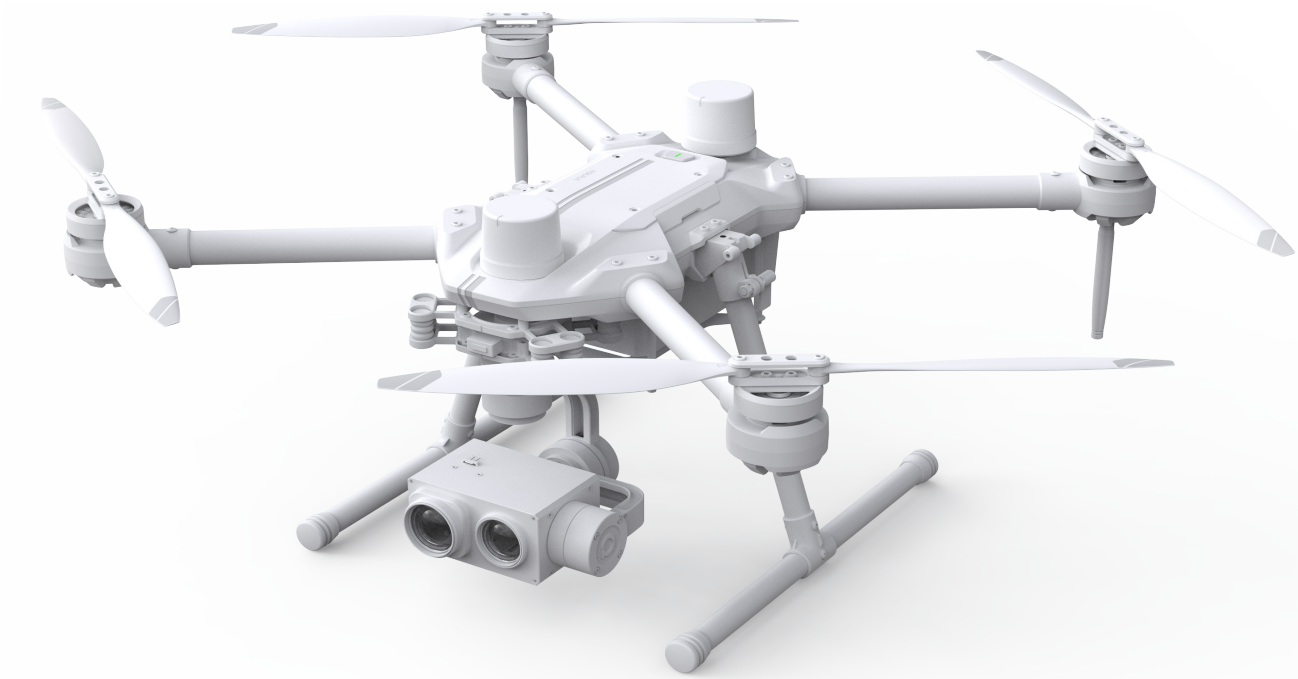
AQUILA

User Manual

2022-07 v2.0



CODEV
DYNAMICS

Contents

Product Profile

Introduction 4
Preparing the Aircraft 5
Linking the Remote Controller 7
Aircraft Overview 10
Expansion Port Overview 11
Remote Controller Overview 13

Aircraft