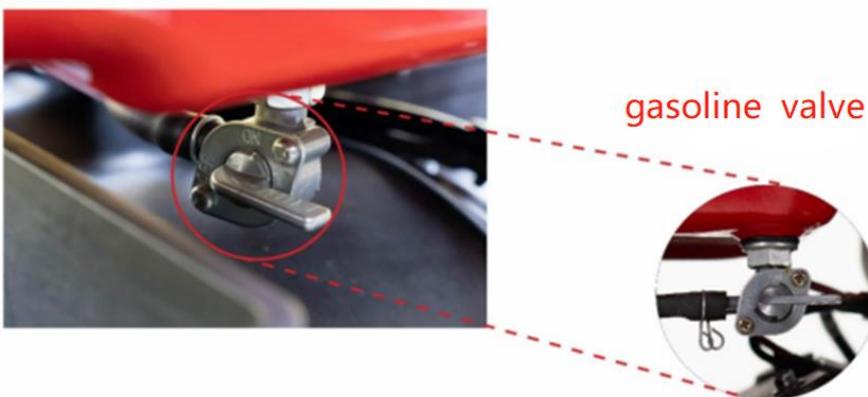
Clean Air Inlet Filter

Clean air inlet filter for every 50 accumulated operation hours



Inspect fuel system

1. check if the fuel pipeline and replace it in time if it has been worn out.
2. if not used for a long time, the fuel in the tank and pipeline needs to be drained.
3. Close the gasoline valve, check the fuel tank, fuel tank cap, carburetor, fuel switch, etc., if there is any damage, leakage. please replace them immediately.



Inspect Spark plug

Every 500 hours of operation, the spark plugs need to be inspected. Pull out the high-pressure cap, use the sleeve to unscrew and check the spark plug, if there is an abnormal situation such as burning, it needs to be replaced by a specialist.



Inspect Air Valve

Every 500 hours of operation, a specialist adjusts the valve clearance.

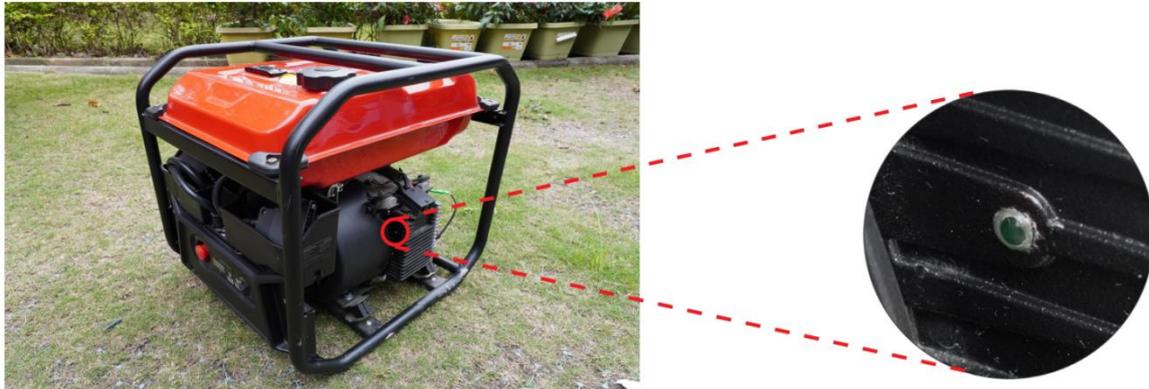


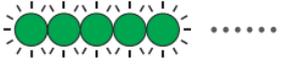
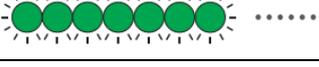
Verification: Charge battery after service

Each time the maintenance is completed, a charge test is required to ensure that the charging function can be used normally.



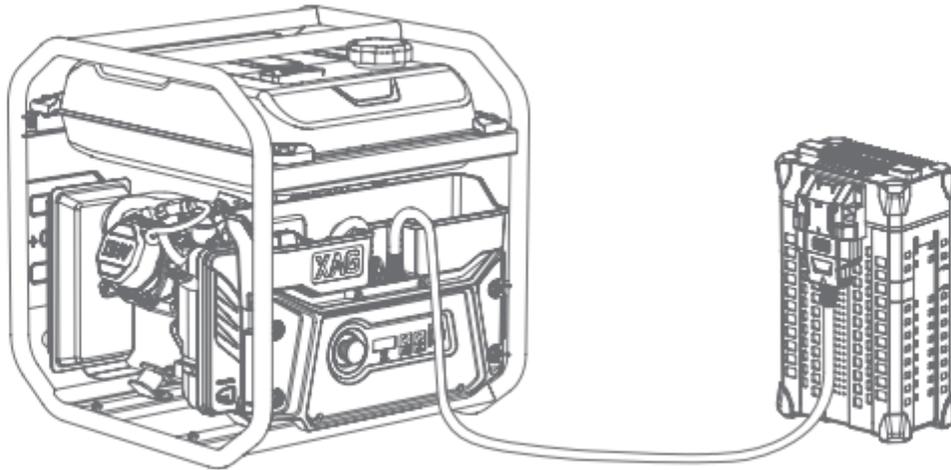
Engine Controller Light Indicator



Light indicator	Illustration
	Engine controller has no calibration data
	Engine malfunction, Fuse melt down, motor disconnected, motor phase loss, etc
	Exceed maximum allowable current during startup. Hardware protection mode is enabled.
	MOS high side short High side = the current travels from the supply through the MOS to the load and then to ground
	MOS low side short Low side = MOS source to ground, drain to load, load to supply
	Exceed maximum allowable current during startup. Software protection mode is enabled.
	Voltage exceed +85V
	Rectifier bridge open circuit or disconnected
	Engine controllers overheat
	No input signal or under work status

When the GC4000+ is malfunctioned, please analyze the scenario according to both fault code and Engine controller light indicators.

GC4000+ Firmware Update



Online Method

Install smart battery B13960S in UAV

Open APP and update the battery and GC4000+ firmware.

Please notice that GC4000+ firmware will be stored in smart battery.

Connect battery to GC4000+

Turn on both battery and GC4000+. The GC4000+ firmware will be transferred from battery to GC4000+. Wait for a while until the firmware update is completed.

Offline Method

Copy the GC4000plus firmware file to UAV flight control

GC4000plus firmware (GC4000plus_v3.1.24) download link: please refer to Appendix I

Install smart battery B13960S in UAV

Restart UAV

The FC will update GC4000+ firmware in B13960S after restart, please wait for a short while

Please notice that GC4000+ firmware will be stored in B13960S.

Connect battery to GC4000+

Turn on both battery and GC4000+. The GC4000+ firmware will be transferred from battery to GC4000+. Wait for a while until the firmware update is completed.

When shall user update GC4000+ firmware?

- i. Regular maintenance
- ii. GC4000+ function abnormally
- iii. GC4000+ online update failure; it keeps flashing red and green all the time, seem the firmware update but never complete. In this case, the GC4000+ need to update it again manually (Use offline method)

Troubleshooting

GC4000+ super charger is used to generate electricity for smart battery. It consumes gasoline fuel and is required to maintain after a certain period of time.



Fault code

Fault Code	Photo	Illustration	Troubleshooting
E1		Low engine oil	Add or replace engine oil
E2		Service Required.	After oil change, the repeatedly turn on/off button 3 times to remove the fault code.
E3		Control panel overheat	Stop use for 10 minutes. Inspect if the control panel is loosened.

		Control panel overheat	Stop use for 10 minutes. Inspect if the charge controller is displaced.
		Control panel overheat	Stop use for 10 minutes. Inspect if the heat dissipation fan or motor air intake are blocked
E4		Exceed maximum current limit	Clean the charge socket Replace control panel
E5		Voltage exceed 86V during operation	contact XAG technical support to export battery log, check whether the battery is under protection mode, which is caused by abnormal temperature, voltage, current, communication.
		Voltage exceed 96V during startup	Adjust and turn the idle valve counterclockwise.

E7		5 consecutive failures of startup	<p>Change engine oil</p> <p>Add gasoline</p> <p>Adjust and turn the idle valve clockwise.</p>
E8		Control panel malfunction	Replace a new control panel
E11		Battery communication failure	Contact XAG technical support
E12		Control panel malfunction (current)	Replace a new control panel
E13		Control panel malfunction (voltage)	<p>Gasoline quality is too bad. Please change gasoline.</p> <p>Check if battery is in protection mode.</p> <p>Replace a new control panel</p>

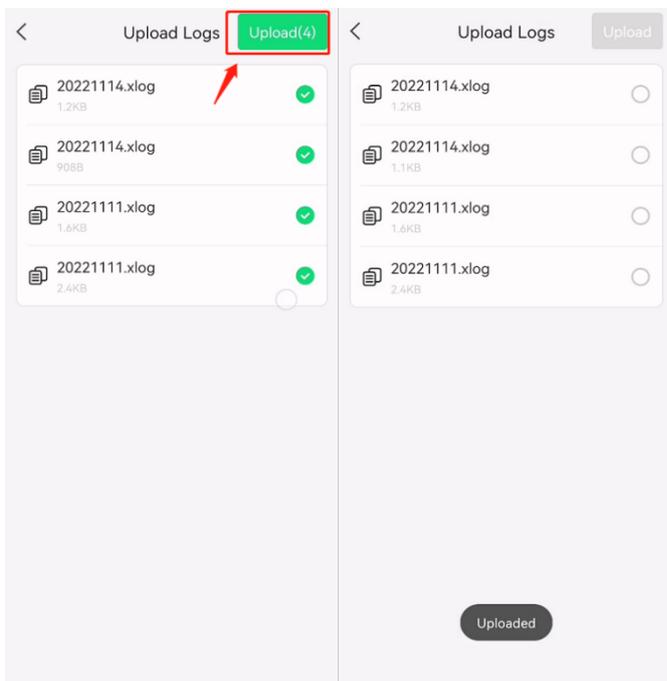
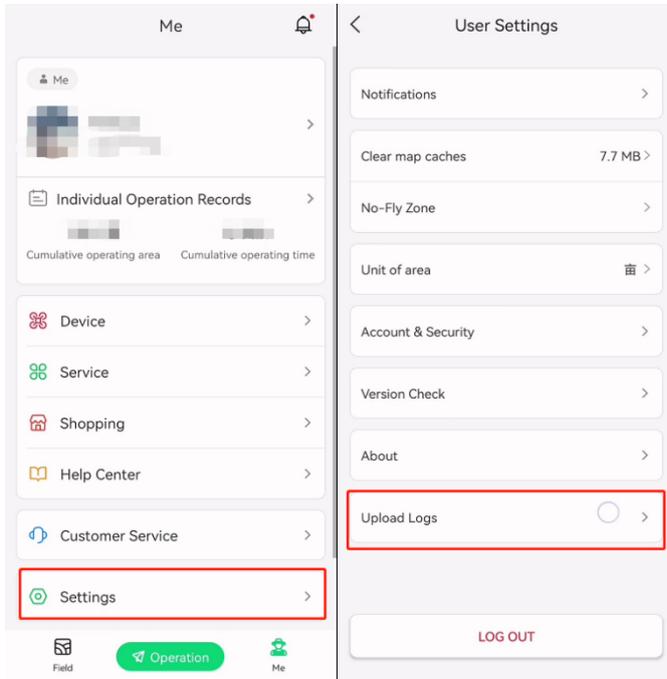
Chapter 14

Troubleshooting

APP Troubleshooting

APP Xlog Upload

To debug the app, please upload the app logs, and give Xcare your account ID.



Troubleshooting Cases

- ii. Problem & Scenario: App error “Fail to upload the route (10102), the drone must be operated within visual range”



Analysis: The location is disabled. The app does not know the user's location. Thus, it fails the safety check because it can't calculate the distance between drone and user's smartphone.

solution: enable the smartphone location feature.

ACS2 2021 Troubleshooting

Check ACS2 2021 LED Indicators



LED Indicator

ACS2 2021 firmware can be updated by online or offline method.

No.	LED INDICATOR	ICON	ILLUSTRATION	IMPLICATION
1	Power indicator 电源灯		remaining battery	Green: >30% Red:<30%
2	Terminal 设备连接信号灯		whether device is connected to the remote serve, 4G or cloud server	Solid Green: OK Solid Red: FAIL
3	Device 无人机连接信号灯		whether device is connected to UAV	Solid Green: OK Solid Red: FAIL Off: Disconnected
4	Manual control Status 飞行状态信号灯		whether manual flight is in use	Solid Green: Manual Off: Automatic
5	Task Status 任务状态信号灯		whether the task is loaded, e.g. automatic flight, WLAN configured	Flash Green: Loading Solid Green: Loaded Off: No data
6	RTK Status 飞行状态灯		related to RTK rover	Flash Green: positioning Solid Green: RTK Ready Solid Red: position error Solid Yellow: RTK disabled Off: Disconnected

ACS2 2021 Hardware 4G Network Bandwidth

There are currently two variants of ACS2 2021, namely domestic (China) and international version respectively.

ACS2 2021	Model	4G Module	Frequency Bandwidth
Domestic version or Chinese version	ACS2	EC20-CN	LTE-FDD: B1/B3/B5/B8 LTE-TDD: B34/B38/B39/B40/B41 WCDMA: B1/B8 GSM: B3/B8
International version or English version	ACS2 G	EG25-G	LTE-FDD: B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/B19/B20/B25/B26/B28 LTE-TDD: B38/B39/B40/B41 WCDMA: B1/B2/B4/B5/B6/B8/B19 GSM: B2/B3/B5/B8

For example, the below ACS2 2021 is international version as the model is ACS2G.



Question: I'm in Panama. Can I connect my ACS2 2021 remote controller to 4G?

Answer: To answer this question, please **follow the below steps:**

1. check your remote controller version.
 If the model is ACS2, your controller is Chinese version.
 If the model is ACS2G, your controller is English version.
2. According to your controller's version, find the corresponding frequency bandwidth.

ACS2 2021	4G module	Frequency Bandwidth
Chinese version (Also named domestic version)	EC20-CN	LTE-FDD: B1/B3/B5/B8 LTE-TDD: B34/B38/B39/B40/B41 WCDMA: B1/B8 GSM: B3/B8
International version (Also named English version, global version)	EG25-G	LTE-FDD: B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/ B19/B20/B25/B26/B28 LTE-TDD: B38/B39/B40/B41 WCDMA: B1/B2/B4/B5/B6/B8/B19 GSM: B2/B3/B5/B8

3. Find your local telecom operator bandwidth chart

Panama Telecommunications Operator Bandwidth Chart

Operator	2G	3G	4G	5G
Cables and Wireless	B5 (850)	B5 (850)	B28 (700)	No
Claro	B2 (1900)	B2 (1900), B5 (850)	B2 (1900), B28 (700)	No
Digicel	B2 (1900), B3 (1800)	B2 (1900)	B2 (1900), B28 (700)	No
Movistar	B5 (850)	B2 (1900), B5 (850)	B2 (1900), B28 (700)	No



-
4. Compare the remote controller's bandwidth table and the local telecom operator chart. Check if there are common bandwidths.

ACS2 2021	4G module	Do you find any common bandwidths?	What telecom operators should I use?
Chinese version (Also named domestic version)	EC20-CN	No.	None of telecom operators can be used as there is no common bandwidths.
International version (Also named English version, global version)	EG25-G	Yes. B2/B28	Cables and Wireless Claro Digicel Movistar

We can draw a conclusion that if you are in Panama, you can only use the international version that uses the 4G module of EC25-G, because the Chinese version (EC20-CN) has no common bandwidths in Panama. As we can see, the EC20-CN bandwidth table gives neither the bandwidth of B2 nor B28. Thus, Panama can only sell international version devices with the 4G module of EC25-G.

5. Obtain the 4G SIM Card from the telecom operators.

Question: I'm in Mexico. Can I connect my ACS2 2021 remote controller to 4G?

Answer: To answer this question, please **follow the below steps:**

1. check your remote controller version. If the model is ACS2, your controller is Chinese version. If the model is ACS2, your controller is English version.
2. According to your controller's version, find the corresponding frequency bandwidth.

ACS2 2021	4G module	Frequency Bandwidth
Chinese version (Also named domestic version)	EC20-CN	LTE-FDD: B1/B3/B5/B8 LTE-TDD: B34/B38/B39/B40/B41 WCDMA: B1/B8 GSM: B3/B8
International version (Also named English version, global version)	EG25-G	LTE-FDD: B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/ B19/B20/B25/B26/B28 LTE-TDD: B38/B39/B40/B41 WCDMA: B1/B2/B4/B5/B6/B8/B19 GSM: B2/B3/B5/B8

3. Find your local telecom operator bandwidth chart

Mexico Telecommunications Operator Bandwidth Chart

Operador	2G	3G	4G	5G
Movistar	B2 (1900)	B2 (1900), B5 (850)	B2 (1900)	N
AT&T	-	B2 (1900), B4 (1700/2100), B5 (850)	B4 (1700/2100), B5 (850)	N
Telcel	B5 (850)	B2 (1900), B5 (850)	B4 (1700/2100 AWS 1)	N



-
4. Compare the remote controller's bandwidth table and the local telecom operator chart. Check if there are common bandwidths.

ACS2 2021	4G module	Do you find any common bandwidths?	What telecom operators should I use?
Chinese version (Also named domestic version)	EC20-CN	B5	AT&T
International version (Also named English version, global version)	EG25-G	B2/B4/B5	Movistar AT&T Telcel

We can draw a conclusion that if you are in Mexico, you are allowed to use both international and Chinese version remote controller. From the above chart, the domestic version can work with AT&T and international version can work with Movistar, AT&T and Telcel.

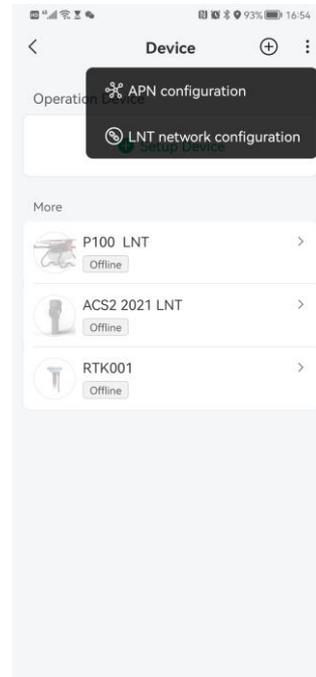
5. Obtain the 4G SIM Card from the telecom operators.

ACS2 APN Setting (4G Network)

If ACS2 is compatible with your local Telcom operator while it still can't access internet with 4G SIM card inserted, then you may need to modify APN setting.

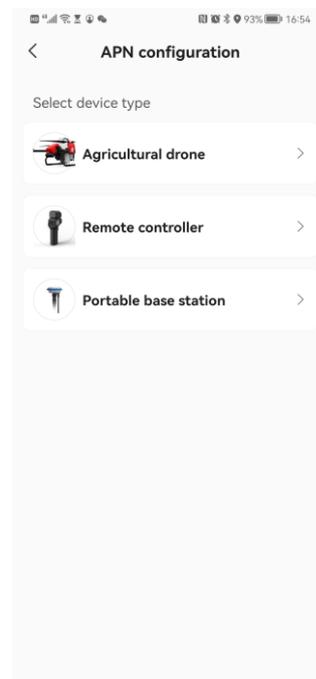
Step 1

Open XAG One App, go to Device



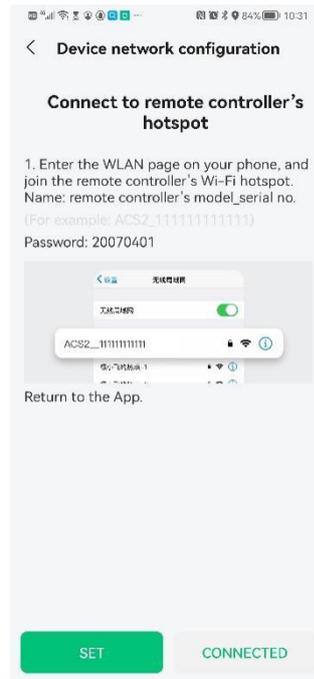
Step 2

Go to APN configuration



Step 3

Connect your smartphone to ACS2 hotspot, and press CONNECTED

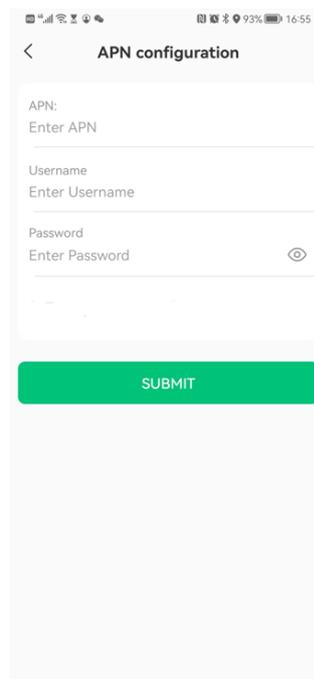


Step 4

Input APN, Username, and password.

Press SUBMIT

If you don't know the APN configuration information, please contact your local Telcom operator.



ACS2 2021 Firmware Introduction

- The firmware version of mainboard (单控主板) is 2.0.1.25. Please make sure that the last two digit of mainboard firmware must be equal or greater than 25. Otherwise, please do the offline firmware update, or contact XAG technician.

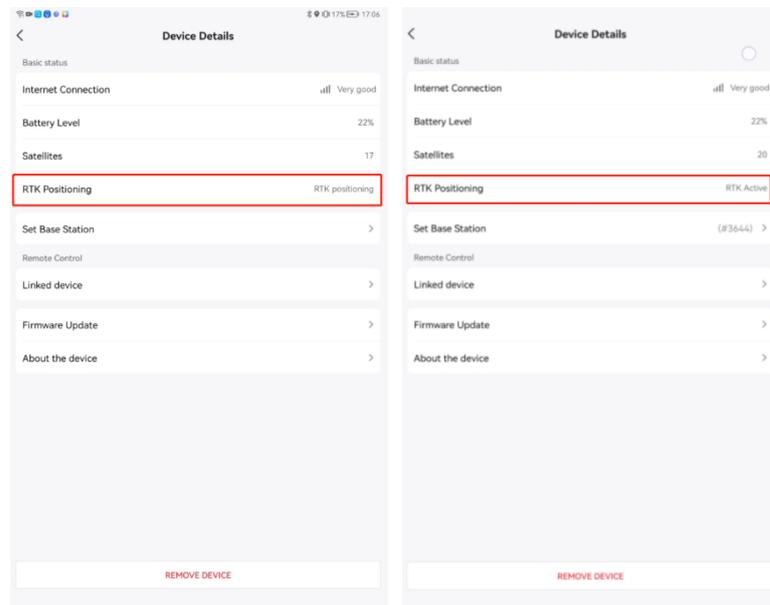


- There are four firmware that must be update
 - keyboard module
 - mainboard module
 - WIFI module
 - RTK rover module
- ACS2 2021 doesn't need to restart after the WIFI/Keyboard/RTK rover module firmware updates complete; Oppositely, ACS2 2021 must restart after the mainboard module firmware update completes.
- Make sure to plugin RTK rover before RTK rover module update



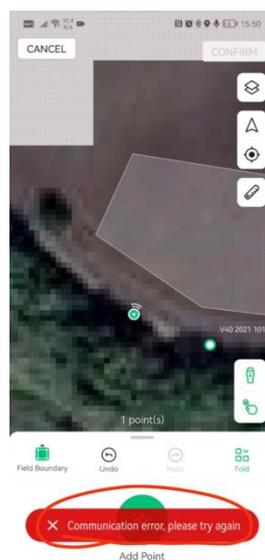
Check ACS2 RTK Positioning Status

This could be import while field mapping.



If the RTK positioning status is displayed as “RTK not connected” or “RTK positioning”, ACS2 field mapping will not work. Make sure the RTK positioning status must be “RTK Active”.

2. **Problem & Scenario:** Fail at field mapping and receive the error of “Communication error. Please try again”

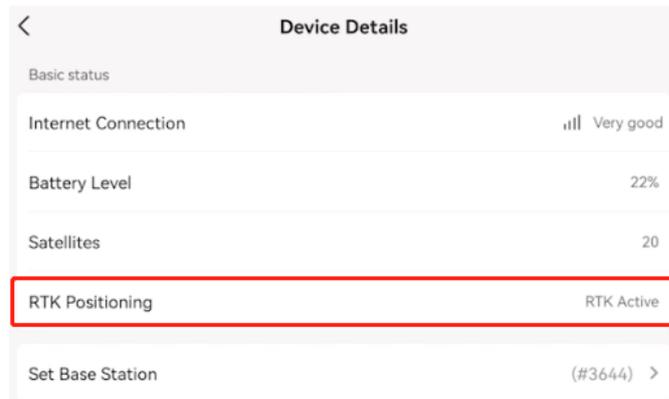


Analysis & Solution: This is due to the network connection delay. Please update the ACS2 firmware and the App software to the latest version, then try again.

3. **Problem & Scenario:** ACS2 fail to connect RTK station

Analysis & Solution:

- i. Check if RTK station is in FIX mode and RTCM is broadcasting
- ii. Check if the ACS2 has the number of satellites greater than 16
- iii. Check if the ACS2 is active



- iv. Change another RTK station
- v. Change another ACS2

Troubleshooting Cases: ACS2 2021 Firmware Update

ACS2 2021 Firmware Update under 4G Networking Mode

1. **Problem:** ACS2 2021 fail to access Internet

Scenario: Terminal LED indicator light (the second from the left) become dim



Analysis & Solution:

- i. Inspect whether SIM card is damaged, do the cross validation on SIM card
- ii. Inspect whether the frequency bandwidth of telecommunication operator is compatible with your ACS2 2021, Change SIM card from another compatible telecommunication operator
- iii. If the SIM card is OK but still fail to connect 4G, it could be the APN problem; Please contact XAG technician to reconfigure APN; Alternatively, use offline update method
- iv. Check if your area has 4G coverage. You can ask your local telecom operator or test it by yourself that Insert SIM card into smartphone and browser websites.

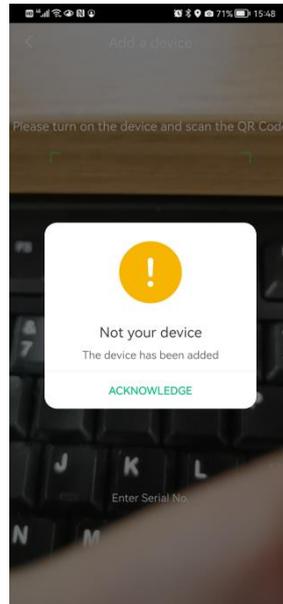


2. **Problem:** Fail to add ACS2 2021 on XAG One App

Scenario: Error "Not your device".

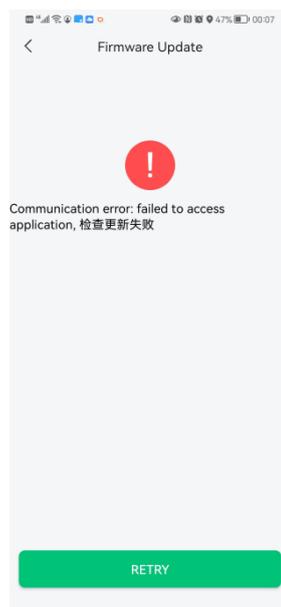
Analysis: This is due to that ACS2 2021 can only bind to one account. If this ACS2 2021 binds to other account and you want to add this device to your account.

Solution: You must remove the device from its original account.



3. **Problem:** Fail to update firmware

Scenario: Error "Communication error Failed to access application".



Analysis: This is caused by cloud server failure or the network connection.

Solution: The cloud server maybe under maintenance. You can retry after a few hours.

4. **Problem:** Fail to update firmware

Scenario: Error "installation failure, please try again"



Analysis: This error could be caused by significant network latency. The XAG server is based in China, thus the user who are far from China, will evitable suffered from this.

Solution: Please have more attempts.

ACS2 2021 Firmware Update Offline

1. **Problem:** Smartphone can't find the ACS2 2021 hotspot.

Scenario: The task status LED indicator light (the 5th from the left) illuminates in orange



Analysis: This may be due to that the ACS2 2021 is under LNT mode as you previously paired your ACS2 2021 with LNT. When the ACS2 2021 is under LNT mode, the hotspot will be disabled.

Solution: To quit LNT mode, please long press button A, until the 5th LED indicator light become dim. Once the ACS2 quits LNT mode, the 5th LED indicator light become dim. Now, your ACS2 is ready to update its firmware.



2. **Problem & Scenario:** after offline firmware update, ACS2 is consistently having voice prompt while none of the light indicator illuminates.

Analysis & Solution: This is due to the offline firmware update failure. Please put the ACS2 into flash drive mode, try a format, run the offline firmware update again.

Other Troubleshooting Cases:

Mapping:

Description	Possible Cause	Troubleshooting
Unable to enter the "RTK" status for a long time (the sixth light keeps flashing, unable to enter high-precision positioning)	<ol style="list-style-type: none"> 1. The network status is unstable or there is no network, so the RTK base station cannot be connected, and the RTCM data cannot be obtained; 2. Firmware out of date; 3. The atmospheric ionosphere is abnormal, and the drone cannot enter the RTK or suffer from RTK latency; 4. ACS2 2021 or RTK module hardware defective (short circuit) 	Refer to solution 007, 008
No response when pressing "A" or "B" button	<ol style="list-style-type: none"> 1. The network is unstable or there is no network, which causes the communication errors between the APP and ACS2; 2. Firmware out of date; 	Refer to solution 023

App:

Description	Possible Cause	Troubleshooting
ACS2 2021 remote controller. XAG One App shows that the ACS2 2021 has been bound to UAV successful but can't control UAV. The third light is dim.	WIFI network/APP problems.	Refer to solution 005
ACS2 2021 remote controller. XAG One App shows that binding UAV failed (command timeout code=4000, error code 30203)	Caused by 4G network delay APP version out of date	Solution 002, 005
ACS2 2020 remote controller. XAG Agri2 App shows that the phone connects to the ACS2 2020 hotspot, but the icon shows ACB1	<ol style="list-style-type: none"> 1. The mobile phone cannot communicate with the controller, so the app display ACB1 icon in default; 2. The mobile phone is connected to a hotspot that is not from ACS2. 	<ol style="list-style-type: none"> 1. Check if mobile phone connects to the ACS2 hotspot 2. Reconnect hotspot 3. Offline update mainboard firmware,

Firmware update:

Description	Possible Cause	Troubleshooting
Click update, but App display "RTK firmware installation failed"	1. Communication failure 2. Firmware out of date	1. Check whether the version of the RTK module is v0.0.0.0. If yes, please check the RTK module hardware first. For details, check solution 022 2. Restart App and make more attempts.
ACS2 cannot start normally. When the ACS2 startup, the red light or yellow light keeps flashing in endless cycles	N/A	Solution 012, 013

Flight Mission:

Description	Possible Cause	Troubleshooting
Fails to manual takeoff and landing, and there is no response voice prompt	Cables/wires loosened	Solution 020

Solution Table
Light Indicators

Solution ID	Phenomena	Causes and Troubleshooting
001	The first light turns on and flashes "red, green and yellow	<p>The troubleshooting steps for software problems are as follows:</p> <ol style="list-style-type: none"> 1. The firmware is the factory production testing version, it is OK to upgrade the formal mass production firmware offline with a USB flash disk
002	The second green light goes off intermittently	<p>There are hardware problems and software problems. The troubleshooting steps are as follows:</p> <ol style="list-style-type: none"> 1. Make sure whether it is 20 or 21 models first. 2. Check the network environment of each model. Check USB cable, interface and mobile phone hotspot of 20 models; Check whether the SIM card of the 21 models is loose, whether the SIM can access the Internet and re-insert it, whether the telecom operator's signal is poor, and try to replace it with a different operator; 3. Still not, please contact the XAG technicians.
003	The second light is solid green, and the APP shows no network.	<p>The troubleshooting steps are as follows:</p> <p>2020 models:</p> <ol style="list-style-type: none"> 1. Confirm whether it is 2020 ACS2 controller, It is also matched with the XAG Agri2 APP for use (special attention: the second controller lamp of 20 models is only the device connection lamp, which is on or off regardless of whether the Internet can be accessed, and the problem is not tenable. It is necessary to distinguish 21 models) 2. Make sure whether the SIM card can access the Internet. <p>If the SIM card can access the Internet by itself and is plugged into the controller, the hotspot still cannot access the Internet. Please check the card slot or whether the mobile phone automatically jump out of the hotspot or try upgrading the motherboard firmware offline</p> <p>If the SIM card itself cannot access the Internet, the problem is not established. Please replace another SIM card or charge the SIM card.</p>

004	The third light always flashes green when it is turned on	<p>There are hardware problems as well as software problems. The troubleshooting steps are as follows:</p> <ol style="list-style-type: none"> 1. Make sure whether it is 20 or 21 models, and upgrade the motherboard firmware to the latest version offline; 2. The battery is not enough, please charge it quickly or try to start the machine by plugging in the power supply; 3. Judge whether it is caused by human factors and ask if it has been dropped, which may damage the WIFI module and cause poor contact; 4. For the reason of WIFI firmware, contact R&D to provide special firmware reset; 5. Still not, please contact the XAG technicians.
005	The third light stays off	<p>The troubleshooting steps for software problems are as follows:</p> <ol style="list-style-type: none"> 1. The UAV fails to bind. Please add and bind it again. 2. Restart the controller, unplug the battery of the UAV, unplug the UPS of the UAV. 3. Replace the mobile phone, or reinstall the APP. After that, please "add again" and "bind the device". 4. If not, please contact the XAG technicians.
006	The third light goes off intermittently	<p>There are hardware and software problems. The troubleshooting steps are as follows:</p> <ol style="list-style-type: none"> 1. Whether the control distance is too far, and whether the backside of the controller is facing the UAV 2. Whether the heat dissipation metal will be abnormally hot 3. Both WIFI and motherboard firmware are upgraded to the latest 4. Disassemble the machine and check whether the antenna is loose 5. Still not, please contact the XAG technicians.
007	The sixth light keeps flashing green	<p>The troubleshooting steps are as follows:</p> <ol style="list-style-type: none"> 1. Normal, the module has low positioning accuracy, and is searching for satellite to enter high precision positioning (RTK) 2. If it flickers for a long time, please place the device in an open position around the sky without any obstruction 3. Check whether the network signal is poor, and whether the connected fixed base station is too far (15km in low latitude areas is generally a reference

		<p>conservative distance, while 30km is far)</p> <p>4. Still not, please contact the XAG technicians.</p>
008	The sixth light is always on yellow and cannot turn to green	<p>The troubleshooting steps are as follows:</p> <ol style="list-style-type: none"> 1. It is normal. Surveying and mapping needs to enter the "Surveying and Mapping Mode" (long press the ∞ smart key). 2. The RTK module cannot communicate with the controller. Check whether the interface is in poor contact. 3. Check the network problem and SIM card problem. 4. If not, please contact the XAG technicians.
009	Multiple green lights automatically flash slowly or light up automatically	<p>For external reasons, the troubleshooting steps are as follows:</p> <ol style="list-style-type: none"> 1. Check whether the "power button" on the back is collapsed, and manually reset it; 2. It may be short circuited due to liquid inlet or damage
010	The indicator light is partially or fully lit, flickering irregularly or constantly, and cannot be charged or switched on	<p>The troubleshooting steps for hardware problems are as follows:</p> <ol style="list-style-type: none"> 1. The machine is short circuited in liquid inlet, and immediately stops working. 2. Remove the machine and pull out the battery, and then try again after drying. 3. If it still fails, please contact the XAG technicians.
011	All six lights are solid red	<p>For external reasons, the troubleshooting steps are as follows:</p> <ol style="list-style-type: none"> 1. Check whether the "lower button" on the back is collapsed, and manually reset it; 2. After entering the USB flash disk mode, press the "Down"+"Power" button to exit; 3. It may be liquid ingress, damage and short circuit; please contact the XAG technicians.

<p>012</p>	<p>All six lights flash red</p>	<p>The troubleshooting steps are as follows: If the machine is started normally: 1. It is normal. This is the firmware upgrade process of the motherboard. Please wait for the flashing and automatic shutdown. The time is about 1 minute 2. If the red light flashes every time when you turn on, enter the USB flash disk mode and use the computer to format the U disk If it is an adding mode (only available for 21 models), it will flash all the time or turn off after flashing and cannot be added, please check the network condition. 1. After normal startup, check whether the third light is flashing all the time. Please refer to problem ID 004. 2. After normal startup, check whether the second light is on. If it is not on, it means that the Internet is unavailable. 3. Check whether the SIM card is connected to the Internet normally. Try unplugging or changing the telecom operator.</p>
<p>013</p>	<p>All six lights flash yellow</p>	<p>The troubleshooting steps are as follows: 1. It is normal. This is the process of upgrading the firmware of the keyboard. Please wait for it to flash and automatically shut down, it may take a few minutes. 2. If the yellow light flashes every time when you turn on, please enter the USB flash disk to do a format.</p>

Battery Charging:

Solution ID	Phenomena	Causes and Troubleshooting
014	Unable to charge, or the controller has been charged for a long time, but the controller cannot be charged	There are hardware problems and software problems. The troubleshooting steps are as follows: 1. First, make sure whether you use the original charger. Check whether the adapter and data cable are abnormal. If they are normal after replacement, it is the cause of "adapter" and "cable". 2. Judge whether to enter fast charging, and the first light will flash and voice "fast charging". If not, it means that the battery is slowly charging or not charging. If "fast charging" is broadcast frequently, please repeat the first step, or check the internal FPC cable. 3. If it is a new battery, please fully charge and discharge it for 1-2 times to activate the lithium battery. 4. Still not, please contact the XAG technicians.
015	Unable to charge, and several lights turn on irregularly	The troubleshooting steps for hardware problems are as follows: 1. The machine is short circuited in liquid inlet, and immediately stops working. 2. Remove the machine and pull out the battery, and then try again after drying. 3. If it still fails, please contact the XAG technicians.

Voice:

Solution ID	Phenomena	Causes and Troubleshooting
016	Voice broadcast "storage abnormal"	The file system is abnormal, and the troubleshooting steps are as follows: 1. Format the USB flash disk in Windows, click "Full Format".
017	Voice broadcast "insufficient takeoff conditions" or "111111111111..."	For external reasons, the troubleshooting steps are as follows: 1. Check the takeoff environment of the drone, and if it meets the requirements, the drone can take off manually
018	Voice broadcast "abnormal data transmission"	There are hardware problems and software problems. The troubleshooting steps are as follows: 1. The region code of the WIFI module disappears or cannot be read. Please contact the XAG technicians.

019	ACS2 2020 controller, voice broadcast "Please insert the surveying and mapping module"	Hardware problems, external causes, troubleshooting steps are as follows: 1. Try inserting a normal RTK module 2. Check the interface and line between the RTK and the controller.
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Buttons

Solution ID	Phenomena	Causes and Troubleshooting
020	No response when pressing the "Up" and "Down" keys on the back	The troubleshooting steps for hardware problems are as follows: 1. If there is a fall, or the internal wiring is in poor contact or loose, the machine can be disassembled and connected
021	Press the "S" key without spraying/spreading	The troubleshooting steps for software problems are as follows: 1. Upgrade the spraying service, remote control service, and controller motherboard firmware to the latest
022	ACS2 2021 controller (ACS2 2020 for reference), after pressing the "∞" smart key to enter the mapping mode, mapping is still unavailable	There are hardware problems and external causes. The troubleshooting steps are as follows: 1. When inserting the RTK module, there are two segments of voice, namely, "the device has been inserted" and "the positioning module has been connected". If there is no "positioning module is connected" voice. It is probably a hardware problem. 2. If you enter the mapping mode, the sixth indicator does not turn green or red, which is probably also a hardware problem. 3. It is easy to exit RTK in the process of use, which may be caused by poor 4G network, blocked RTK antenna, loose interface, etc., which need to be further tracked. a) : If the antenna is lifted vertically and there is no obstruction, it can be eliminated b): Check the 4G network condition, plug in the SIM card, and if the network is good and the Internet is available, it can also be eliminated c): The possibility of interface looseness is high, you can try to replace the device to eliminate it 4. If it still not works, please contact the XAG technicians.

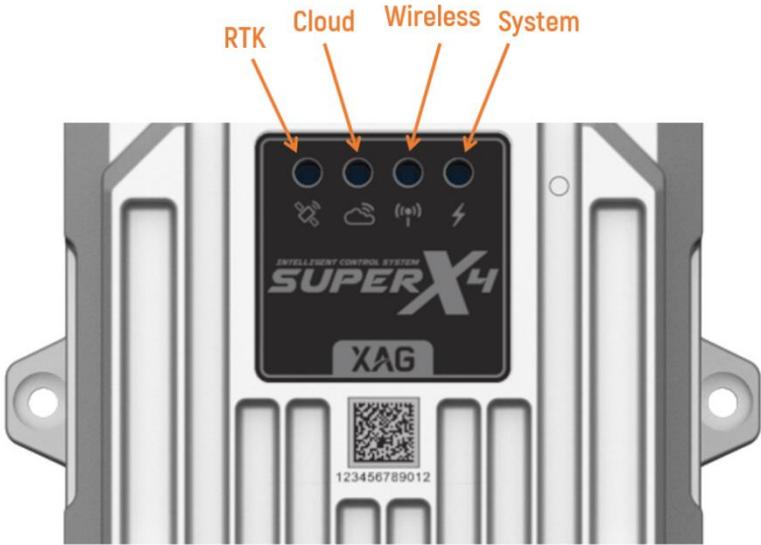
023	The "A" and "B" keys cannot be used to make point	There are external reasons as well as hardware reasons. The troubleshooting steps are as follows: <ol style="list-style-type: none">1. Ensure that the RTK module is "connected" and enters the "mapping mode", and see the sixth "indicator" and "voice broadcast" for details;2. Check the network condition and whether the SIM card is normal. Try changing the SIM card of other telecom operator.3. APP, RTK module and mainboard software versions need to upgrade to the latest version.4. It is still not possible. Please contact the XAG technicians.
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Flight Control Troubleshooting

SuperX4 Flight Control Light Indicators



Flight control SuperX4 is used on P40/V40.



whether UAV system is normal

System Status Indicator		Description
Solid Green Light		System normal
Solid Red Light		System anomalous
Dim		Check tail light

related to RTK positioning

RTK Indicator		Description
Flashing Green Light (slow)		Normal
Flashing Green Light (rapid)		Insufficient satellites (<16), heading accuracy: <math><2^\circ</math>
Flashing Red Light (slow)		RTK timeout exceeding 10s
Flashing Red Light (rapid)		Exit RTK, no differential signal, no heading
Solid Red Light		Not searching for satellites, not positioning, no output from board
Red/Green Light Alternate Flashing(slow)		Initialization/Configuration
Red/Green Light Alternate Flashing(rapid)		Firmware Update

whether device can communicate with remote server (cloud or local network terminal)

Wireless Communication Indicator		Description
Flashing Green Light (slow)		Communication module normal, DLS receiving and processing data
Flashing Green Light (rapid)		Communication module normal, no data received
Flashing Red Light (slow)		Initialization normal, serial port disconnected
Flashing Red Light (rapid)		Interface disconnected, initialization failed
Red/Green Light Alternate Flashing		Pairing. Indicators will become Green Light Fast Flash whether the pairing is successful or not

whether HDLS module can transmit and process data

Cloud Communication Indicator		Description
Cloud Communication Indicator		Cloud communication connected
Cloud Communication Indicator		Cloud communication disconnected

SuperX4 Pro Flight Control Light Indicators



SuperX4 Pro Flight Control is used in P100.



related to RTK positioning

Flight Controller RTK Indicator 📶

Indicator	Visual Representation
Solid Red	
Flashing Red (Slow)	
Flashing Green (Slow)	
Flashing Red (Fast)	
Flashing Green (Fast)	
Flashing Red & Green	
Flashing Red & Green (Fast)	

Description

Not searching for satellites, not positioning, no output from board
RTK timeout over 10s
Normal
Exited RTK; no differential signal; no heading
Satellites less than 16; heading accuracy lower than 2°
Initializing/Configuring
Updating firmware

whether device can communicate with remote server (cloud or local network terminal)

Flight Controller 4G Indicator ☁️

Flashing Red (Slow)	
Flashing Green (Slow)	

Description

Disconnected from IoT
Connected to IoT

whether HDLS module can transmit and process data

Flight Controller Wi-Fi Indicator ^(*)

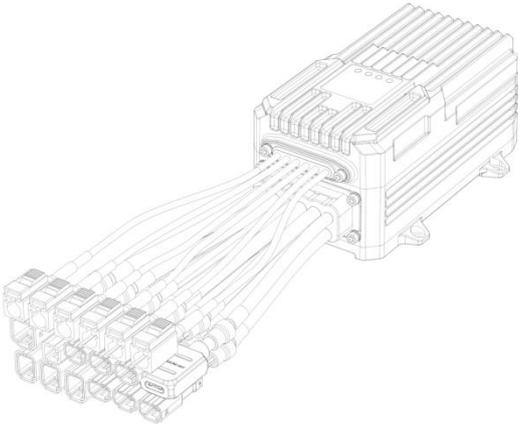
		Description
Flashing Red (Slow)		Disconnected from Wi-Fi module
Flashing Green (Slow)		Connected to Wi-Fi module
Flashing Orange (Slow)		Flight controller's Wi-Fi hotspot enabled

whether UAV system is normal

Flight Control System Status Indicator ⚡

		Description
Solid Green		In operation
Solid White		File system mounting failed
Flashing Red (Slow)		Taking off/landing
Single Flashing Red		GPS malfunctioning/dramatic satellite loss
Single Flashing Green		Attitude mode
Single Flashing Blue		Manual mode
Single Flashing Purple		Initialization failed or preheating
Flashing Red (Fast)		Sensor error
Flashing Blue (Fast)		Propulsion system error
Flashing Purple (Fast)		Underlying controller formatting/incorrect parameters
Double Flashing Red		Flight in safe mode
Double Flashing Green		Manual GPS mode; good GPS signal
Flashing Red & Green		Weak GPS signal
Triple Flashing Red		Low voltage
Triple Flashing Green		Auto GPS mode; good GPS signal
Red/Green/Blue Alternating Flashing		Unlocking

Check 4G module Bandwidth



There are currently two variants of Flight control SuperX4, domestic (China) and international version respectively. They have different ranges of frequency bandwidth. Please provide your SN and confirm the variant with your sales representative.

Flight control SuperX4/SuperX4 Pro	UAV	4G module	Frequency bandwidth
Chinese version (Also called domestic version)	P40	EC20-CN	LTE-FDD: B1/B3/B5/B8 LTE-TDD: B34/B38/B39/B40/B41 WCDMA: B1/B8 GSM: B3/B8
	V40		
	P100		
International version (Also called English version, global version)	P40	EG25-G	LTE-FDD: B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/B19/B20/B25/B26/B28 LTE-TDD: B38/B39/B40/B41 WCDMA: B1/B2/B4/B5/B6/B8/B19 GSM: B2/B3/B5/B8
	V40		
	P100		

UAV FC Chinese Version

Please use SIM card slot 2 only, because UAV FC Chinese version slot 1 is dedicated to China Mobile Operator.

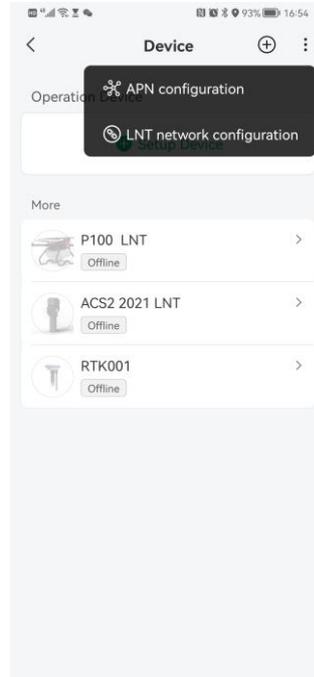


UAV APN Setting (4G Network)

If UAV is compatible with your local Telcom operator while it still can't access internet with 4G SIM card inserted, then you may need to modify APN setting.

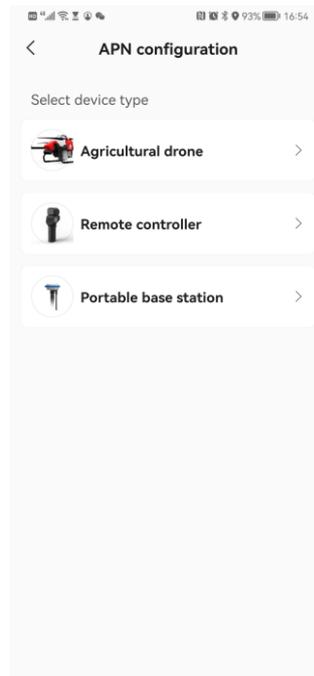
Step 1

Open XAG One App, go to Device



Step 2

Go to APN configuration



Step 3

Connect your smartphone to UAV hotspot, and press CONNECTED

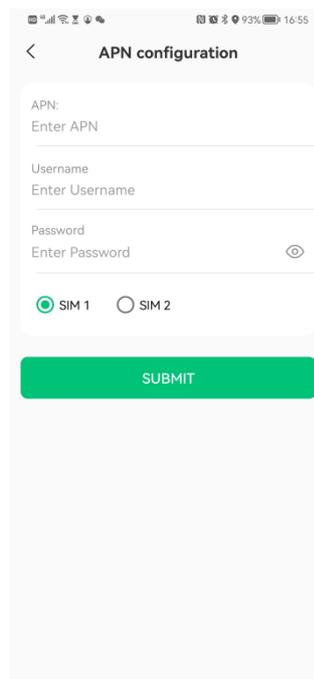


Step 4

Input APN, Username, and password.

Press SUBMIT

If you don't know the APN configuration information, please contact your local Telcom operator.



Troubleshooting Cases: Motors or Servo Failure after Flight Control

Replacement

Problem: after flight control replacement, P40/P100 has only two out of four motors worked. Vice versa, the servos of the V40 cannot stand upright .

Analysis: this could be caused by the flight control configuration issue. The flight control is somehow configured as V40 or P40. Thus, there are only 2 out of 4 motors working in P40 and P100. While in V40, the servos are out of order.

Solution:

Environment Setup Schematic:



Preparation:

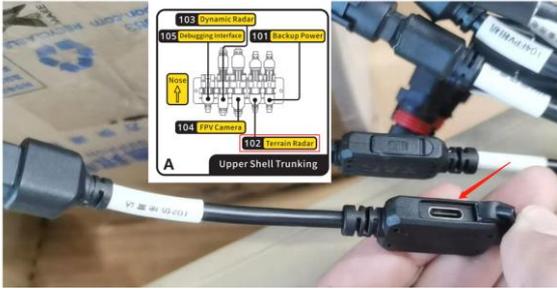
No.	Items	photo
1	Laptop or desktop computer Windows10/11	
2	UAV	

3 Type-C USB Cable

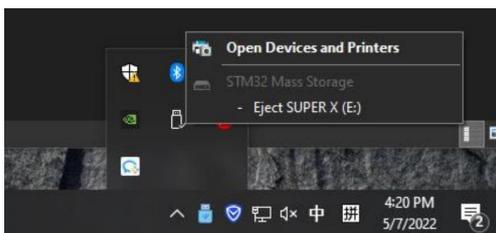


Procedure:

1. use USB Type-c cable
2. connect flight control to laptop

Flight Control	UAV model	Type-C Connector Port
Super X4	P40, V40	
Super X4 Pro	P100	

3. Turn on UAV
4. Read the flight control drive from laptop



5. Copy the files “P100P40_Release_1.136.0.5.hfw” or “superx_v6.49.0.171_release.hfw”(for V40) to the root directory of the flight control drive
Download link: please refer to Appendix I
6. Delete the “info”file from the “CFG” directory
7. Restart UAV, wait for firmware installation
8. Once restarted, you should be able to see all the motors or the servos working
9. Update the UAV to the latest firmware version



Troubleshooting Cases: UAV under 4G Networking mode

1. **Problem:** UAV fail to connect 4G

Scenario: The Flight control cloud communication light is flashing in red. It implicit that the 4G internet connection fails

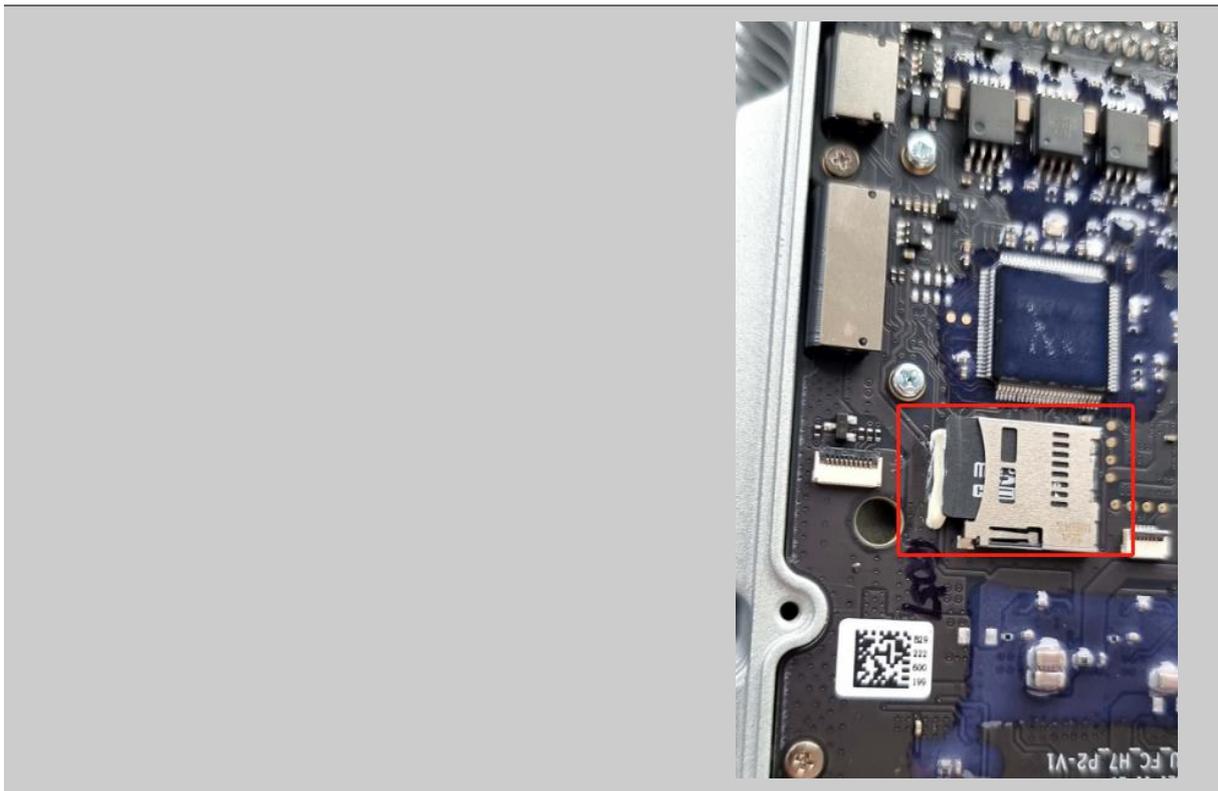
Analysis & Solution:

- i. Check if your UAV quit the LNT networking mode as LNT networking mode does not allow UAV to have 4G access.
- ii. Inspect if the SIM card is damaged or defective
- iii. if SIM card is OK, double check if its frequency bandwidth is compatible with that of SuperX4's 4G module
- iv. Change SIM card and use another telecommunication operator
- v. APN setting issue, please contact telecom operator and reset APN accordingly.
- vi. Flight control 4G module malfunction. Please contact XAG technical support for remote debug.
- vii. Check if the area has weak 4G coverage. You can contact local telecom operator. Also, Insert SIM card into smartphone and browser websites to test if the area has proper 4G coverage.



Other Troubleshooting Cases

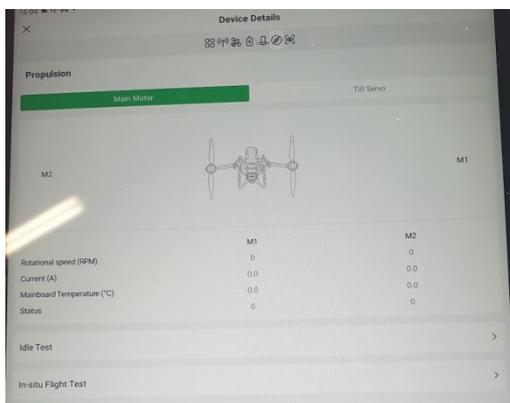
No	Scenario	Possibly Causes & Solution
1	cloud communication LED indicator become dim or illuminate green without flashing	Flight control is malfunctioned. Please run a cross validation test on flight control, and don't forget to contact XAG technician after flight control changed.
2	Fail to add (9030. The device model is not supported)	a wrong SN is given. Please input a correct SN.
		
3	P100 Arm Light flashing in blue with the sound de-de-de-de-...	<p>This is due to the propulsion system error. you can do the followings:</p> <ol style="list-style-type: none"> <li>i. Restart UAV several times <li>ii. Check the cable connection of ESC <li>iii. Contact XAG technical support. If FC firmware version fail to read and FC communication failure. Mostly like the SD card inside FC is loosen or corrupted. Please pen up flight control, take out SD card. Format SD card in FAT32, insert SD card back into FC slot, and finally test it again.
		

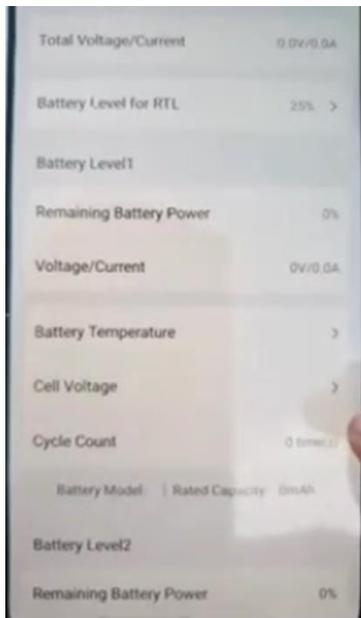
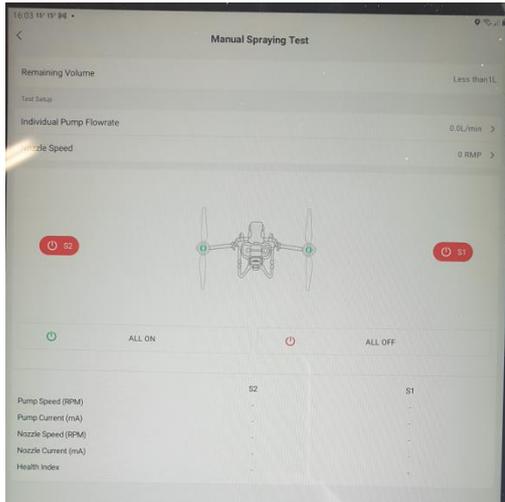


- 4 Fail to read the FC data
 Not data from Propulsion system/ Spray system/ smart battery

Methods to solve this issue:

- i. Connect computer to UAV flight control, format the FC flash drive.
- ii. Turn on battery, quickly connect and disconnect between FC and Type-c/USB cable **twice**. Then remain type-c/USB cable connected. Make sure that type-c/USB cable connects to computer during this process. Format the FC flash drive. Make multiple attempts if it does not work.

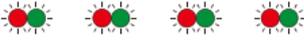
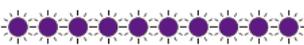
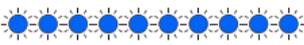




P40 Troubleshooting

Tail Light

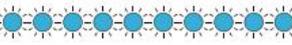
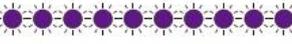
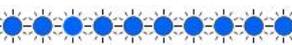


Tail Lights		Description
Red/Green Light Alternate Flashing(slow)		Weak GPS signal
Double Flashing Green Light		Strong GPS signal
Triple Flashing Green Light		GPS route mode
Flashing Red Light(slow)		Fly in safe mode ^[1] /Taking off or landing
Solid Red Light		Powered on, Flight Control initialization incomplete or heating up
Flashing Purple Light(rapid)		Flight Control formatted or parameter anomalous
Flashing Blue Light(rapid)		Propulsion system detected as anomalous
Flashing Red Light(rapid)		Sensors (excluding IMU) anomalous, GPS malfunction or low heading accuracy
Flashing White Light(rapid)		IMU failure
Triple Flashing Red Light		Low voltage alert

[1]: UAV will enter safe mode when UAV is under manual control, but lost the telecommunication of remote controller. UAV will hover and then return to take off point automatically.

Arm Light



Arm Light		Description
Solid Green Light		Spraying
Illumination Green		Spraying paused for line changing
Solid Red Light		Idling or obstacle avoidance in process
Illumination Red		Departure or RTL
Solid Cyan Light		Initializing firmware update
Flashing Cyan Light (rapid)		Downloading firmware
Flashing Purple Light (slow)		Subsystem update
Flashing Purple Light (rapid)		Transmitting subsystem firmware
Illumination Blue		No signal from flight controller
Flashing Blue Light (rapid)		Spray system offline
Solid Yellow Light		System crash

V40 Troubleshooting

Tail Light

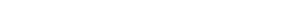


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Flashing Blue Light (rapid)		Spray system offline
Solid Yellow Light		System crash

Case Solved: Spray Arm Vibrating A Lot

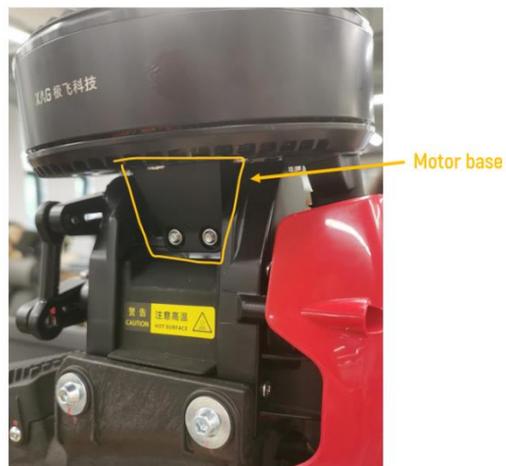
Problem description: mechanical parts loosened

Solution: expect for checking if all the screws are loosened, please also check the followings:

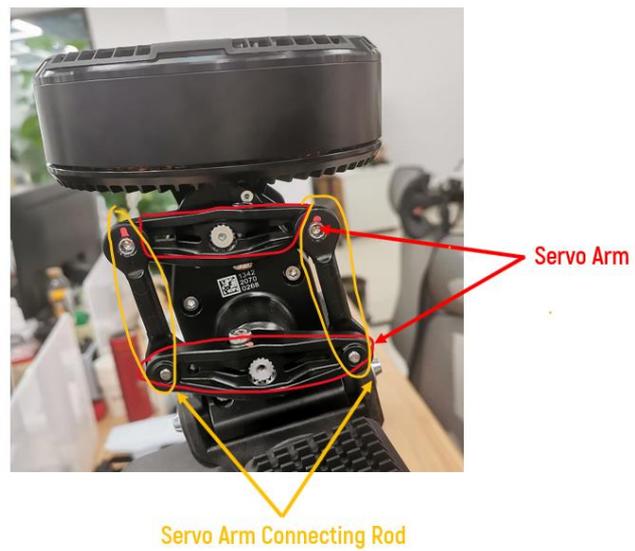
check if foldable arm is loosened



Check if motor base is loosened



Check if servo arm connecting rod and servo arm are loosened



P100 Troubleshooting

Arm Light



Arm Light (ESC Indicator)	Description
Solid Green	In operation
Solid White	File system mounting failed
Flashing Red (Slow)	Taking off/landing
Single Flashing Red	GPS malfunctioning/dramatic satellite loss
Single Flashing Green	Attitude mode
Single Flashing Blue	Manual mode
Single Flashing Purple	Initialization failed or preheating
Flashing Red (Fast)	Sensor error
Flashing Blue (Fast)	Propulsion system error
Flashing Purple (Fast)	Underlying controller formatting/incorrect parameters
Double Flashing Red	Flight in safe mode
Double Flashing Green	Manual GPS mode; good GPS signal
Flashing Red & Green	Weak GPS signal
Triple Flashing Red	Low voltage
Triple Flashing Green	Auto GPS mode; good GPS signal
Red/Green/Blue Alternating Flashing	Unlocking
Illuminating Red	Entering; returning; avoiding/bypassing obstacles

Arm light behaviors with firmware updating:

Arm Light (ESC Indicator)	Description
Red Light ON for 2s	Update failed
Green Light ON for 2s	Updated
Flashing Cyan (Slow)	ESC updating
Flashing Cyan (Fast)	ESC requesting to be updated
Flashing White (Fast)	Updating
Illuminating Blue	Updates detected by underlying controller; waiting for the update

Problem Solved: ESC Firmware loss or Update Failure

Problem description:

The ESC arm light is fast flashing in Cyan.



Open App, go to UAV device details, propulsion system, it shows that some motors have no reading. In this example, the M2 and M4 has no reading.

***Analysis: this is due to ESC boot issue. To solve it, re-install ESC firmware is necessary.*

	M1	M2	M3	M4
转速(RPM)	0	0	0	0
电流(A)	0.0	0.0	0.0	0.0
主板温度(°C)	19.0	0.0	20.0	0.0
状态	16	0	16	0

Go to drone firmware list, it shows 1.3.0.117(2) instead of 1.3.0.117(4). The number inside the () means the number of ESC firmware installed for this drone.

***Please be aware of that ESC firmware version number will be different depending on the latest firmware.*

In this example, the ESC firmware shows 1.3.0.117(2), which means only two ESC firmware install successfully, while another two ESC firmware fail to install.

载机固件	固件更新
飞行控制器	1.139.0.23
电调 ← ESC	1.3.0.117(2)
执行服务	1.1.0.27
无线通信	3.2.1.34

Analysis

Some ESC has the boot issue. To solve it, re-install ESC firmware is necessary until successful installation. In this example, M2/M4 ESC has boot issue and need to have firmware updated.

Solution #1: Update ESC firmware through 4G

Connect smartphone to 4G, Open App, update the ESC firmware again.

If it does not work, please make more attempts (5~6 times). If it still does not work, try solution #2.



Solution #2: Offline update ESC firmware

- 1) Remove all ESC signal cables
- 2) Turn on UAV
- 3) Copy ESC firmware to UAV flight control, using type-c cable
- 4) Turn off UAV
- 5) Connect the ESC signal cable whose ESC fail to install firmware.

*In this example, they are M2 and M4.
Usually update firmware one by one.
Let's do M2 first. Connect the M2 ESC signal cable*

- 6) Turn on UAV, wait for ESC firmware update completed
- 7) Check if ESC is online
- 8) Repeat the process for other malfunction ESC.

In this example, it's M4

If it does not work, please make more attempts (5~6 times). If it still does not work, try solution #3.



ESC firmware (XAG_ESC2020_1.3.0.117.fw) download link: please refer to Appendix I

Solution #3: Offline update ESC firmware with special UAV FC main firmware

- 1) Remove all ESC signal cables
- 2) Turn on UAV
- 3) Copy **debug flight control firmware** to UAV flight control, using type-c
- 4) Turn off UAV
- 5) Turn on UAV, wait for flight control firmware update completed
- 6) Copy ESC firmware to UAV flight control, using type-c cable
- 7) Turn off UAV
- 8) Connect the ESC signal cable whose ESC fail to install firmware.



*In this example, they are M2 and M4.
Usually update firmware one by one.
Let's do M2 first. Connect the M2 ESC
signal cable*

- 9) Turn on UAV, wait until ESC firmware update completed
- 10) Check if ESC is online
- 11) Repeat the process for other malfunction ESC.

In this example, it's M4

- 12) At the end, use App to **update the UAV FC latest firmware version, which will replace the debug FC firmware**

If it does not work, please contact XAG technical

ESC firmware (XAG_ESC2020_1.3.0.117.fw) download link: please refer to Appendix I

Debug Flight Control firmware (P100P80P40_Debug_framework2_1.142.0.155) download link: please refer to Appendix I

ESC Verification

Once ESC firmware has been updated successfully. The propulsion system will show the MOS temperature and status for M1/M2/M3/M4. From UAV firmware list, the ESC firmware shows 1.3.0.117(4).



RevoCast

Spiral feeder malfunction

When spiral feeder malfunction, please check the followings:

- i. Check if the hall sensor is broken or worn out



- ii. Check if the magnet is still inserted into spiral feeder



- iii. Check if the magnet is eroded.



- iv. Check if the spiral motor is malfunction

Chapter 15

Service and Maintenance

General UAV Maintenance program

Maintenance Inspection Cycle table

Maintenance Inspection Cycle Title	Period	Standard
Start of Day Inspection	Before each day's flying	Start of Day Inspection
Pre-flight Check	Before each flight	Pre-flight Inspection
Daily Post-Flight Clean	After each day's flying	Daily Post-Flight Clean
10 Hour Check	Every 10 Hours	10 Hour Check
Battery	100 charging cycles or 3 months, whichever is first	<ol style="list-style-type: none"> 1. Check whether the battery has swollen or misshapen. 2. Charge and discharge the battery at least once every 3 months to keep it in good condition.
	500 cycles	Replace
Auto Super Charge Station	20h usage	<ol style="list-style-type: none"> 1. Visual inspection to check whether the charger has experienced any collision, and whether the charging cable connector is malfunctioning. 2. The Super Charger Station Maintenance Guide
	50h usage	
	100h usage	
50 Hour / Monthly Inspection	Every 50 flight hours or every months, whichever is first	50 Hour / Monthly Inspection All Daily Pre-flight items All 10 Hour Items.
12 Month Electrical System Overhaul	12 months usage	Replace all 12-month items due for replacement as per Lified Items table.
Spray Pump	200h usage	Replace
Propellers	100h usage	Replace

Lifed Items Reference

The following table specifies the recommended component life limits for components other than those specified in the Maintenance Inspection Cycle table

Item	Period	Standard
Motors	150h	Replace if worn out or corrosion
Motor base	200h	Replace if crack
ESC	300h	Replace
Propeller blade	100h	Replace if deformation
Propeller clamp	200h	Replace if worn out
Screw bolts on frame arm	100h	Replace if worn out or corrosion
Aircraft cables/connectors	100h	Replace if worn out
Main Frame	400h	Replace if crack
Landing skid	200h	Replace if crack
Spray nozzle	200h	Replace
Spray pump	200h	Replace
Spray disk	100h	Replace
Spray solenoid valve	100h	Replace if corrosion
Hose Connector	200h	Replace
Hose	100h	Replace if worn out
Filter Basket	300h	Replace if worn out
Liquid Level sensor	300h	Replace
Spreader motor	200h	Replace
Feeder motor	200h	Replace
Spreader disk	200h	Replace if worn out
Spiral Feeder	50h	Replace if worn out
Flight control	12 months usage	Replace if malfunction
Cable hub	12 months usage	Replace if malfunction
Radar	12 months usage	Replace if malfunction
Terrain Module	12 months usage	Replace if malfunction
Antenna	6 months usage	Replace if malfunction

Attention: the above items are only for reference, please use it on your own risk.

XAG P100/P40/V40 Major Inspection Schedule

Make/Model:

Serial Number/ FCSN:

Item	Due	This Inspection	Next Due
Date:			
Flights:			
Flight Hours:			

Module	Daily Preflight	10 Hour Check	20 Hours Inspection
Propulsion System			
Motors - visual check			
Motors - wire check			
Motors - internal check			
Motor Mount			
Propellers			
Propeller Adapter			
Aircraft Components			
Aircraft Arm Securing Screws			
Aircraft Frame			
Aircraft Screws			
Aircraft Arms			
Aircraft Main Beams			
Aircraft Landing Brace			
Spraying System			
Hose Connectors			
Sprinkler System			
Hose Connectors			
Tank Filter			
Liquid Level Guage			
Peristaltic Pump			
Peristaltic Tubing			
Electronics			
ESC - physical check			
ESC - wire check			
Aircraft Battery Connector			
Battery Connector			
Radar			
Aircraft Battery Connector Wire			
Flight Computer - physical check			
Liquid Tank Connector			
Wire			
Electrical Connector			
Charging System Connector			
Controller			

Start of Day Inspection

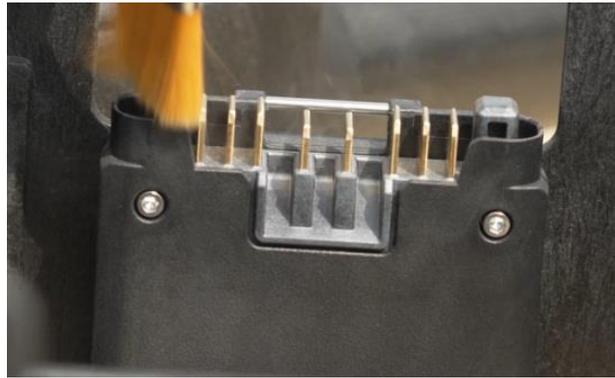
The following inspection must be performed before flight each day:

1. Clean and check propellers.
2. Check propeller adaptor.
3. Inspect Airframe.
4. Inspect battery connector – ensure clean, dry, and free of defects.
5. Sprinkler system atomization and nil leakage.
6. Hose Connector condition and tightness.
7. Hose not broken or worn.
8. Check filter and liquid level gauge.
9. Check Charging system.

An expanded and illustrated daily pre-flight inspection list is provided below.

Illustrated Start of Day Inspection	
Procedure	Photo
<p>1. Clean and check propellers: Clean the propeller, hold the end of the propeller, lift gently and check whether the edges show any cracks. Check if the propeller is loose. Use an M5 screwdriver to tighten the propeller's securing screws. Recommended torque: 20.0 kgf*cm.</p>	
<p>2. Check Propeller adaptor: Rotate the propellers horizontally to the limit position of the propeller adapter and check whether the limit position is misshapen or broken.</p>	
<p>3. Inspect Airframe: Check the aircraft landing brace, arms, main beams to ensure there are no deformities, cracks, or breaks. Replace any unfit or broken parts. Inspect bolts attaching propeller arms to body. If bolts are loose use a sleeve to tighten the hexagon nut (recommended torque 20.0 kgf*cm). If the tightening force is too small, replace the nut.</p>	

4. **Inspect Battery Connector:** Visual inspection to ensure battery connector is clean, dry, and free of defects. Use cotton swab to clean any debris on electrical contact. Ensure the battery connector plug allows small movement. If the plug is stuck, reassemble.



5. **Sprinkler System Test:** Start the spraying system and observe the atomization effect of the sprayer. Check whether there is divergence and whether the sprayer is blocked. If the sprayer is blocked, remove, and clean it to prevent uneven spraying effect and excess pressure from damaging the spraying system. Check whether the nozzle and exhaust valve leak water. If yes, replace the sealing gaskets at these two positions.



6. **Hose Connectors:** Manually check whether the hose connectors are loose, and visually check whether the connectors are damaged. (See figures below). If damaged, replace them immediately, or air will enter the hoses and cause malfunctioning.



7. **Check Hose Manually and visually inspect hose to check whether it is broken or worn.**

8. Check filter and liquid level gauge: Remove the liquid tank lid and take out the mesh filter basket. Ensure that the liquid level float gauge is not stuck and is free moving. Clean any debris on mesh filter basket.



9. Check Charging System Connector: Inspect the charger and water tank plug (if using cooling tank) and ensure the plugs are clean and free of debris. Clean any debris and ensure all electrical plugs are dry before use.



10. Inspect Radar: Visually check whether the main front radar mount is deformed. If there is deformation, it should be replaced immediately. The deformation of the radar mount will affect the radar detection ability. Radar Cable should be on the left, reinstall radar if incorrect.



Daily Clean After Flight Mission Completed

The following Daily Post-Flight Clean must be conducted if the aircraft has been used for the application of agrichemicals.

1. Refill the Tank with soap water or soap powder and water. Engage all nozzles to drain and clean out remaining residues within the spray system.
2. Refill the Tank with clean water and engage all nozzles to drain and clean out remaining soap water within the spray system.
3. Place an empty Tank and engage all nozzles to drain and clean out any remaining residues within the spray system to avoid residues leaking during transportation.
4. Use a water-filled spray washer to clean the aircraft body and wipe it with a soft brush or wet cloth before cleaning water stains with a dry cloth.
5. Wring a wet rag, then wipe and clean the exterior of the aircraft to remove any stains and foreign objects. Wipe and clean the propellers. Wipe and clean the motor housing.
6. Wring a clean wet rag, then wipe and clean the remote controller.
7. Use a clean damp microfiber cloth to clean the terrain module; ground radar and ground vision lens to ensure that the terrain module is clean and free of foreign debris.
8. Use a lens or microfiber cloth to wipe the perspective image camera and check whether it is functional through the XAG One App.



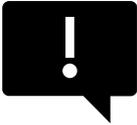
Instructions for Recording Inspections

Use the XAG Major Inspection Schedule of this manual. This inspection schedule includes all items in the XAG Guidelines plus additional items specified in the documentation for authorized Dealers and Service Agents.

1. Record the model and UAV nameplate (FC-SN, UAV-SN) for the aircraft.
2. Record the date, flights, and flight hours that the inspection was due, and the actuals for this inspection.
3. Calculate and record the date, flights, and flight hours that the next inspection is due:
 - a. Date Next Due is earlier of Date Due and Date This Inspection, plus 6 months (for the 6-Month Inspection – the only calendar-based item).
 - b. Flights Next Due is the lesser of Flights Due and Flights This Inspection, plus the inspection period specified in the Maintenance Inspection Cycle table.
 - c. Flight Hours Next Due is the lesser of Flight Hours Due and Flight Hours This Inspection, plus the inspection period specified in the Maintenance Inspection Cycle table.
4. Work through the checklist and take the indicated remedial actions as required. Initial each row once the inspection and any associated maintenance is completed.
5. Once completed the checklist should be signed, dated, and filed. A summary entry must be entered in the UAV Maintenance and Modifications Logbook, noting that the inspection has been completed and any rectification or maintenance conducted as a result of the inspection.

10 Hour Check

The 20 Hour Check consists of an inspection of high use parts and critical systems as detailed below.



Make sure wear clean ESD safety gloves before check.



Critical Check for P100

Procedure	Photo
1. [Important] Use alcohol for deep cleaning. Remove all the impurities, sweat, dust from the metal plates.	

2. Inspect if the rubber connectors are worn out (crackles, flaw, damaged, etc).



3. Inspect if the cables are intertwined or worn out (crackles, flaw, damaged, etc).



4. Inspect the cable connection of motors and ESCs from loosening.
Torque: 25-26kgf.cm



Please fasten the the screws and relevant parts after every 5 services. Replace them if they are worn out.



5. **Inspect the ESC screws from loosening**



6. **Wire inspection:**
Remove the cover and check whether any wires are worn-out, broken or loosen. Replace if necessary.



7. **Inspect screws from loosening**



8. **Inspect the rubber ring inside propeller clip. Replace rubber ring if it's worn out.**

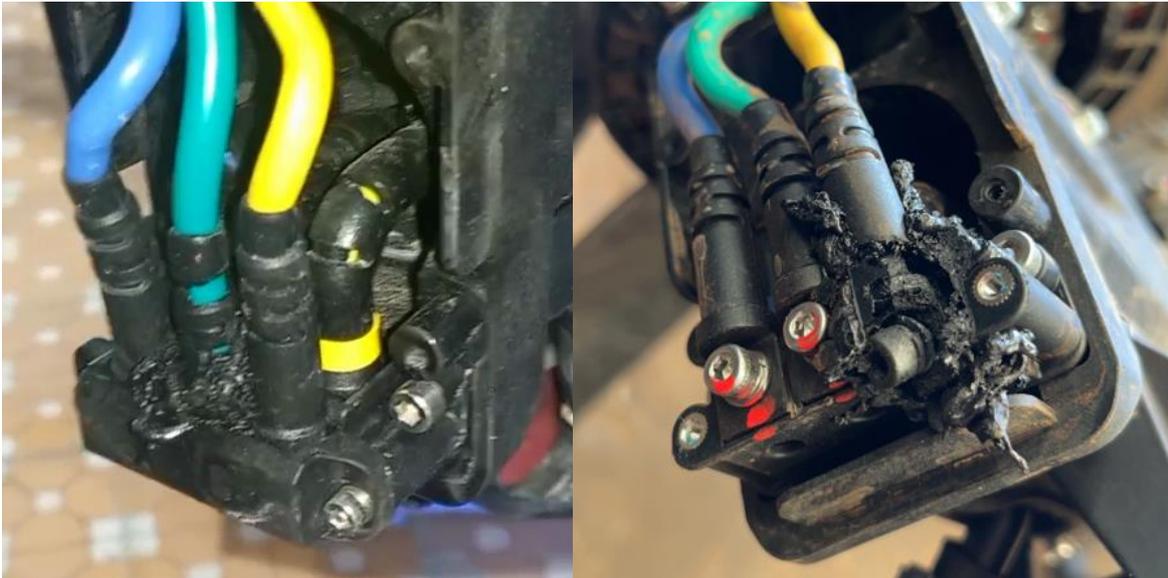




It's important to perform service maintenance once a period.

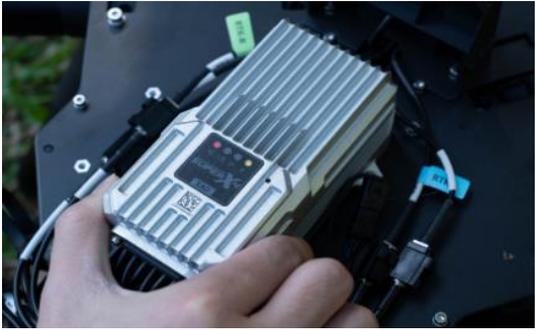
The below pictures show that wire burned due to screw loosen.

This is because during flight, UAV will be suffered from serious vibration, which inevitably result in loosen screws. From the below picture, it is the consequences of loosen motor connectors, where connectors burned, motor stopped, then UAV crashed.



Thus, it is important to have the practice of clean and fasten, or even replace the screws and relevant parts.

Routine Check

<p style="text-align: center;">Procedure</p>	<p style="text-align: center;">Photo</p>
<p>1. Strainer / Filter: Inspect and clean Replace if damaged.</p>	
<p>2. Remote Controller: a) Clean Remote Controller and check whether it is corroded. b) Check whether Remote Controller can be powered on and function normally.</p>	
<p>3. Tail Plug Power Cord Inspection: Remove the drone battery plug housing, and visually check whether the power supply cables of the plug are damaged, whether the power cable connectors are fused or broken, and replace any abnormal tail plug in the power system.</p>	
<p>4. Firmware Updates: After powering on the drone, check the firmware version of each device and module through the XAG One app and upgrade to the latest version if possible.</p>	
<p>5. Flight Control Checks: Check whether the flight computer mounting bracket is firmly fixed. Ensure there are no error codes broadcasted through any of the status lights.</p>	

6. **Releasable hood and lock Inspection:**
Inspect the releasable hood and lock from loosening, deforming, eroding



7. **Inspect cable connector from loosening, eroding, deforming**



8. **Inspect the UAV from physical damage, deformation, cracks**



9. **Inspect the joint of motors and base from loosening**



10. **Inspect the joint tightness between propellers and clips**



11. **Inspect the screws (motor/clip) from missing or loosening**



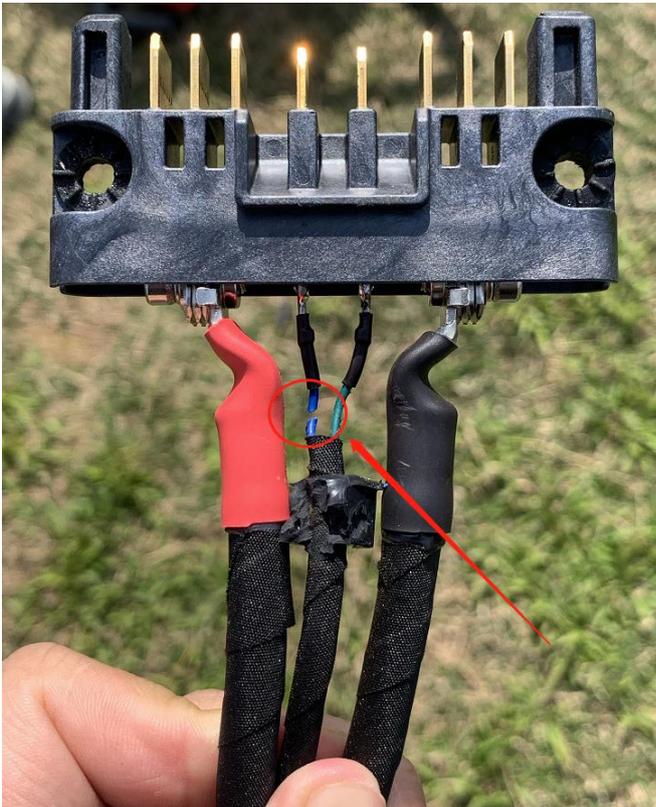
12. **Inspect its bearings from loosening or abnormal sound. Rotate the motor to check the motor bearings**



13. Inspect the ESC from containing chemicals or other impurities



Battery charge plug should be inspected regularly, make sure that the cable is in good condition. The below picture shows the cut off signal cable of battery plug.



20 Hour / 6 Month Inspection

The 100 Hour / 6 Month Inspection consists of an inspection of critical parts and systems as detailed below.

Procedure	Photo
<p>1. Detailed Airframe Inspection: Check the aircraft structure, arms, main beams, and carbon frames to ensure there are no deformities, cracks, or breaks. Replace any unfit or broken parts.</p>	 A top-down photograph of a black and red drone airframe lying on a light-colored tiled floor. The drone has four arms extending outwards, each with a motor and propeller. The central fuselage is red and black. The arms are black with some yellow accents.
<p>2. Screw inspection: Use a screwdriver and Allen key to check whether any fixing screws of the fuselage are loose, slippery, rusted or broken, and replace any damaged screws.</p>	 A close-up photograph showing a person's hands using a screwdriver to inspect a screw on the black fuselage of a drone. The screw is being turned, and the person is looking closely at it. The background is blurred.
<p>3. ESC Wire Inspection: Check if the three-phase wires and terminals of the ESC are worn or broken. It is necessary to wrap the three-phase wires of the ESC with Acetate Cloth Electrical to ensure that the wire shielding is not exposed. Replace any ESC with damaged wires.</p>	 A close-up photograph showing a person's hands holding three black three-phase wires connected to an ESC. The wires are being inspected for wear or damage. The background is a grassy area.
<p>4. Motor Inspection: Remove the propeller and motor cover. Use a soft brush to clean any debris, foreign matter, or dust on the caged wire of the motor. Visually check whether the caged wire of the motor is discolored. Replace motors if necessary.</p>	 A close-up photograph of a motor's stator. A yellow brush is being used to clean the copper windings. The motor is black and red. The background is a blurred green area.

<p>5. Motor Wire Inspection: Check whether the three-phase wires and terminals of the motor are worn or broken. It is necessary to wrap the three-phase wires of the motor with Acetate Cloth Electrical tape to ensure that the wire shielding is not exposed. Replace any motors with damaged wires or terminals.</p>	
<p>6. Motor mount inspection: Disassemble the motor and check whether there are obvious abnormalities such as cracks on the motor mount.</p>	
<p>7. Peristaltic Pump Tubing Inspection: Remove the peristaltic pump. Check whether the peristaltic pump tube is blocked. Clean any debris or foreign matter in the peristaltic pump tube. Observe whether the peristaltic pump tube is showing age or damage and replace any aged or damaged peristaltic pump tube and conduct a spray calibration in the XAG One app.</p> <p>The peristaltic pump tube with no abnormality should be properly lubricated with the synchronizing plate. If the lubrication is poor, plain Vaseline or petroleum jelly should be applied.</p>	
<p>8. Electrical Connector Inspection: Check and ensure all electrical connectors are not loosen or disconnected with any fasteners in place. Tighten any loose connectors and replace any connectors which are damaged.</p>	

Torque Tension Reference

P100 TORQUE-TENSION REFERENCE GUIDE			
Main part	Sub parts	Torque tension reference	requirements
Front	Front and Main Fuselage	29-31kgf.cm	-
	Dynamic Radar	21-22kgf.cm	-
Arm	Propeller	48-52kgf.cm	-
	ESC	12-14kgf.cm	-
	Arm and Main Fuselage	29-31kgf.cm	-
	Motor Bracket and Motor	Preload: 35-41kgf.c	Install in Diagonal sequence
		Tightening: 49kgf.cm	Red mark
	Arm and Motor Bracket	Preload: 35-35kgf.c	The threaded end of the sleeve faces outward
		Tightening: 49kgf.cm	Red mark
	Motor and ESC connector	25-26kgf.cm	Follow cable colors
			Wipe the metal contact with alcohol

Main Fuselage	Central Power Busbar	12-14kgf.cm	Installation direction
			No cable entangled; Arm 3 and Arm 4 cable should avoid interference
			Check whether the plastic is cracked
	ESC input cable	25-26kgf.cm	-

	Application System Mount	12-14kgf.cm	No cable entangled; Positive cable inward; Negative cable outward
Tail Frame	Tail Frame and Main Fuselage	29-31kgf.cm	-
	Tail Socket Cable	25-26kgf.cm	-
Real Terra/ RevoSpray	Liquid Container and Landing Skid	13-14kgf.cm	-
	Application System Upper Frame and Liquid Container	21-22kgf.cm	-

V40/V50 TORQUE-TENSION REFERENCE GUIDE			
Main part	Mounting parts	Torque control point	Installation requirements
Main Fuselage Frame	Dynamic Radar	11-12kgf.cm	-
	Cable Hub	11-12kgf.cm	-
	Clamp	11-12kgf.cm	-
	Sensor Bracket	11-12kgf.cm	-
	Quick release semi-finished products	20-21kgf.cm	-

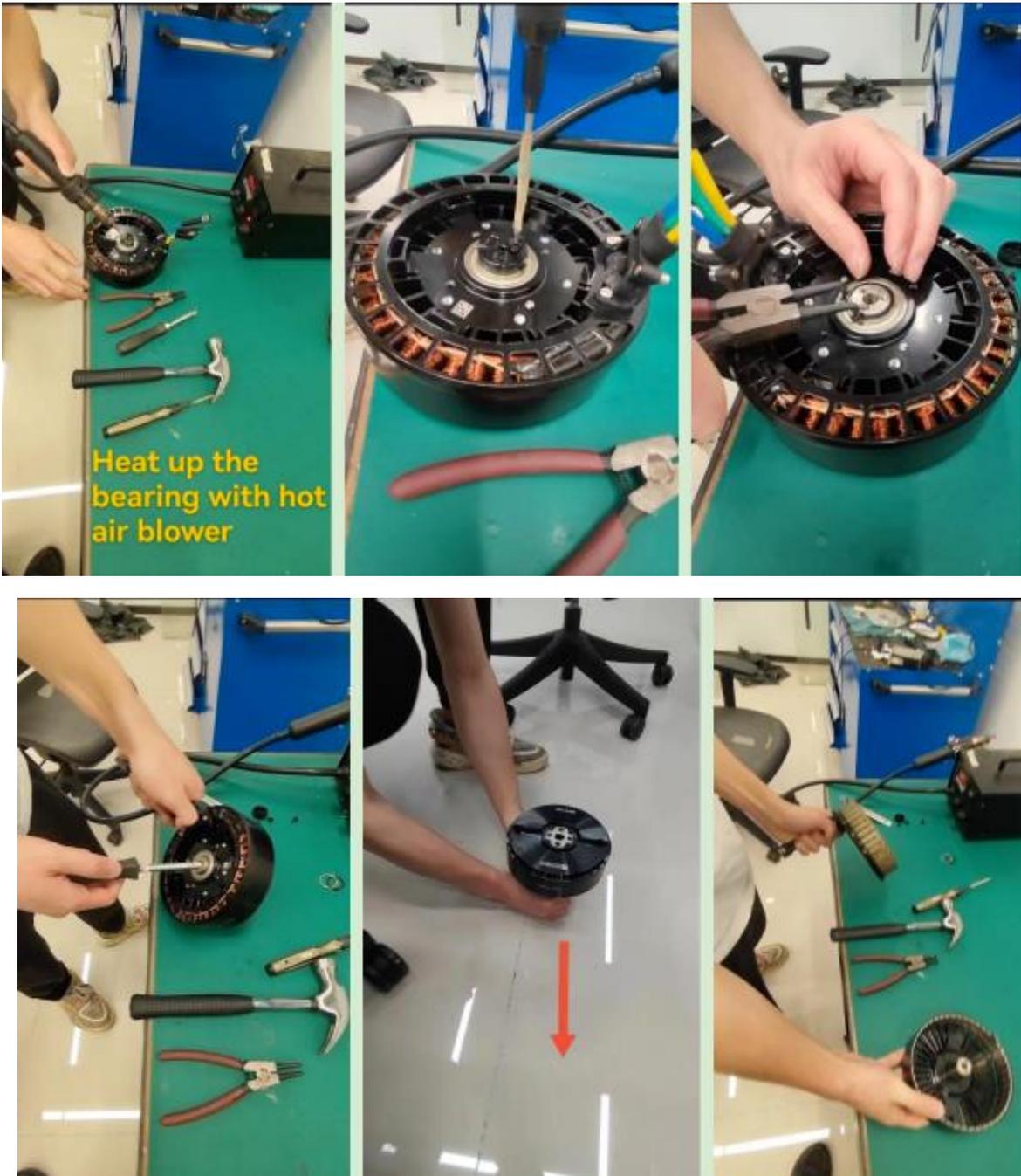
		Preload: 11-12kgf.cm	Use alcohol to wipe the metal contact and the tail plug
	Tail Frame and Socket	Tightening: 30kgf.cm	
Arm	Arm and Main Fuselage	80-90kgf.cm	The bolts are locked and fixed by the flange locknuts, and the main arm steel shaft gasket should be placed under the nuts
	Propeller	48-52kgf.cm	-
	Motor Bracket and Servo	Preload: 25-27kgf.cm	-
		Tightening: 60kgf.cm	
	Motor Bracket and Motor	Preload: 25-27kgf.cm	-
		Tightening: 60kgf.cm	
Motor and ESC connector	24-26kgf.cm	Color matching	
		Wipe the fixed terminal surface with alcohol	

	The connect of Servo and Arm	Preload: 25-27kgf.cm	-
		Tightening: 60kgf.cm	-
	Servo Arm Connecting Rod (Rocker Arm)	Preload: 25-27kgf.cm	-
		Tightening: 60kgf.cm	-
	Servo Arm Connecting Rod (Connecting Rod)	Preload: 25-27kgf.cm	-
Real Terra/ RevoSpray	Liquid Container and Landing Skid	13-14kgf.cm	-
	Application System Upper Frame and 药箱	21-22kgf.cm	-

Propulsion System

As the dust or chemicals can erode the physical parts of UAV, it will shorten the lifespan. Thus, please wash and clean the UAV every time when the operation is finished.

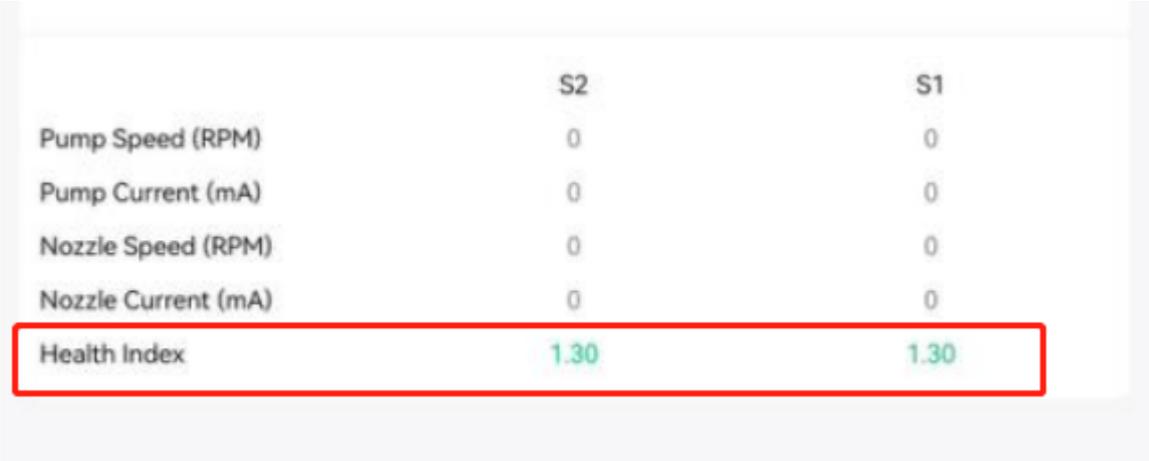
In case that there is foreign object or something that makes the motor stuck that cannot be removed from outside, here is the method to separate the motor:



RevoSpray System

As the chemicals can erode the physical parts of UAV, it will shorten the lifespan. Thus, please wash and clean the UAV every time when the operation is finished.

Before spray operation, it's suggested to calibrate spray system using clean water. Make sure that the health index is OK and shown in green. If not, please inspect the peristaltic pump and rubber tube. Replace them if necessary.



	S2	S1
Pump Speed (RPM)	0	0
Pump Current (mA)	0	0
Nozzle Speed (RPM)	0	0
Nozzle Current (mA)	0	0
Health Index	1.30	1.30

Inspect peristaltic pump

Disassembly peristaltic pump



Inspect the lubrication between peristaltic pump internal rubber tube and plate synchronizer

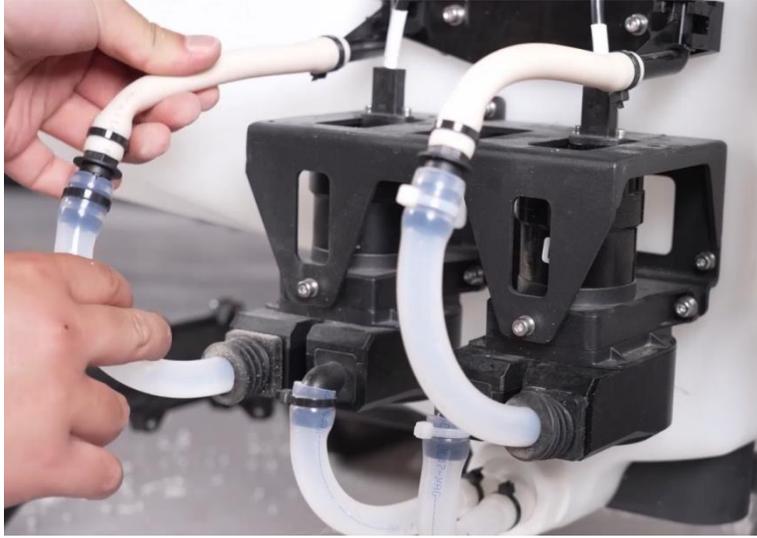


Apply lubrication If necessary



Inspect the rubber tube circuit

Inspect the external rubber tubes circuit



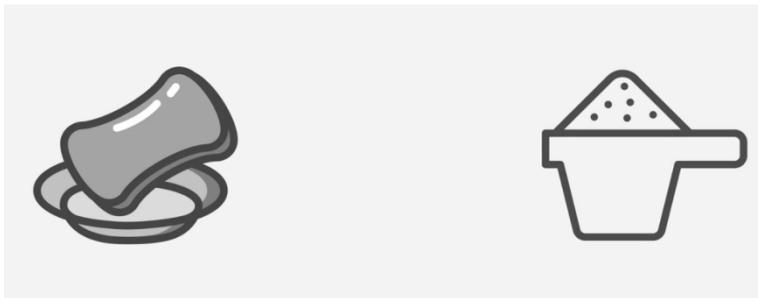
Remove the filter underneath the liquid tank



Clean the filter from dust and impurity



Use soap and washing powder to clean the liquid tank internal



Pour soap water into liquid tank and use manual spray mode to clean spray system.
This can remove the chemical residue inside liquid tank.



Pour into clean water



Emit the water from liquid tank to clean spray system again.
This can clean and eliminate the soap residue inside liquid tank.
Make sure the liquid tank is empty after cleaning



RevoCast System

It's important to deeply clean the RevoCast system after the operation, from entangling, Fertilizer agglomerating, losing accuracy, etc. These will significantly affect the operation of RevoCast system.

The below pictures shows that Revocast parts worn out due to the lack of cleaning.



Clean Spiral Feeder

Soak spiral feeder into the clean water for 4~12 hours.



Use clean water to rinse spiral feeder. It's recommended to use high pressure water gun.



Clean the spiral feeder from impurities with cloth
Impurities will jam the spiral feeder, resulting the inaccuracy of spreading.



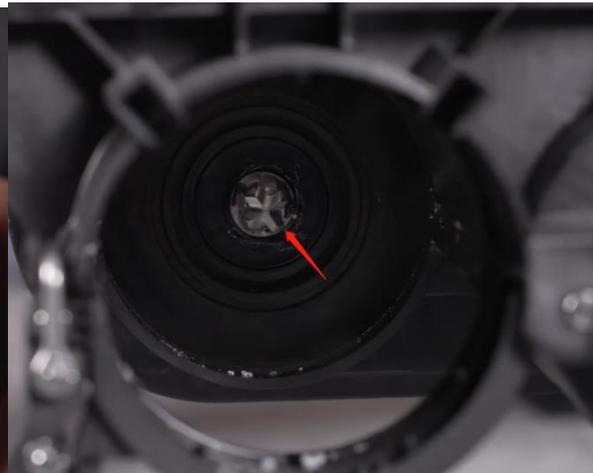
Visual inspect Spiral Feeder

Perform regularly visual inspection of the spiral feeder worn-out condition.

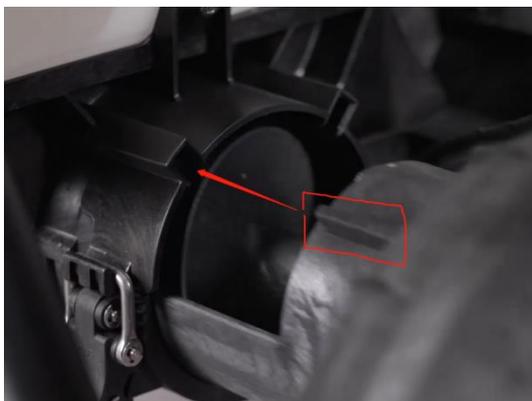
If the worn-out thickness is more than 2 mm, please replace the spiral feeder immediately.



Make sure cross groove joint is clean



When placing the spiral feeder back to the slot, please make sure it follows the groove guide.



To lock the feeder easily, you are allowed to manually adjust the spirial feeder angle inside the container.



Reconnect the cable connectors



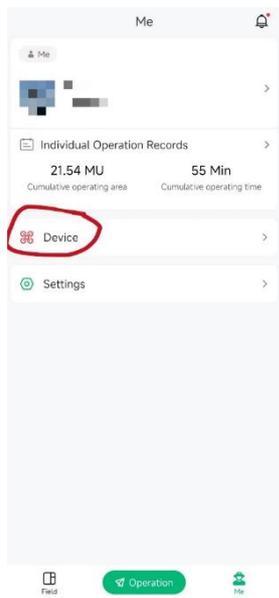
V40 Duo Propeller Drone

V40 Servo Calibration

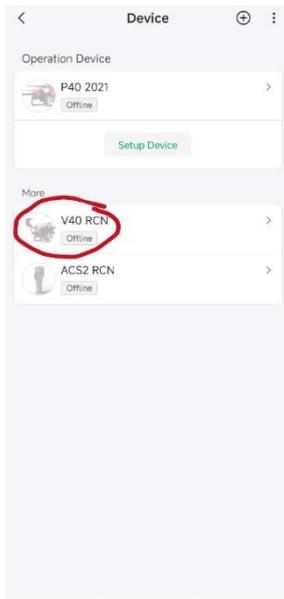
1. Open the XAG ONE app, click on me.



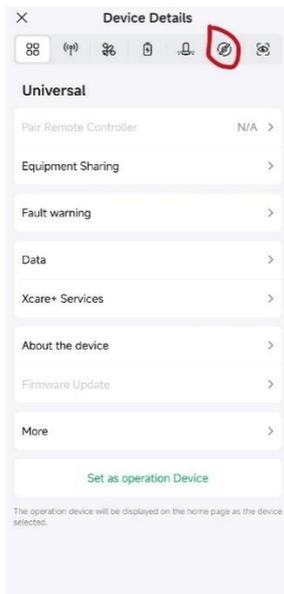
2. Click on device.



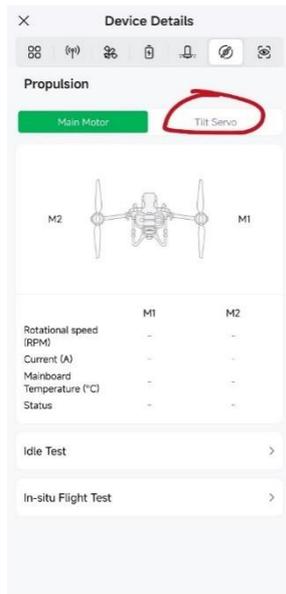
3. Click on your droneV40.



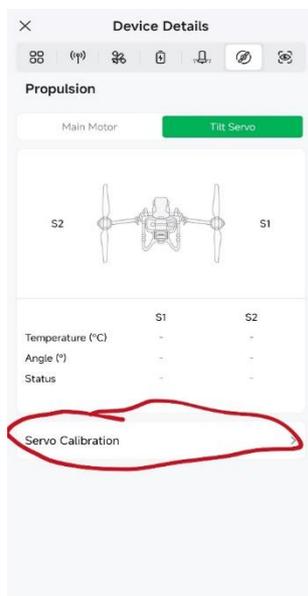
4. From Device Details, click on Propulsion.



5. Click on Tilt Servo



6. Click on Servo Calibration



7. Expand the V40 arms according to the APP prompts.
Make sure the propeller is facing parallel to the V40, Click on NEXT.



Instruction

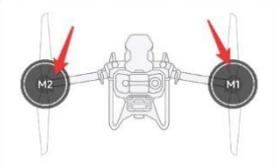


- 1 Place the drone on level ground
- 2 Unfold the Arms, and ensure the Arms are fastened and secured.
- 3 Unfold the Propeller until the spring plunger has properly snapped in place, then rotate and keep the propeller parallel to the fuselage.

NEXT

8. Choose M1 or M2, place the smartphone on the top surface of the motor. Be aware of that the phone camera should not tilt up your smartphone. Then start auto calibration.

Select Servo for Calibration



M2 Servo Calibration

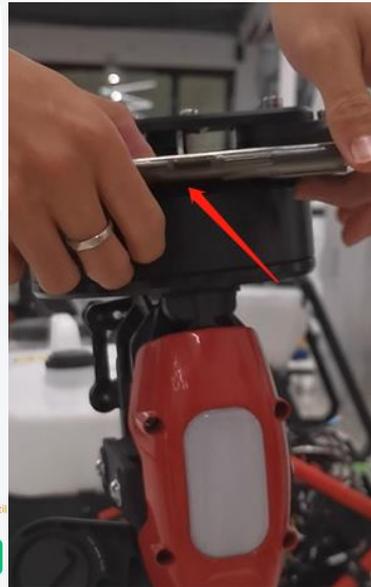


- 1 Place your phone horizontally on the servo (right side of blades is recommended) in the same direction of the drone
- 2 Tap "Start Auto Calibration"

Please hold the phone during calibration so it will not fall until the calibration is completed

CALIBRATION COMPLETED

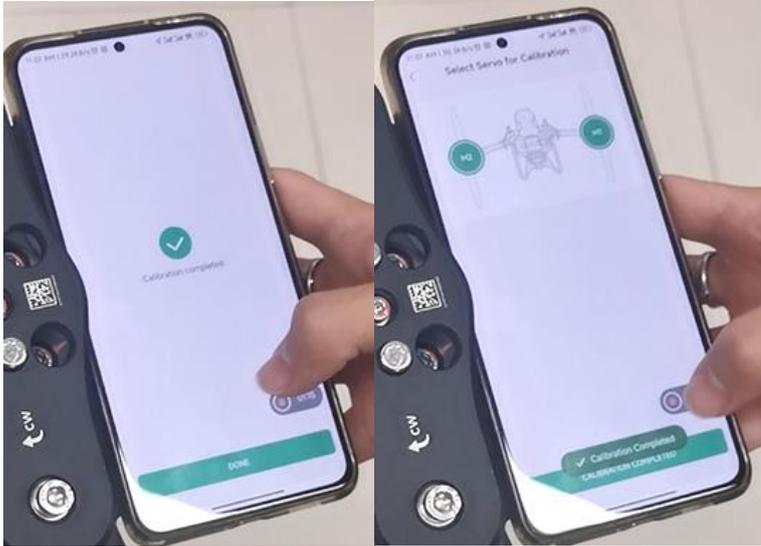
START AUTO CALIBRATION



9. Finish Calibration. You can watch the below video to complete the calibration.

Video link:

<https://drive.google.com/file/d/1EMlfm4XbIN7gucxXCrBTNVVdiLyiSQON/view?usp=sharing>



Chapter 16

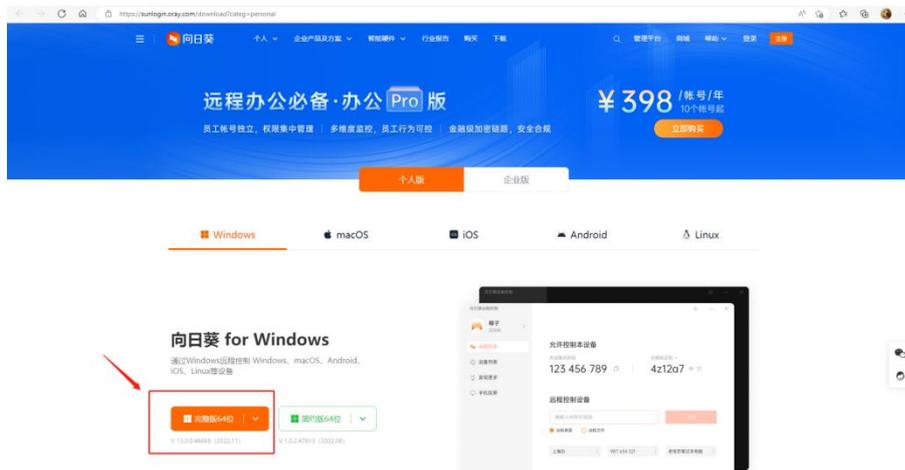
Remote Debugging

Setup Sunlogin Remote Control Software

Download Sunlogin

It's required to use Sunlogin because this software is nice to use and most importantly, **it's for free!**

Download Sunlogin from <https://sunlogin.oray.com/download?categ=personal>

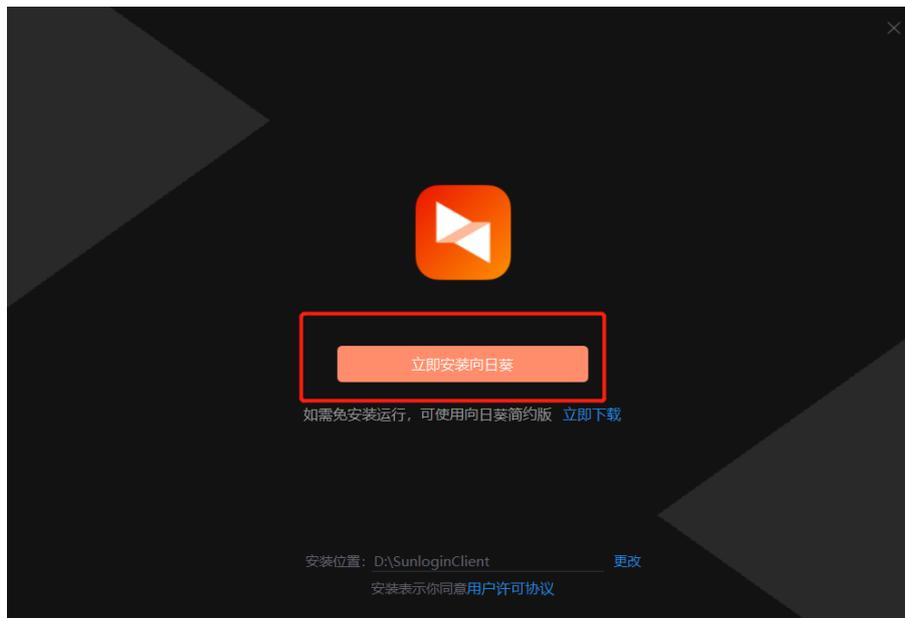


Choose windows 64, and press download.

Once downloaded, please install

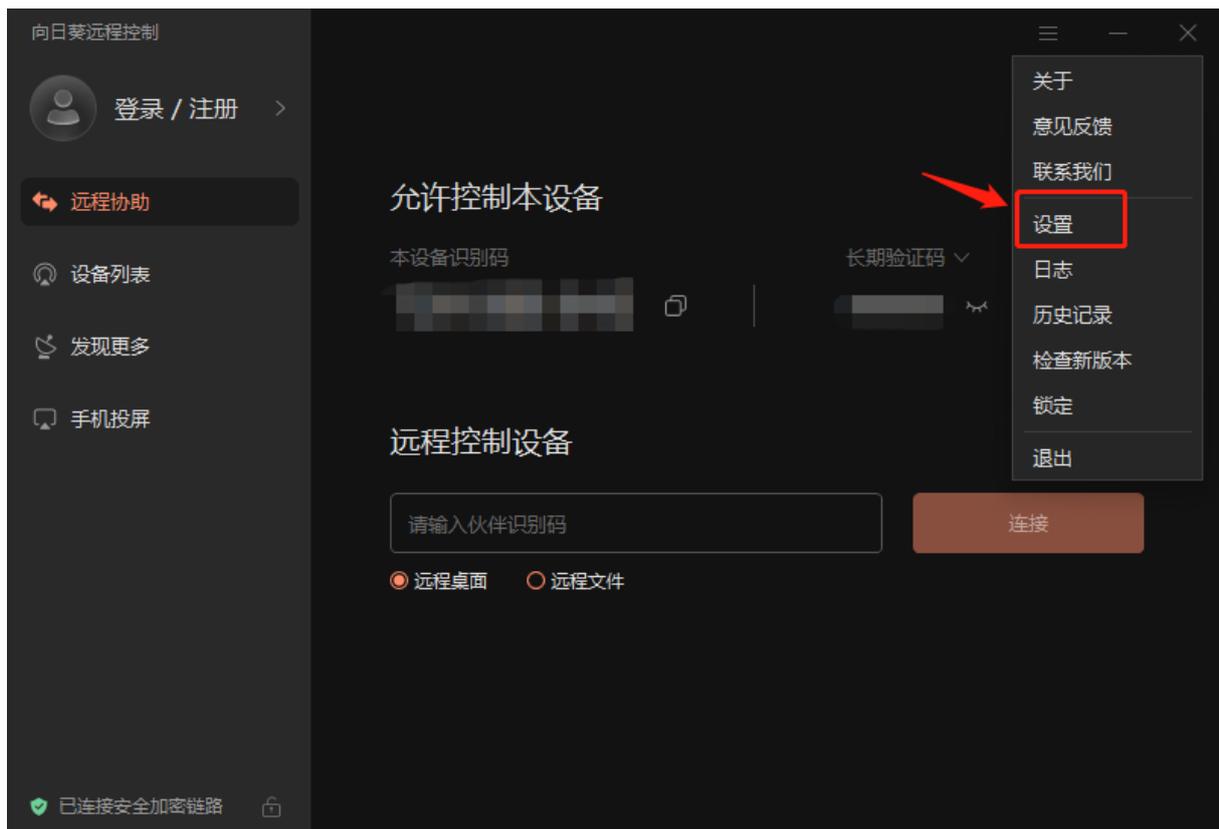


Install Sunlogin

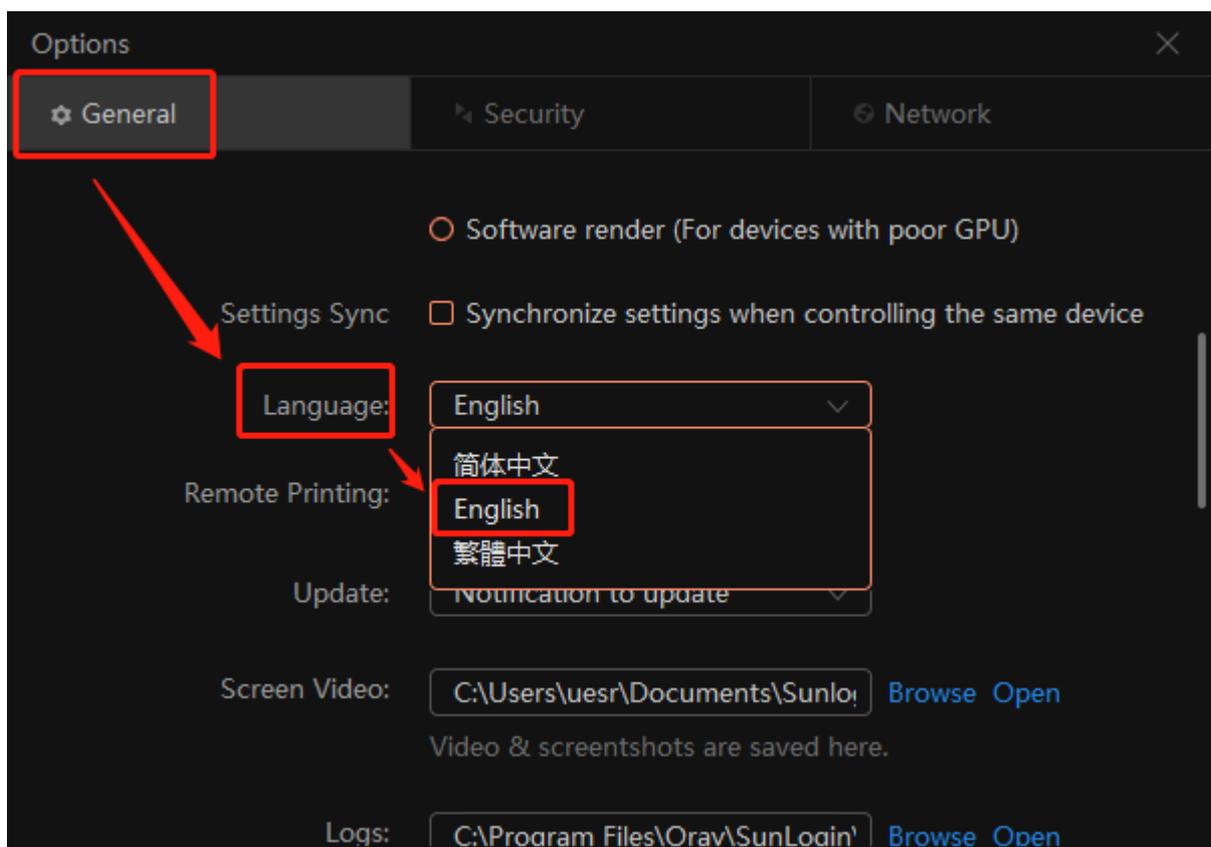
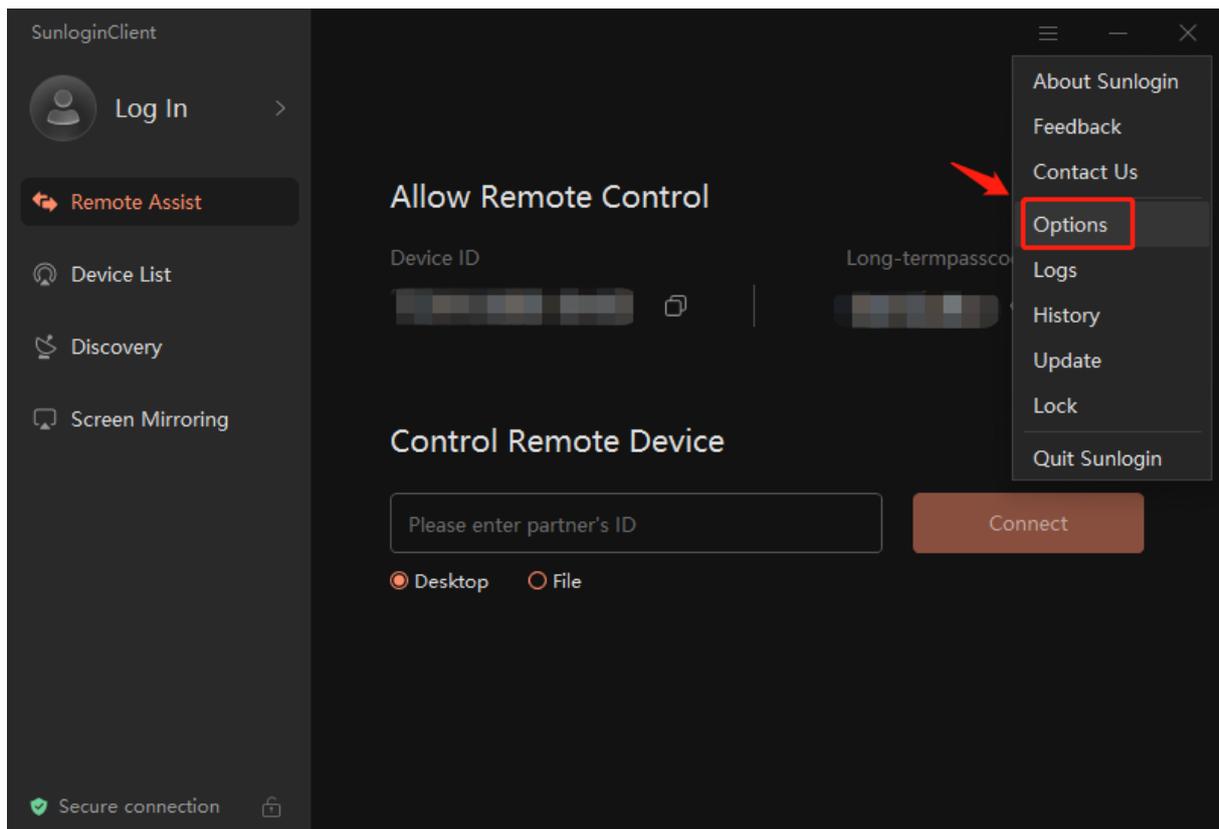


Change language to English

Sunlogin allows users to change language to English.

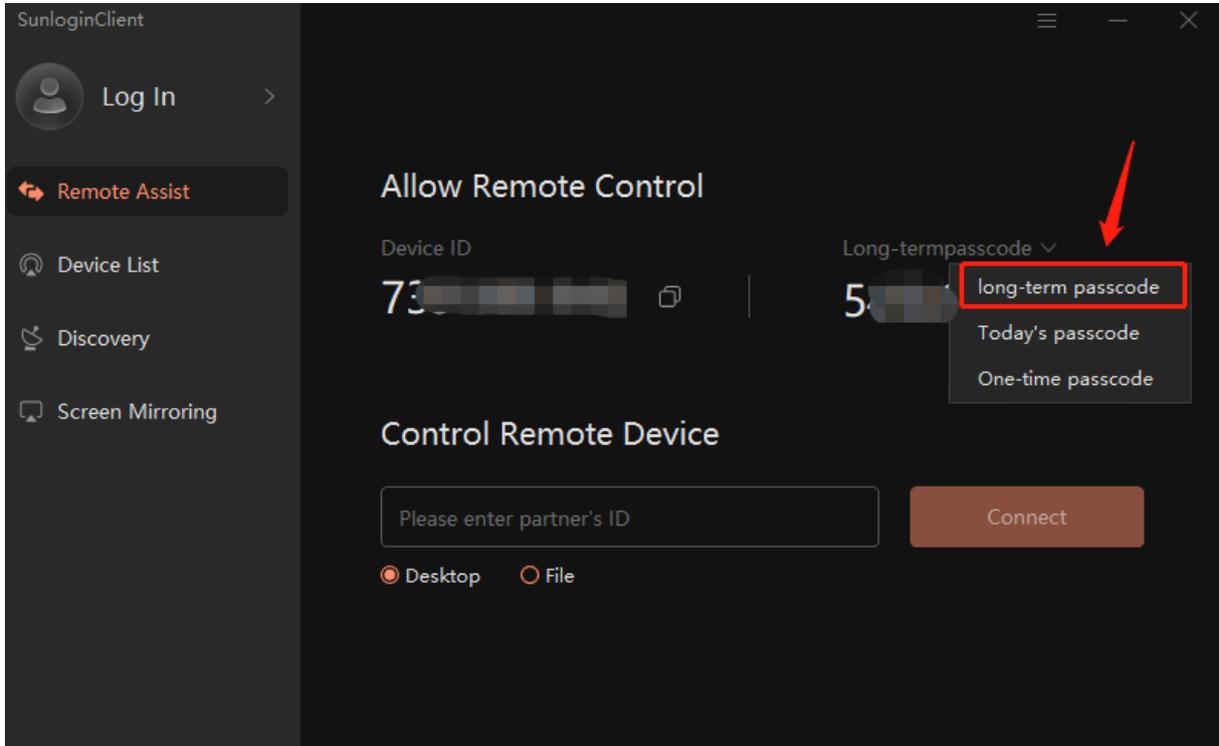


If you want to change it back to Chinese, you can do the following



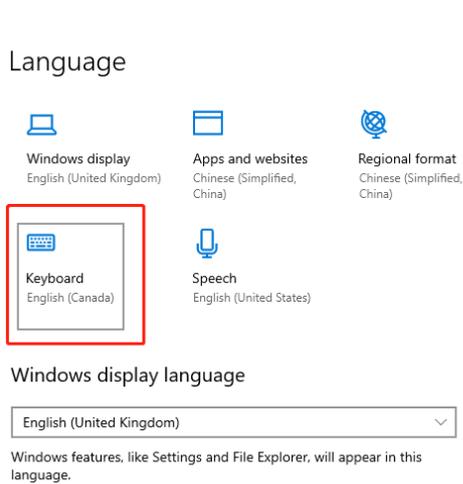
Choose long-term password

Once long-term password is chosen, the password will not be change. This is convenient to XAG remote debugging.

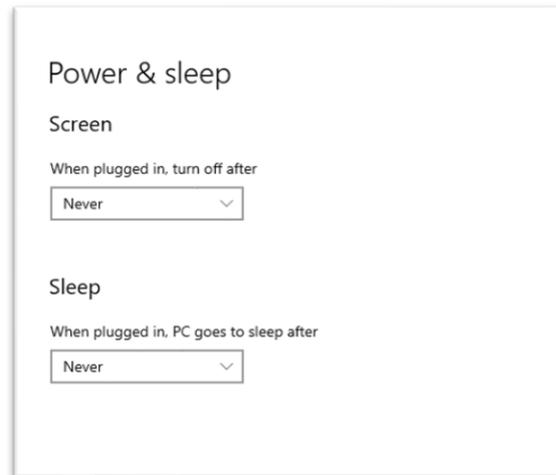


Change windows setting if applicable

Use English keyboard



Disable sleep mode; Under windows setting, change the Power & Sleep to "Never"



LNT remote debugging

Method 1: Internet – LNT – Laptop

Environment Setup Schematic:



Preparation:

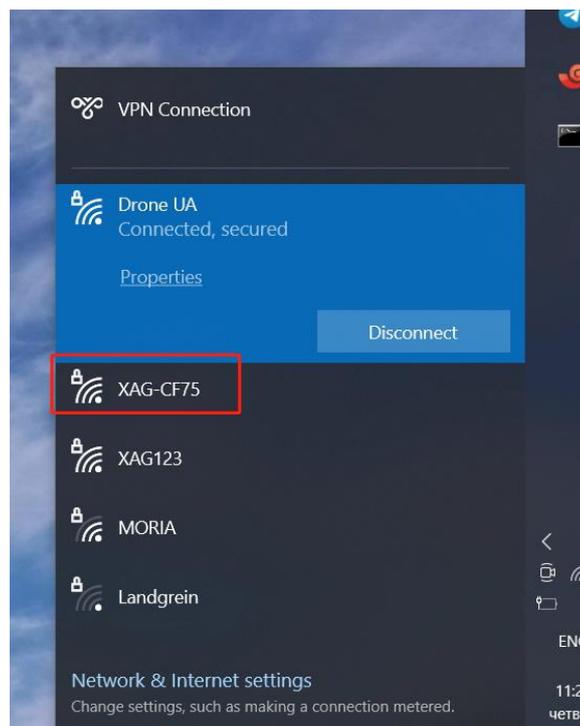
No.	Items	photo
1	Remote control software (sunlogin) Before remote debugging, please install remote control software in your desktop computer or laptop.	
2	LNT	
3	Laptop or desktop computer Windows 10/11	
4	WIFI access	

Procedure:

1. Connect LNT to WIFI router. You can set the LNT Wireless connection under <http://www.iotlogin.com>. Once LNT has internet access, the 3rd light indicator will illuminate in green. If not, please double check your internet connection or restart the LNT.



2. Connect laptop to the LNT's hotspot



3. Install remote control software on laptop. Open it, provide XAG technician's the screenshot of the TeamViewer/Sunlogin ID

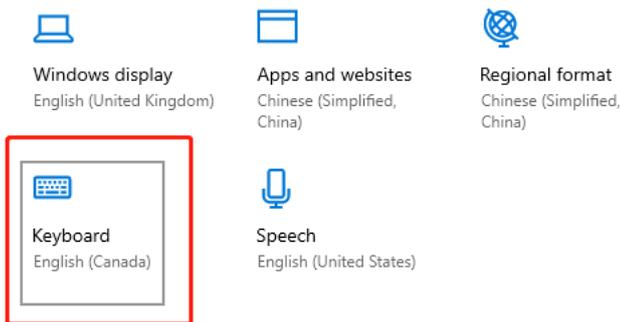


Sunlogin Download Link (Recommended): <https://sunlogin.oray.com/en/embed/software.html>



4. Make sure using English keyboard

Language

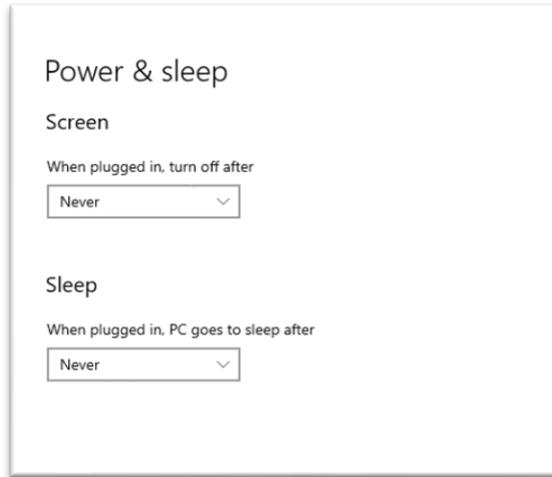


Windows display language



Windows features, like Settings and File Explorer, will appear in this language.

5. Under windows setting, change the Power & Sleep to "Never"

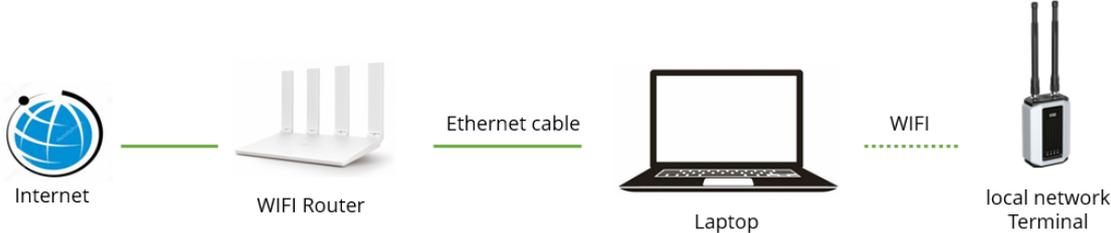


6. Contact XAG technician that the remote control is ready.

Attention: If method 1 is slow to respond, please use method 2.

Method 2: Internet – Cable – Laptop – WIFI – LNT

Environment Setup Schematic:



If method 1 has poor network connectivity, you can try this method.

Preparation:

No.	Items	photo
1	Remote control software (sunlogin) Before remote debugging, please install remote control software in your desktop computer or laptop.	
2	Ethernet cable	
3	LNT	
4	Laptop or desktop computer	

**Procedure:**

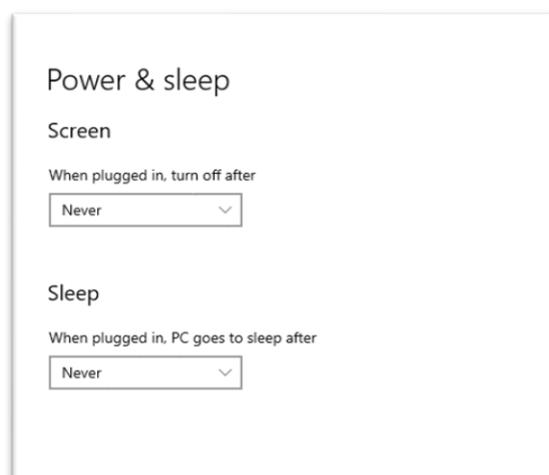
1. Connect your laptop to Internet through ethernet cable. To test the internet connection, please browser any websites.
2. Connect your laptop to LNT.
3. Install remote control software on laptop. Open it, provide XAG technician's the screenshot of the Sunlogin ID



Sunlogin Download Link (Recommended): <https://sunlogin.oray.com/en/embed/software.html>



4. Under windows setting, change the Power & Sleep to "Never"



5. Contact XAG technician that the remote control is ready

Method 3: Internet – WIFI – Laptop – Cable – LNT

Environment Setup Schematic:



If method 1 has poor network connectivity, you can try this method.

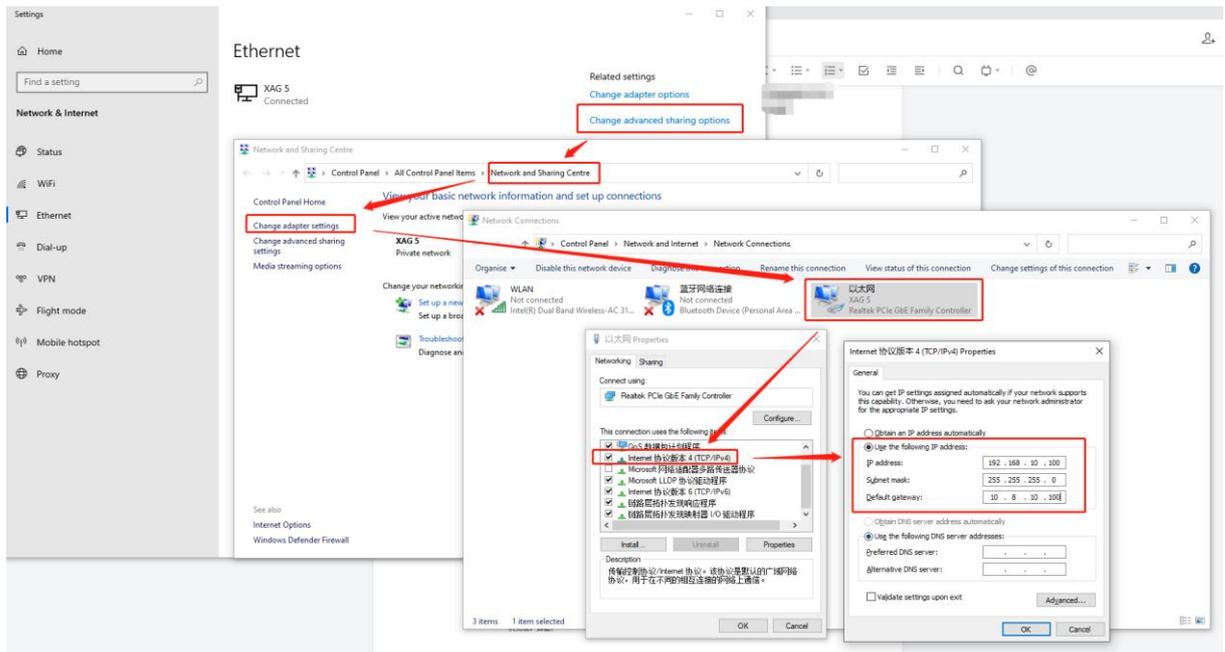
Preparation:

No.	Items	photo
1	Remote control software (sunlogin)	
<p>Before remote debugging, please install remote control software in your desktop computer or laptop.</p>		
2	Ethernet cable	
3	LNT	
4	Laptop or desktop computer Windows 10/11	



Procedure:

1. Connect laptop and LNT via ethernet cable. Under TCP/IPv4 ethernet cable setting, change IP address to 192.168.10.100; mask 255.255.255.0; Default gateway 10.8.10.100;



To test the connection, open CMD, ping 192.168.10.65.

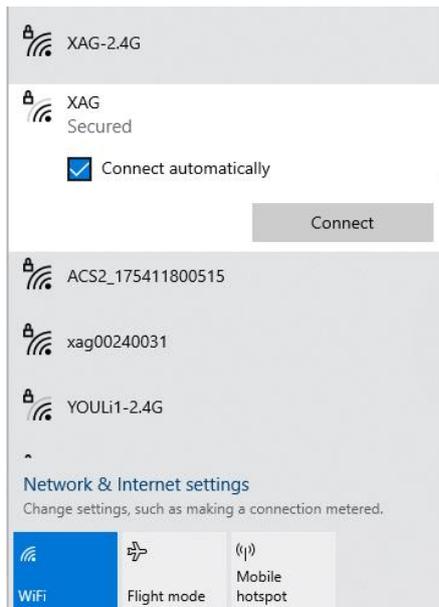
```

C:\> Command Prompt
Microsoft Windows [Version 10.0.19041.264]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\> esr>ping 192.168.10.65
  
```

If ping is OK, you can move forward to the next step. Otherwise, please check your physical cable connection and IP setting. Make sure your LNT is powered on during this process.

2. Connect your laptop to WIFI router. To test the internet connection, please browser any websites.



3. Install remote control software on laptop. Open it, provide XAG technician's the screenshot of the Sunlogin ID

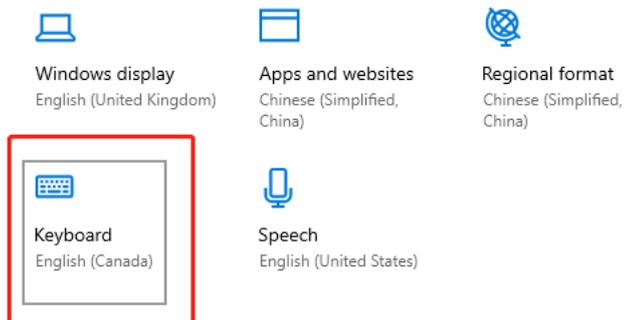


Sunlogin Download Link (Recommended): <https://sunlogin.oray.com/en/embed/software.html>



4. Make sure using English keyboard

Language

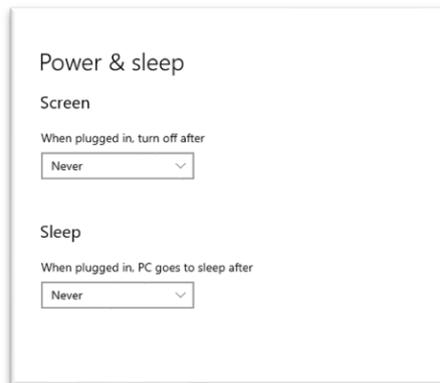


Windows display language



Windows features, like Settings and File Explorer, will appear in this language.

5. Under windows setting, change the Power & Sleep to “Never”



6. Contact XAG technician that the remote control is ready

Method 4: Internet – LNT (remote VPN Debug)

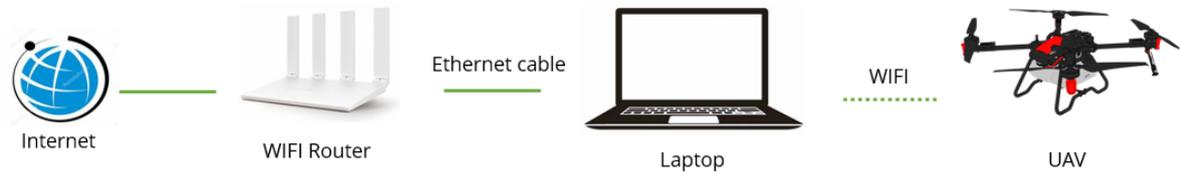
For XAG remote debugging, please connect LNT to internet, and leave it online. XAG technician will remote into your LNT using directly. Make sure your LNT has internet access.



UAV Remote Debugging

Method 1: Internet – Laptop – UAV (WIFI)

Environment Setup Schematic:



Preparation:

No.	Items	photo
1	Remote control software (sunlogin)	
2	UAV, Model 2021/2022	
3	Laptop or desktop computer (Windows 10/11)	
4	WIFI access	
5	Ethernet cable	

Before remote debugging, please install remote control software in your desktop computer or laptop. There are two methods to setup UAV remote debugging environment.

Procedure:

1. Turn UAV
2. Enable the UAV's WIFI.

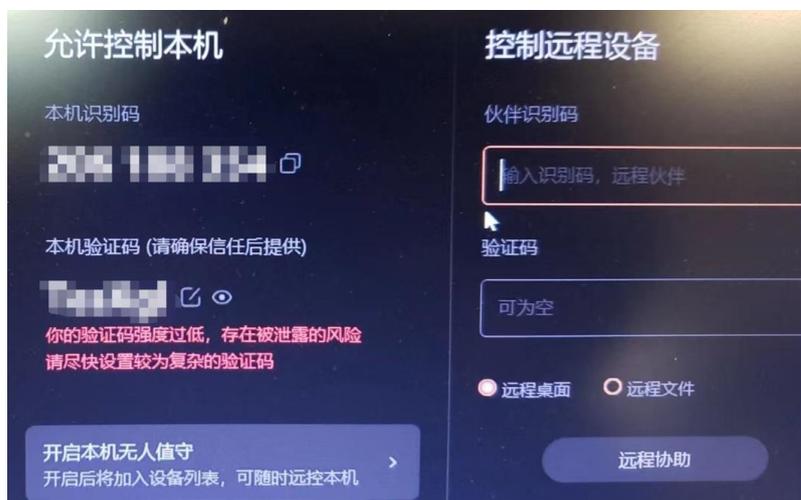
Press the reset button for 1~3 seconds, release for 1~2 seconds, then press the reset button for 1~3 seconds again. if not, please do a cold restart. shut down the UAV and wait for 5 mins, then turn it on.



3. Connect laptop to the LNT's hotspot
4. Connect laptop to WIFI router (internet) via ethernet cable
5. Install remote control software on laptop. Open it, provide XAG technician's the screenshot of the TeamViewer/Sunlogin ID

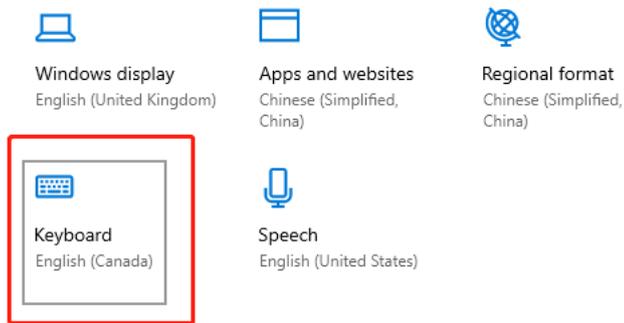


Sunlogin Download Link (Recommended): <https://sunlogin.oray.com/en/embed/software.html>



6. Make sure using English keyboard

Language

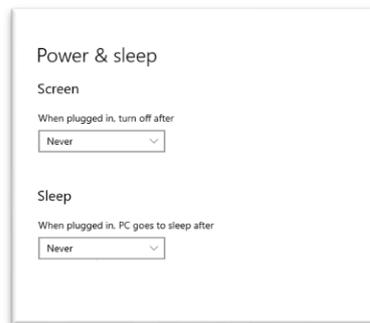


Windows display language



Windows features, like Settings and File Explorer, will appear in this language.

7. Under windows setting, change the Power & Sleep to “Never”



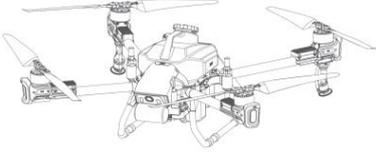
8. Contact XAG technician that the remote control is ready

Method 2: Internet - Laptop – UAV (Cable)

Environment Setup Schematic:



Preparation:

No.	Items	photo
1	Remote control software (sunlogin)	
2	01-027-01519 SuperX4 Diagnostic Cable (LAN Port) Used for P40/V40	
	01-027-02113 SuperX4 Pro Diagnostic Cable (LAN Port) Used for P100	
3	UAV, Model 2021/2022	
4	Laptop or desktop computer (Windows 10/11)	

5 WIFI access



6 Ethernet cable



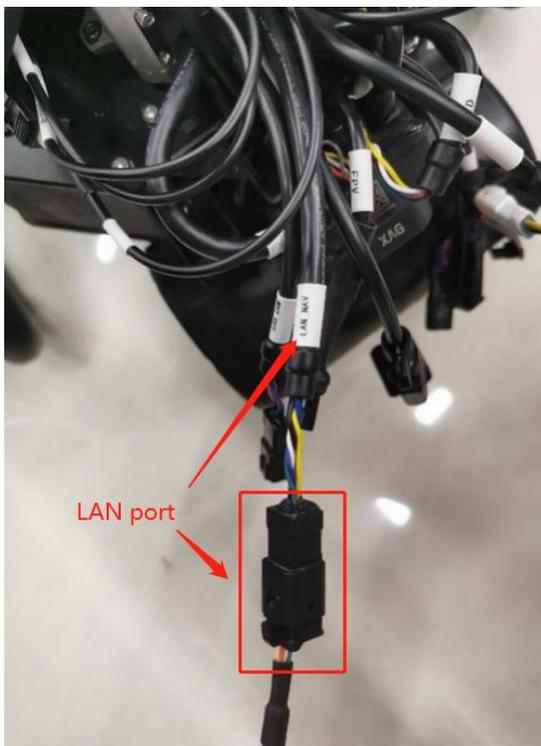
Before remote debugging, please install remote control software in your desktop computer or laptop. There are two methods to setup UAV remote debugging environment.

Procedure:

1. Connect UAV to laptop
 - a. P40/V40: via SuperX4 Diagnostic Cable (LAN Port, 01-027-01519)
 - b. P100: via SuperX4 Diagnostic Cable (LAN Port, 01-027-02113)

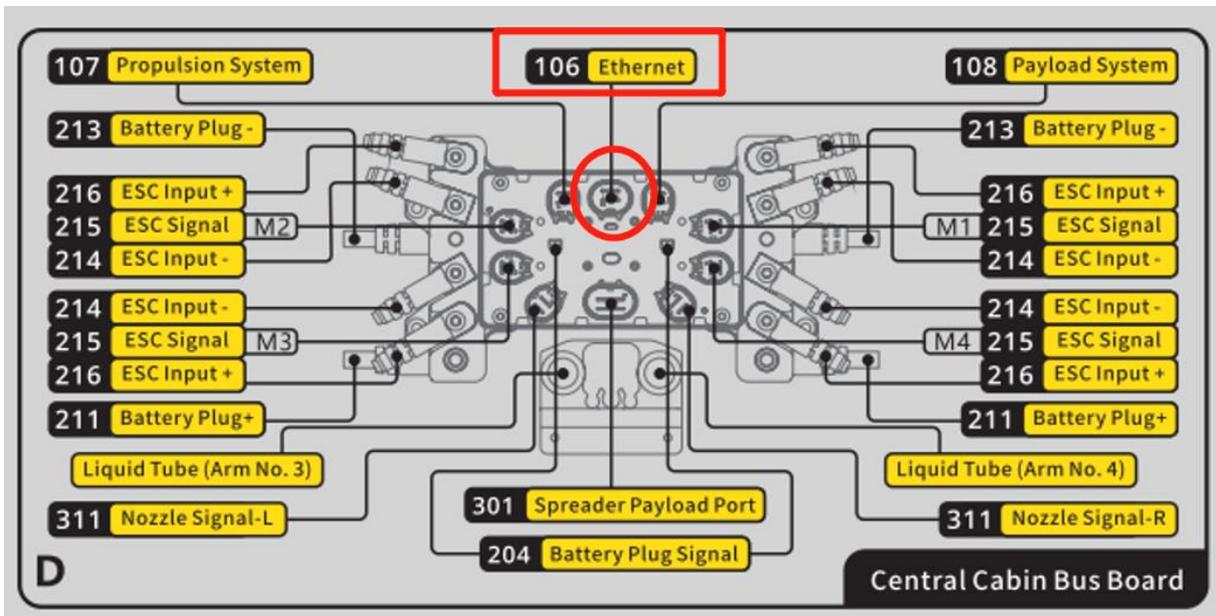
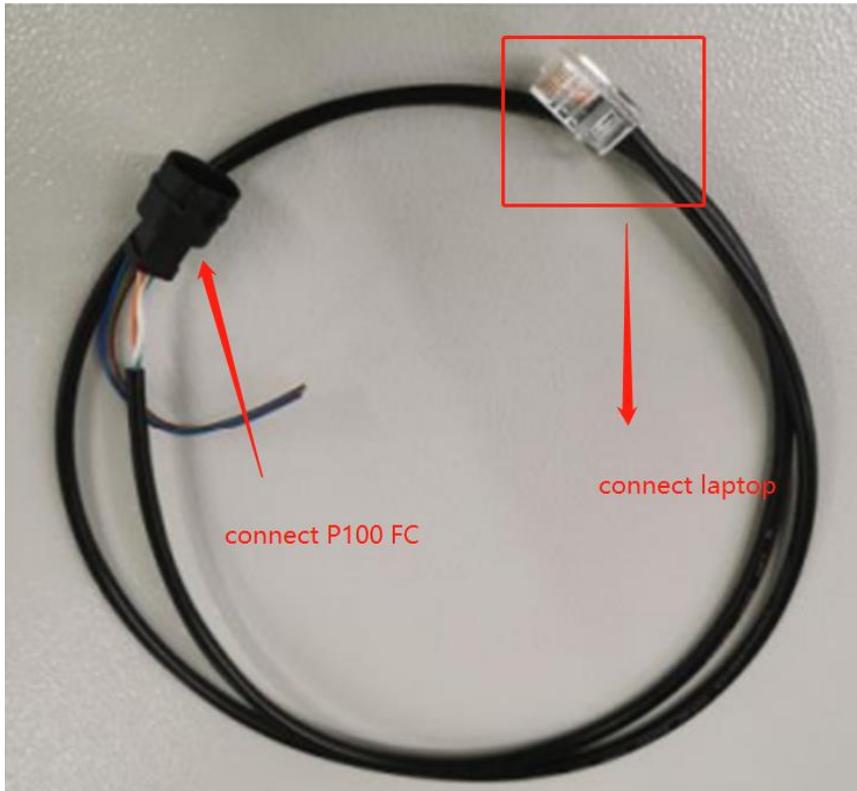


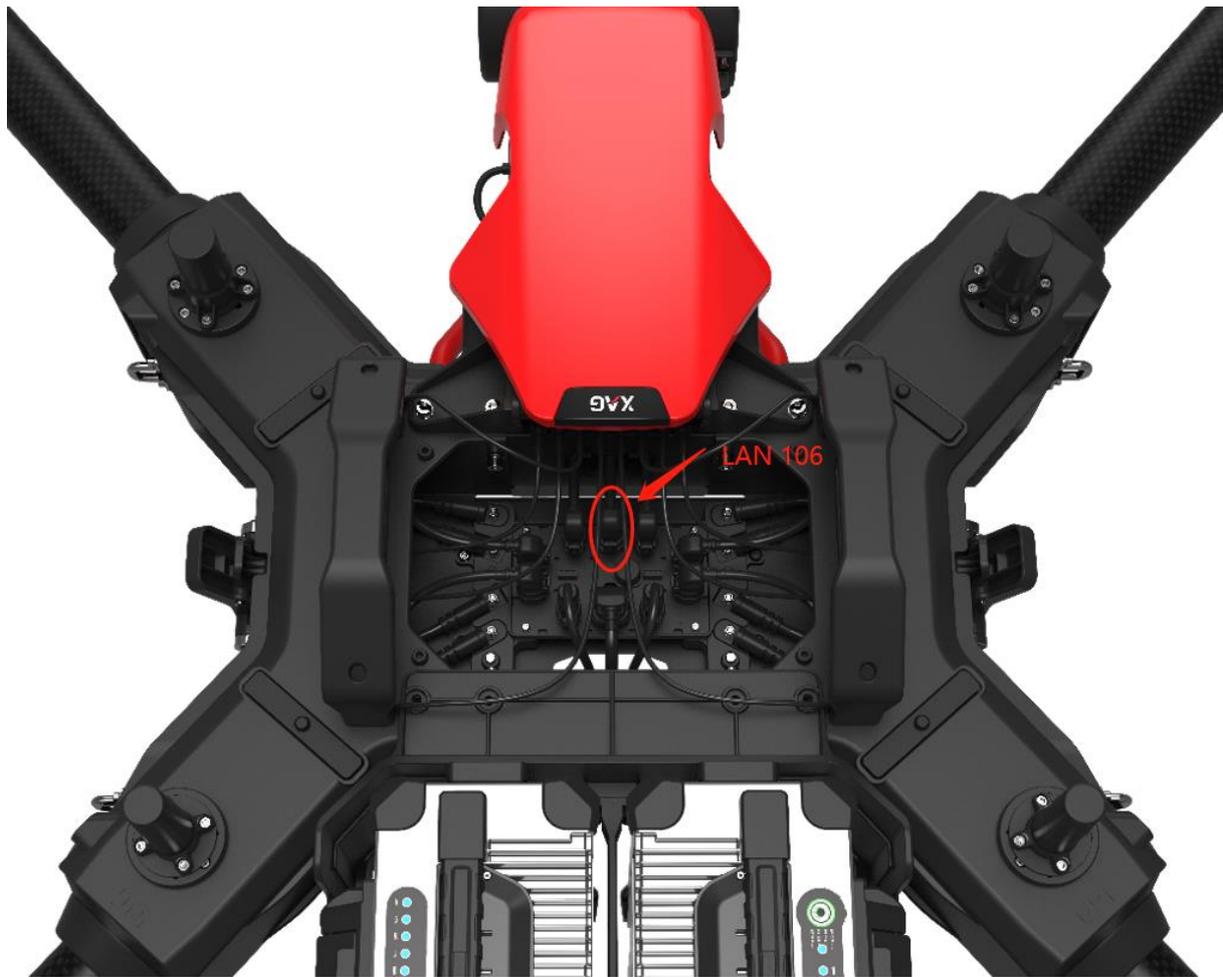
when connecting P40/V40 SuperX4 LAN cable, please be aware of that:





when connecting P100 LAN cable, please be aware of that:





2. Turn on UAV
3. Connect laptop to WIFI router (internet)
4. install remote control software on laptop. Open it, provide XAG technician's the screenshot of the Sunlogin ID

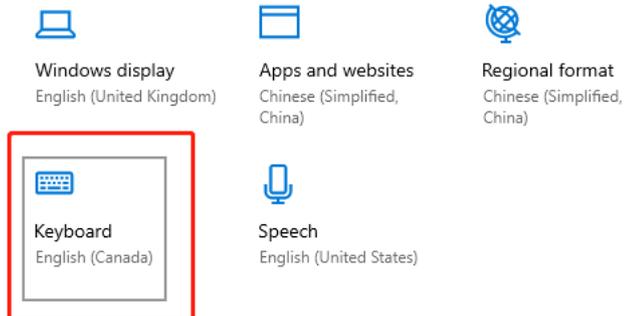


Sunlogin Download Link (Recommended): <https://sunlogin.oray.com/en/embed/software.html>



-
5. Make sure using English keyboard

Language

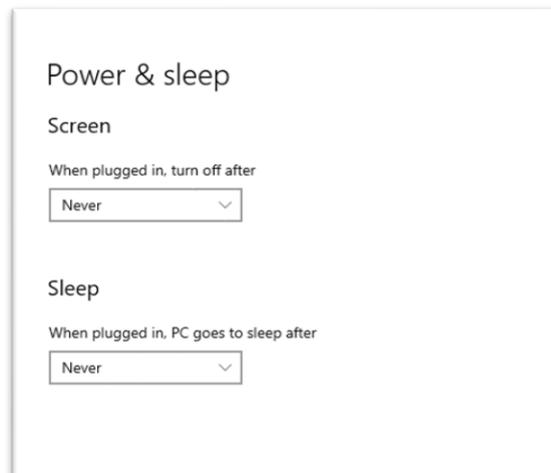


Windows display language

English (United Kingdom) ▼

Windows features, like Settings and File Explorer, will appear in this language.

6. Under windows setting, change the Power & Sleep to "Never"



7. Contact XAG technician that the remote control is ready

Method 3: Internet - FC

Environment Setup Schematic:



If your UAV has 4G SIM card inserted, and able to connect 4G network. You are allowed to use this method.

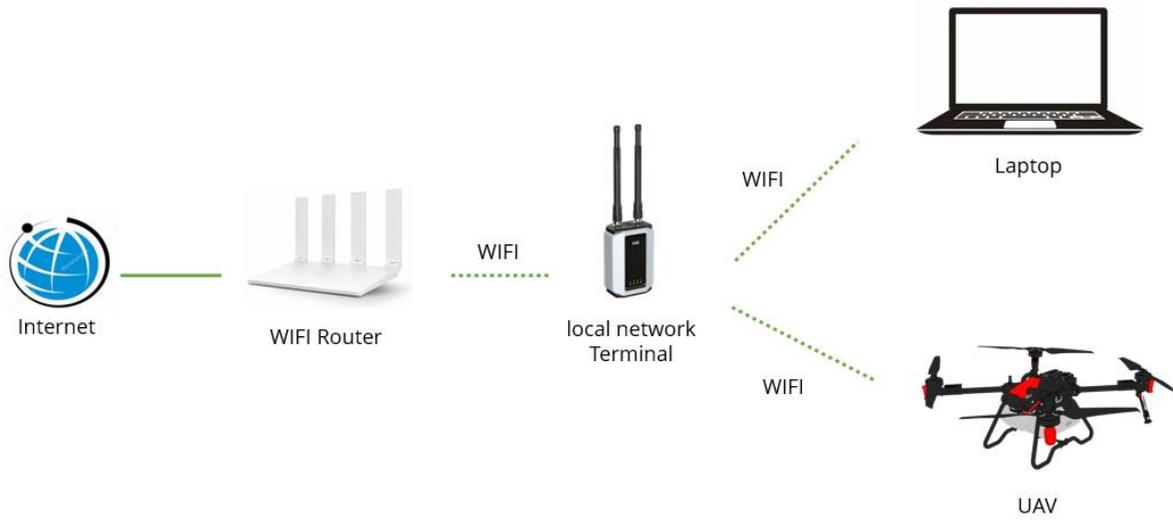
1. Make sure your flight control 2nd light (remote cloud server) is illuminated in green.



2. Provide XAG technician the serial number of UAV
3. Turn on UAV. Keep the UAV online.
4. Contact XAG technician to remote into the UAV via 4G

Method 4: Internet – LNT – UAV

Environment Setup Schematic:



Preparation:

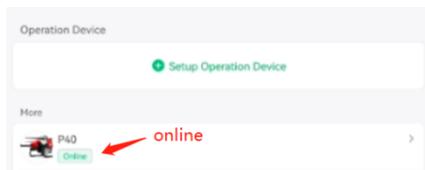
No.	Items	photo
1	Remote control software (sunlogin) Before remote debugging, please install remote control software in your desktop computer or laptop.	
2	LNT	
3	Laptop or desktop computer Windows10/11	
4	WiFi access	
5	UAV	

Procedure:

1. Turn on UAV. Make sure the UAV is under LNT network.
 - a. Flight control 2nd and 3rd light are illuminated in green.



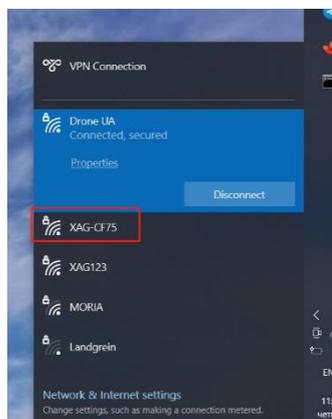
- b. Make sure the UAV is online in XAG One App.



2. Connect LNT to WIFI router. You can set the LNT Wireless connection under <http://www.iotlogin.com>. Once LNT has internet access, the 3rd light indicator will illuminate in green. If not, please double check your internet connection or restart the LNT.



3. Connect laptop to the LNT's hotspot



4. Install remote control software on laptop. Open it, provide XAG technician's the screenshot of the Sunlogin ID

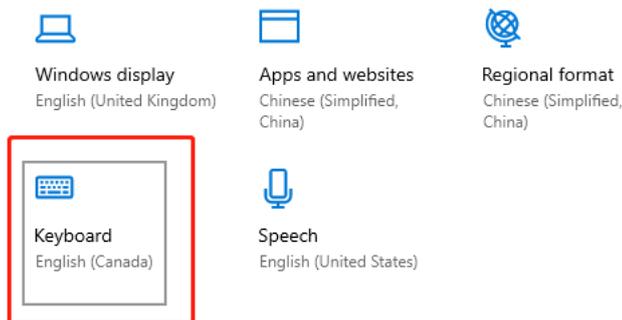


Sunlogin Download Link (Recommended): <https://sunlogin.oray.com/en/embed/software.html>



5. Make sure using English keyboard

Language

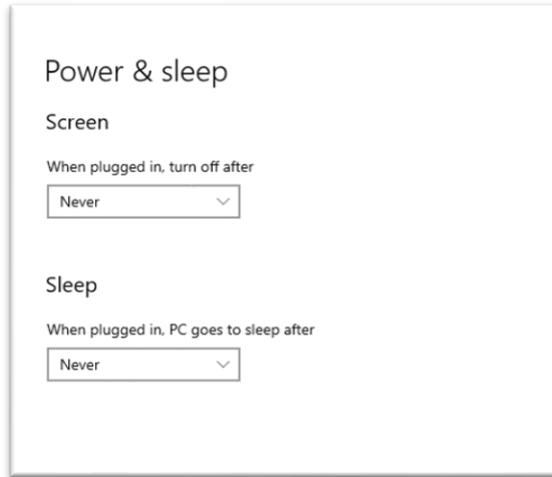


Windows display language



Windows features, like Settings and File Explorer, will appear in this language.

6. Under windows setting, change the Power & Sleep to "Never"



7. Contact XAG technician that the remote control is ready.

Method 5: UAV Offline Copy Log

Overview: flight control log is important for XAG technical support. The log provides very detailed flight information and allows XAG to have deep flight analysis. This method do not allow any internet connection on UAV.

Environment Setup Schematic:

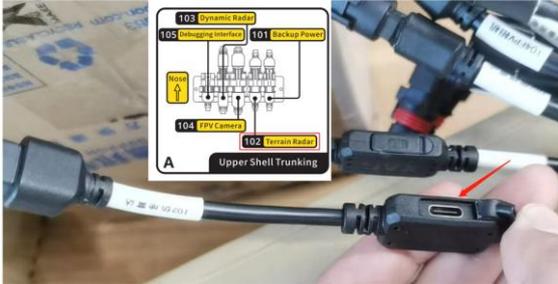


Preparation:

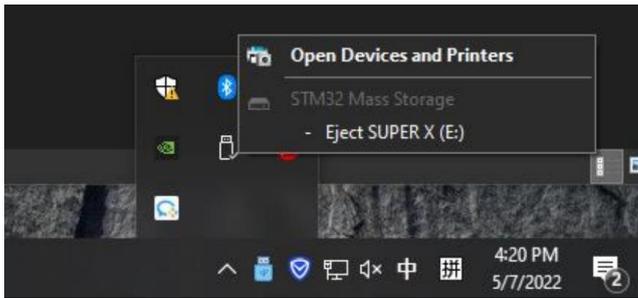
No.	Items	photo
1	Laptop or desktop computer Windows10/11	
2	UAV	
3	Type-C USB Cable	

Procedure:

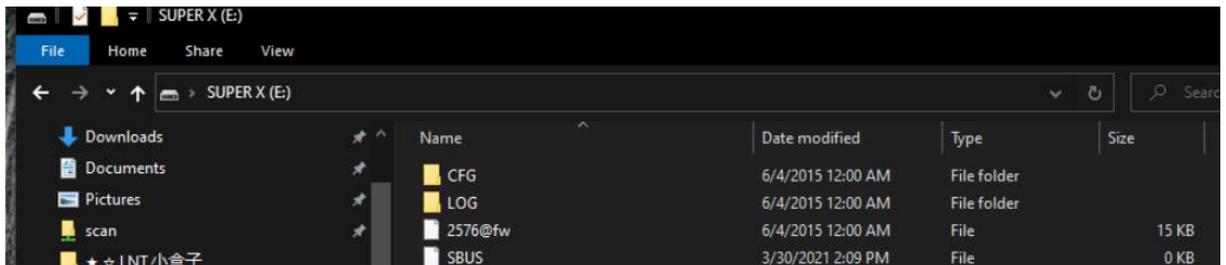
10. use USB Type-c cable
11. connect flight control to laptop

Flight Control	UAV model	Type-C Connector Port
Super X4	P40, V40	
Super X4 Pro	P100	

12. Turn on UAV
13. Read the flight control drive from laptop



14. Copy the all the files in flight control drive to laptop



15. Zip the log and send to XAG technical support.

Please report the accident or abnormal flights by email:

E-mail Subject: Company name-Drone SN-Drone type- Accident Date

E-mail to: Overseas Technology Support (ot@xa.com)

Content and attachment should include:

1. Link of the operation report, or provide exact time and date of the flight
2. Description of the accident and abnormal symptoms.
3. Photos or videos of the accident and environment
4. Flight log

Method 6: Report and Upload Log to the Cloud

1. In case of a crash or a major abnormality occurred in flight, it is important to upload the flight log and report to your technology support for analysis.

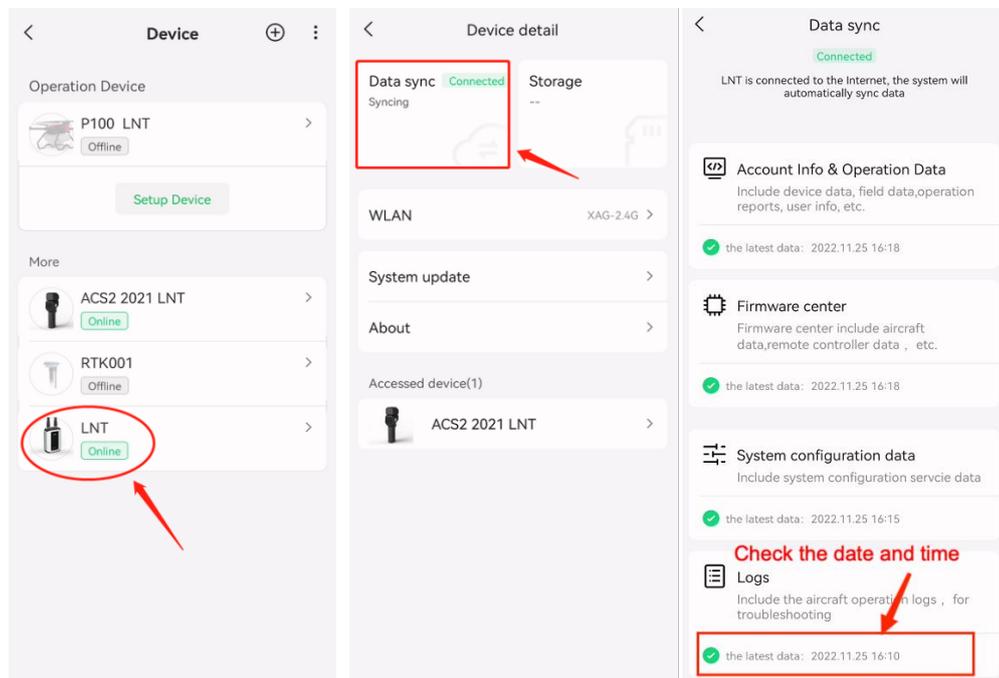
For 4G User

Make sure that there is a valid sim card with enough data in the drone's flight controller. The flight log will be automatically upload to the server when the drone has good internet access.

For LNT User

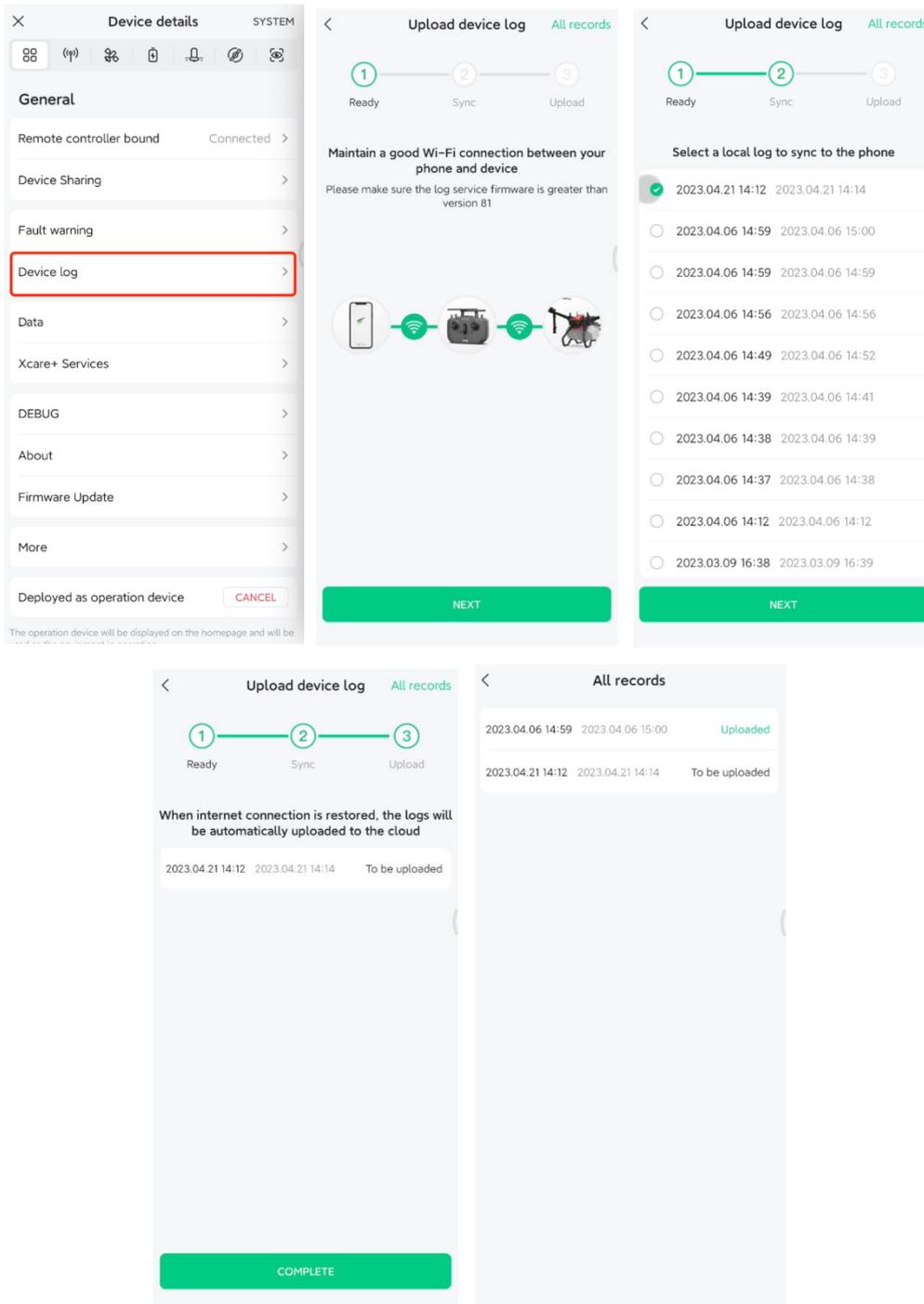
Please make sure to connect the LNT with internet, and check the status of data synchronization.

Make sure the logs have been successfully synchronized to the server by following the steps below:

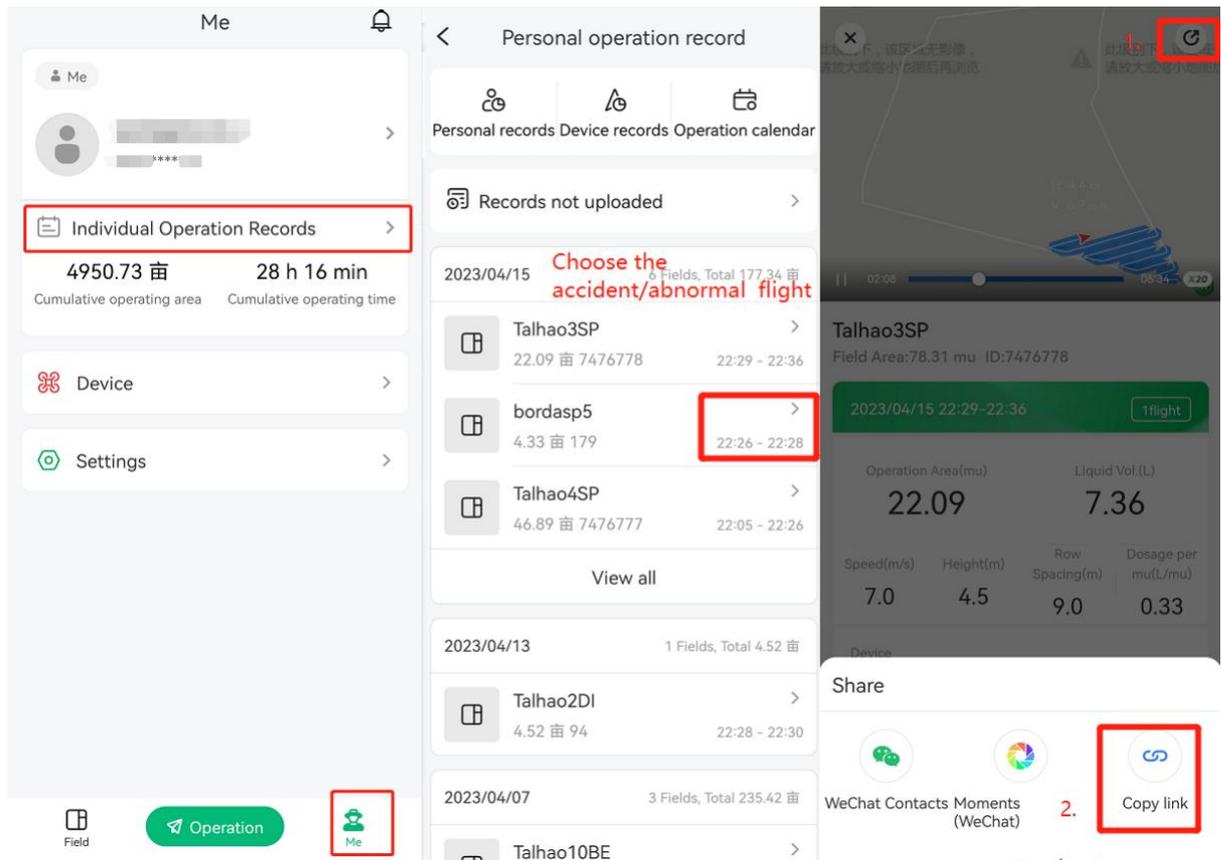


For RCN User

Make sure the remote controller is paired with the drone, so the drone can transfer the device logs to the phone via the remote controller. Power on the drone and the RC, and use the app to select the logs. The app will upload the selected logs to the server when the phone has internet access. Make sure to upload the related logs by following the steps below:



2. In order to locate the logs more rapidly and correctly from the server, the user is required to provide the link of the related Operation Report to the support staff. Follow the next steps to provide such link:



3. Please report the accident or abnormal flights by email:

E-mail Subject: Company name-Drone SN-Drone type- Accident Date

E-mail to: Overseas Technology Support (ot@xa.com)

Content and attachment should include:

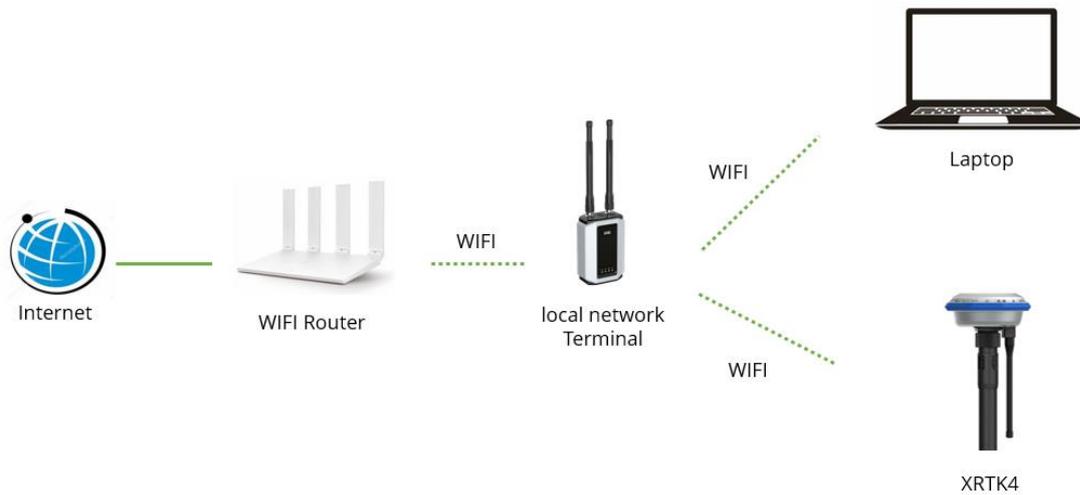
5. Link of the operation report, or provide exact time and date of the flight
6. Description of the accident and abnormal symptoms.
7. Photos or videos of the accident and environment

If the log cannot be uploaded to the server, please copy the log from the flight controller and attach it with the email. (Check Method 5 to understand how to copy log from the FC)

XRTK4 Remote Debug

Method: Internet – LNT – XRTK4

Environment Setup Schematic:



Preparation:

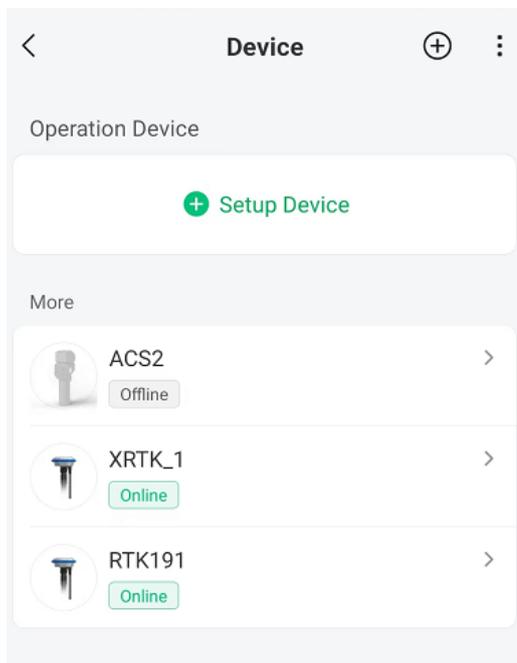
No.	Items	photo
1	Remote control software (sunlogin)	 <p>Before remote debugging, please install remote control software in your desktop computer or laptop.</p>
2	LNT	
3	Laptop or desktop computer (Windows 10/11)	
4	WIFI access	
5	XRTK4	

Procedure:

16. Turn on XRTK4. Make sure the XRTK4 is under LNT network.
 - a. Make sure the F2 light has triple flashing



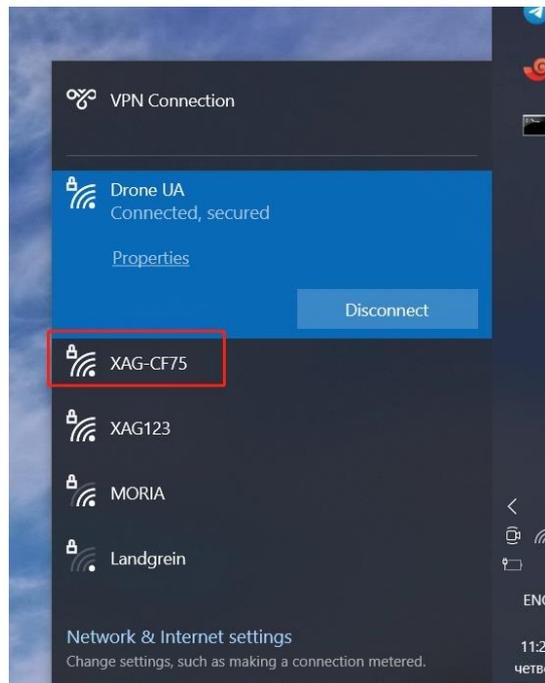
- b. Make sure the XRTK4 is online in XAG One App. You can connect more than one XRTK4 devices.



17. Connect LNT to WIFI router. You can set the LNT Wireless connection under <http://www.iotlogin.com>. Once LNT has internet access, the 3rd light indicator will illuminate in green. If not, please double check your internet connection or restart the LNT.



18. Connect laptop to the LNT's hotspot



19. Install remote control software on laptop. Open it, provide XAG technician's the screenshot of the Sunlogin ID

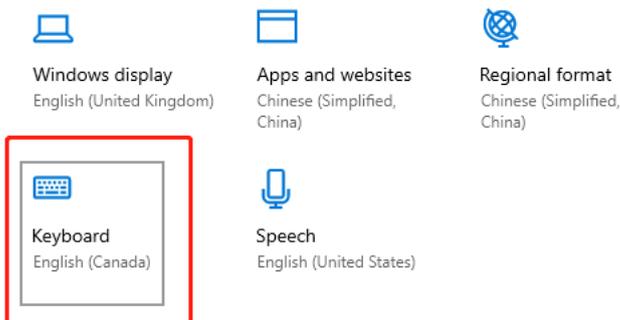


Sunlogin Download Link (Recommended): <https://sunlogin.oray.com/en/embed/software.html>



20. Make sure using English keyboard

Language

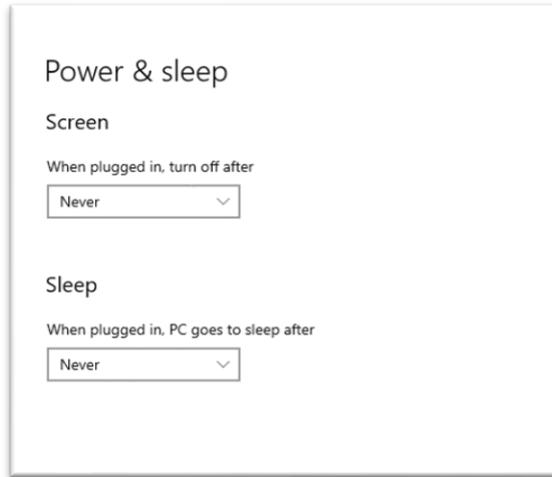


Windows display language



Windows features, like Settings and File Explorer, will appear in this language.

21. Under windows setting, change the Power & Sleep to "Never"

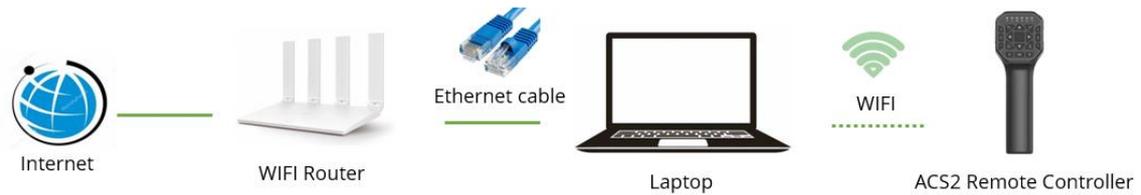


22. Contact XAG technician that the remote control is ready.

ACS2 Remote Debugging

Method: Internet – Laptop – ACS2

Environment Setup Schematic:



Preparation:

No.	Items	photo
1	Remote control software (sunlogin)	
2	ACS2 remote controller	
3	Laptop or desktop computer (Windows 10/11)	
4	WIFI access	
5	Ethernet cable	

Before remote debugging, please install remote control software in your desktop computer or laptop.

Procedure:

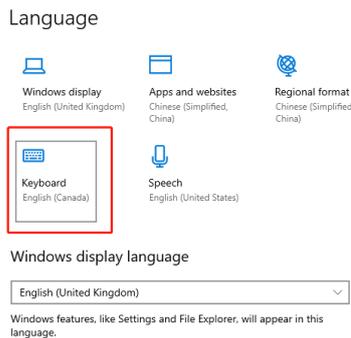
1. Turn on ACS2, wait for 3 minutes until initialization completed
2. Connect laptop to the LNT’s hotspot
3. Connect laptop to WIFI router (internet) via ethernet cable
4. Install remote control software on laptop. Open it, provide XAG technician the screenshot of the Sunlogin ID



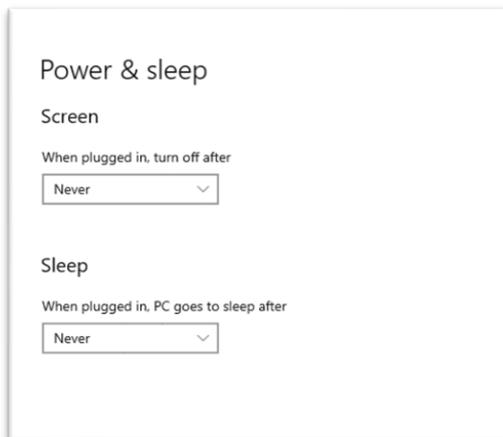
Sunlogin Download Link (Recommended): <https://sunlogin.oray.com/en/embed/software.html>



5. Make sure using English keyboard



6. Under windows setting, change the Power & Sleep to “Never”



7. Contact XAG technician that the remote control is ready

Chapter 17

System Failure

Flight Events

	Related to INS (Intelligent Navigation System)
	Critical events
	Flight Control response failure

No.	event_uuid	System Failure	en_event	What event triggers this error?	Flight Operation	What is the Aircraft automatic behavior?	App Error display	Recommendation
1	47ba331e-1505-45cb-aa01-33d96a7b7051	electric	Battery over discharge	Battery over discharge/ emergency landing take place	Autonomous flight, Manual control	hover and land immediately	Battery over-discharged, please change battery (1003)	Please use the battery properly and contact after-sales service if it occurs repeatedly.
2	c493a5a3-57bc-46f2-992e-6a2cef3f5a95	navigation	RTK position malfunction	Geographic position error after re-entering RTK	Autonomous flight, Manual control	hove and wait for manual remote control for 120s. After 120s, UAV will land on hovering position.	Abnormal positioning, please take over manually, or forced landing (1004)	
3	0b0e5749-5599-4c86-ba7c-aca89738636e	Propulsion	Propulsion system shutdown due to tile angle reach its limits	tile angle reach its limits	during flight	Propulsion system shutdown	Angle too large	Aircraft crashed, please contact the service station.
4	d0dc4303-ce5a-45e7-adb3-542fba0dd9cb	Propulsion	Propulsion system shutdown due to control failure	control failure	during flight	Propulsion system shutdown	Control error	Stop the aircraft

5	7d816ff3-5fef-4e93-83aa-b6e81ede3f09	Propulsion	ESC malfunction	ESC malfunction	during flight	Propulsion system shutdown	Motor error	Stop the aircraft
6	569f377f-95d1-479f-b785-00988f93e298	navigation	GPS Malfunction	GPS malfunction, Optic flow OK	Autonomous flight	If remote control is not involved, UAV will hover in the sky, wait for 120 seconds unless GPS recovery or remote controller command. If GPS fails to recover, then UAV will be forced landing.	GPS Error (1008)	
7	2244bf51-c697-4cd8-a1f5-fe513eff60cd	navigation	Unable to detour when encountering obstacles	Unable to detour when encountering obstacles	Autonomous flight, Manual control	display errors on App/ UAV hover	Cannot bypass the obstacle above, please take over or use Tap & Go (1010)	
8	5faa6f86-50a4-4a03-bb11-f60d349b8fd2	navigation	Terrain radar error during takeoff	terrain following mode is enable but meanwhile terrain radar malfunction	Autonomous flight, Manual control	not allow to take off / forced landing	Terrain radar malfunction, please pay attention to the flight height (1012)	
9	83efd637-e133-427c-89a9-458cc18db145	electric	ESC check failure	motor speed abnormal during take off	take off, idle test	Propulsion system shutdown	ESC error detected, please restart the device (1015)	
10	bbf5b8ec-f7e4-4913-a9c5-4472a92d8c63	navigation	NAV offline	no control output (GPS, acceleration, speed, attitude)	Autonomous flight	display errors on App / UAV hover	NAV offline, please take over the aircraft with ACS2	

11	c7b89d70-c4f0-43a9-b4a9-e4e406af4795	system	Flight Control offline	N/A	Autonomous flight, Manual control	display errors on App/ UAV hover	Flight controller offline	Please try any of the following instructions: 1. Turn off the aircraft, remove the UPS cable from the flight controller and restart the aircraft. 2. If the above does not work, please contact the customer service.
12	cbe22f5e-c6d2-494a-be99-c47936cb0cae	system	TPS (task program system) offline	not receiving TPS command for more than 3 seconds	Autonomous flight, Manual control	display errors on App/ UAV hover/ resume the operation when recovery	Flight control TPS data not updated	Restart the device
13	0c55b755-3325-4949-a50d-6f7137600121	Propulsion	Overloaded, please reduce payload	Overloaded	Autonomous flight, Manual control	Forced landing	Overloaded, please reduce payload	Please try any of the following instructions: 1. Try to reduce payload. 2. Check whether the structural parts in the propulsion system are deformed or broken, including propellers, motor bases, steel sleeves, and rubber sleeves. 3. If all else fails, please contact the service station.
14	e8821745-ec5a-4d3d-bfce-c9790e5df36a	Propulsion	Aircraft crashed	Aircraft crashed detected	Autonomous flight, Manual control	display errors on App	Aircraft crashed	N/A
15	3f4b5d59-a143-478e-a6aa-3e89c834f990	Propulsion	Insufficient power (M1)	payload overweight	Autonomous flight, Manual control	Forced landing	Insufficient power (M1), please reduce payload	Please try any of the following instructions: 1. Try to reduce payload.

16	81ffc939-f069-483d-aa2f-b30df39b39c8	Propulsion	Insufficient power (M2)	payload overweight	Autonomous flight, Manual control	Forced landing	Insufficient power (M2), please reduce payload	2. Check whether the structural parts in the propulsion system (motor) are deformed or broken, including propellers, motor bases, steel sleeves, and rubber sleeves. 3. If all else fails, please contact the service station.
17	437b7545-94cd-4e3e-94d5-830ac58605f9	Propulsion	Insufficient power (M3)	payload overweight	Autonomous flight, Manual control	Forced landing	Insufficient power (M3), please reduce payload	
18	16b1097b-32d1-489d-834d-b73ae67617ab	Propulsion	Insufficient power (M4)	payload overweight	Autonomous flight, Manual control	Forced landing	Insufficient power (M4), please reduce payload	
19	fe2b1828-9d08-40c3-886c-cc4cf887e05d	Propulsion	Servo or motor self-inspection failure	hardware condition	Autonomous flight	Stop the aircraft and reject to take off	Servo or motor self-inspection failure, please restart the device (1043)	Restart the devices
20	09dcd7e5-a404-4fae-9f5c-32e8e36cc443	navigation	tilt angle Composition error	tilt angle Composition error	Autonomous flight, Manual control	Recovery, forced landing or crash	Navigation error, waiting for recovery (1044)	Keep safe distance from UAV
21	09dcd7e5-a404-4fae-9f5c-32e8e36cc443	navigation	vertical Composition error	vertical Composition error	Autonomous flight, Manual control	Recovery, forced landing or crash	Navigation error, waiting for recovery (1045)	Keep safe distance from UAV
22	09dcd7e5-a404-4fae-9f5c-32e8e36cc443	navigation	horizontal Composition error	horizontal Composition error	Autonomous flight, Manual control	Recovery, forced landing or crash	Navigation error, waiting for recovery (1046)	Keep safe distance from UAV

23	09dcd7e5-a404-4fae-9f5c-32e8e36cc443	navigation	no position data	no position data	Autonomous flight, Manual control	UAV hover within 5 seconds; If recovery, users can continue the flight mission. If not recovery, UAV will adjust its attitude and is forced to make a landing. Otherwise, UAV stay hovering.	Navigation error, waiting for recovery (1047)	Keep safe distance from UAV. If UAV-ground height is valid and less than 3 meters, UAV will be forced to make a landing, If UAV-ground height is not valid and UAV - take off point height is less than 3 meters, then UAV will be forced to make a landing. Otherwise, UAV stay hovering.
24	2f6b79a2-6488-43b0-b680-b632ba9255f7	navigation	position hopping	RTK position error is greater than 10 meters after RTK reinitialization	Autonomous flight, Manual control	UAV hover and wait for further commands; display errors on App	Navigation position accuracy change, waiting for restoration. If restoration fails, aircraft will be forced to land, please keep a safety distance (1048)	Aircraft is circling in attitude mode to wait for recovery, or it will be forced to land 1 minute later

25	cd004956-caec-42ae-95d9-61e3fd810ed7	navigation	GPS horizontal speed error	GPS horizontal speed error	Autonomous flight, Manual control	If there is no higher priority actions involved and the error exceeds 5 seconds, UAV will stop moving and hover in position mode, waiting for 120 seconds. If there are no recovery or manual commands within this period, the UAV will be forced to make a landing. User can still control it manually during UAV landing.	GPS speed error, aircraft will be forced to land (1049)	Land
26	cd004956-caec-42ae-95d9-61e3fd810ed7	navigation	GPS vertical speed error	GPS vertical speed error	Autonomous flight, Manual control	If there is no higher priority actions involved and the error exceeds 5 seconds, UAV will stop moving and hover in position mode, waiting for 120 seconds. If there are no recovery or manual commands within this period, the UAV will be forced to make a landing. User can still control it manually during UAV landing.	GPS speed error, aircraft will be forced to land (1050)	Land

27	dbb55cfd-0e02-402b-9ba3-257039595116	navigation	GPS heading error	INS algorithm	Autonomous flight, Manual control	<p>Within 15 seconds after UAV take off, UAV will hover and wait for further commands. Otherwise, UAV will resume the flight mission.</p>	GPS heading error, cannot take off (1051)	<p>Please try any of the following instructions:</p> <ol style="list-style-type: none"> 1. Check whether the environment around the aircraft is open and unobstructed. 2. Check whether the RTK antenna is worn or broken. 3. If all else fails, please contact the service station.
28	f129bb62-24ad-408c-ac48-f587263e9a5d	navigation	The barometer measurement error, GPS positioning OK but RTK offline	The barometer measurement error, GPS positioning OK but RTK offline	Autonomous flight, Manual control	<p>If there is no higher priority actions involved and the error exceeds 5 seconds, UAV will stop moving and hover in position mode, waiting for 120 seconds. If there are no recovery or manual commands within this period, the UAV will be forced to make a landing. User can still control it manually during UAV landing.</p>	Navigation error, aircraft will be forced to land, please keep a safety distance (1052)	Land

29	f129bb62-24ad-408c-ac48-f587263e9a5d	navigation	GPS Positioning OK but RTK offline	GPS Positioning OK but RTK offline	Autonomous flight, Manual control	If there is no higher priority actions involved and the error exceeds 5 seconds, UAV will stop moving and hover in position mode, waiting for 120 seconds. If there are no recovery or manual commands within this period, the UAV will be forced to make a landing. User can still control it manually during UAV landing.	Navigation error, aircraft will be forced to land, please keep a safety distance (1053)	Land
30	47e4d6a7-7c6e-4ffd-a0fd-bfba228bbcbbd	navigation	Exceed the upper height limit to ground	Terrain module OK but terrain following mode is turn off, the UAV flight height exceed 30 meters	Autonomous flight, Manual control	continue flight mission, UAV stops climbing up, until UAV fly below the maximum allowable height	Exceeded height limit, please be cautious (1054)	ready to take over by remote controller
31	03ceb744-57b2-41ea-8c45-e7abc3a267b9	navigation	Exceed the lower height limit to ground	Terrain module OK but terrain following mode is turn off, the UAV flight height is below 0.5 meters	Autonomous flight, Manual control	Forced to flight at the height of 1.5m	Exceeded height limit, please be cautious (1055)	ready to take over by remote controller
32	47e4d6a7-7c6e-4ffd-a0fd-bfba228bbcbbd	navigation	Exceeded height limit	Exceeded the maximum permissible height, 200 meters in comparison to the UAV take-off point	Autonomous flight, Manual control	continue flight mission, but restrict UAV flight height and report issue in App	Exceeded height limit; flight height will be restricted (1056)	N/A
33	50109dd4-f2f7-4b92-bb30-16176913822f	navigation	remote controller reaches the	remote controller reaches the	Manual control	not restricted	You are flying too fast, please be cautious	N/A

			maximum flight speed	maximum flight speed, 5.8m/s				
34	d0d91de4-b4b4-48f8-8963-661b9b2913c7	navigation	Maximum flight distance reached	The distance between UAV and remote control reaches the maximum horizontal distance, 2000 meters	Manual control	UAV will stop and hover at the edge of the maximum flight radius from remote controller	Maximum distance reached	N/A
35	5faa6f86-50a4-4a03-bb11-f60d349b8fd2	navigation	Terrain radar malfunction during flight mission	Under terrain following mode, terrain radar malfunction during flight mission	Autonomous flight, Manual control	UAV will continue to fly without terrain following mode	Terrain radar malfunction, please pay attention to the flight height	N/A
36	41049675-d85f-4976-acb9-8f88c5d52fa0	C2 Link	remote controller offline	significant signal interference, bad signal strength, dead remote controller	Autonomous flight, Manual control	During manual flight, UAV will hover and land when the battery is low. During autonomous flight, UAV will automatically complete the flight mission.	Please try any of the following instructions: 1. Check if the remote controller is linked to the aircraft. 2. Try to reconnect the remote controller and the aircraft. 3. If all else fails, please contact the customer service.	N/A
37	ef7d0f6a-e67e-40e3-a700-00c4f5bdbba4	C2 Link	remote controller not connected	remote controller not connected	Autonomous flight, Manual control	UAV is allowed to fly autonomously without remote controller. UAV is not allowed to fly manually without remote controller.	Remote controller not connected	connect remote controller

Flight Safety Management

Autonomous flight failure

LNT/4G networking mode

- Question:** If UAV loses GPS, how does UAV response?
Answer: Depending on the situation, exception handlings could be different. In the extreme case that UAV lost all satellites, UAV will hover using optical flow. After hovering for 2 minutes, the UAV will be forced to land without manual control involved. if it is within autonomous flight mission, the UAV will stop spraying during hovering.
- Question:** If UAV itself is abnormal, such as flight controller failure, etc., how does the aircraft response?
Answer: Depending on the situation, exception handlings could be different. In the extreme case that flight control is complete dead, UAV will stop the motors to prevent fly-away.
- Question:** If for some reason, the flight altitude of the aircraft is greater than the pre-defined maximum value, or less than the pre-defined minimum value, do any error prompts appear on the XAG One App?
Answer: There will be no alarm.
- Question:** When the height of the aircraft is less than the minimum altitude (currently 1.5m), how is the distance 1.5m being calculated? Is it through a terrain following radar, or RTK altitude positioning, or a barometer? If you encounter complex ground conditions (hills, trees, lakes, etc.) and the aircraft is flying in fast speed, this altitude may change over time, how is the minimum altitude determined?
Answer: According to UAV flight setting, user can enable or disable terrain following mode. When terrain following mode is on, UAV will fly at the height that measured by terrain radar. Oppositely, when terrain following mode is off, UAV will fly at the fixed height that measured by RTK positioning system. UAV has the feature of flight protection, when the aircraft gets close to ground or crops, the terrain following mode will be triggered and enabled to prevent crashing or hitting.

4G networking mode

- Question:** How will the aircraft response if it loses WIFI communication?
Answer: Once the aircraft loses WIFI communication, it will continue to operate using the 4G network.
- Question:** How does the aircraft react if it loses both 4G and WIFI?
Answer: Once flight route is uploaded to the aircraft, UAV will continue to complete the operation and return home according to its own status.

Manual flight failure

- Question:** If UAV loses WIFI signal, will the aircraft hover? Does spraying system stop automatically?
Answer: The aircraft will hover for 30 seconds, and then automatically stop spraying and return home.
- Question:** If the UAV is commanded to keep moving forward, will UAV exceed the communication distance? Will UAV hover if disconnected? Will the spraying stop immediately?
Answer: the UAV will hover, but will not stop spraying, which means the original state will be persisted.
- Question:** After the remote controller is disconnected from the aircraft, will the remote controller LED indication light response timely?
Answer: The remote controller LED light indicator of UAV connection (3rd light from the left) will automatically become dim off, but it is not instantaneous, it needs to wait for about 10s~30s.
- Question:** If the remaining battery of remote controller is low, will UAV automatically return home?
Answer: Remote controller will shut down by itself if it reaches low battery (5%), the UAV will hover and wait for commands. If UAV does not receive commands for 120 seconds, it will automatically return home. If UAV battery goes low, it will be forced to land by itself.
- Question:** After the UAV loses the GPS signal, will it hover and stop spraying automatically?
Answer: After the aircraft loses the GPS signal, the aircraft will hover using optical flow and wait for GPS recovery. It will wait for 120 seconds. After 120 seconds, UAV will be forced to land and. As the UAV is under manual control mode, the UAV will not stop spraying (the firmware can be changed to over without spraying). Since the UAV optical flow is not accurate at an altitude greater than 7m, the UAV will lower its altitude less than 7 meters. The maximum altitude of the UAV is 30m.
- Question:** Will spraying system stop automatically after the obstacle avoidance event is triggered by dynamic radar?
Answer: Spraying system will stop automatically.
- Question:** Will spraying system stop automatically after RTH (Return to home) is triggered?
Answer: Spraying system will stop automatically.
- Question:** If the UAV is malfunctioned during flight, will the spraying system stop automatically?
Answer: Spraying system will stop automatically.
- Question:** Will there be a voice prompt in addition to the indicator light with low power control with one hand? Can voice prompts be made into English?
Answer: There are voice prompts, Chinese and English
- Question:** Will the aircraft's dynamic radar and terrain following radar work in manual mode?
Answer: The dynamic radar does not work during manual mode, but terrain following radar is subject to enable. Remote controller is allowed to turn on/off terrain following radar, where users can press the rise and fall button to control the height limitation in terrain following mode.

-
11. **Question:** How can user control UAV via remote controller?
Answer: Please read the ACS2 remote controller user manual. Generally, UAV manual flight speed can vary from 0.5m/s to 6m/s, where 0.5m/s per gear. Once press “S” button, Spread/spray system will turn on. Once turn-on, the spread/spray amount is at default 50% of maximum spread/spray amount. If press S+/S-, the amount will increase/decrease at 10% each press, the maximum spray amount varies according to each aircraft
P40/V40, Maximum Flow Rate 10L/min
P100, Maximum Flow Rate 12L/min
 12. **Question:** What is this criterion of GPS signal loss?
Answer: GPS is OK if its accuracy control is within 1m.
 13. **Question:** What happen if GPS signal is weak?
Answer: UAV can still fly but the flight path accuracy is low.
 14. **Question:** If the GPS signal is restored after loss, whether it will automatically resume spraying, or requires users to manually turn on the spray system?
Answer: After the GPS signal is restored, the user needs to manually turn on the spray system.

Return Home Trigger

1. **Question:** Will the radar be turned on automatically when the aircraft triggers an automatic return home?
Answer: It will not be turned on automatically, whether it is turned on or not depends on whether the radar is enabled when the user uploads the route. If the obstacle avoidance dynamic radar is enabled in the flight setting, the radar is enabled when the aircraft returns home. Otherwise, the radar is disabled.
2. **Question:** If the UAV triggers automatic return to home, will the UAV slow down its flight speed?
Answer: No. The return speed is based on the speed of entering and exiting the route set by the APP. It is recommended that the user set the entry and exit speed lower.

Power Abnormality

1. **Question:** Does UAV has any power redundancy to secure the flight?
Answer: The UAV has no power redundancy. But if one of the motors has an abnormal speed, the other motors can quickly compensate. If the compensation goes off, the UAV will crash.

Battery Abnormality

1. **Question:** What happen if the smart battery is dead?
Answer: the UAV will crash during flight as there is only one power supply source

Chapter 18

Appendix

Appendix I

ACS2 2021 Mainboard firmware:

ACS2 2021 WIFI module firmware

XRTK Mainboard firmware

XRTK WIFI module firmware:

ACS2 2020 mainboard firmware

ACS2 2020 WIFI module firmware:

LNT Firmware V1.0.0.31, V1.0.0.36

P100P40_Release_1.136.0.5.hfw

ESC firmware (XAG_ESC2020_1.3.0.117.fw)

Debug Flight Control firmware (P100P80P40_Debug_framework2_1.142.0.155)

Battery firmware

GC4000plus firmware

Appendix II

HDLS update tool:

2-hdls_fwupdate.exe

MD5

Battery Tool Kit

RTK_Tool

All firmware and tools listed in appendix I and II above can be downloaded from:

https://drive.google.com/drive/folders/1OxC8RyWPgiF6m8Gc2PK3Ua98G3S4PEU5?usp=share_link

If you are unable to download, please contact the tech support and provide your email address that is able to log into google.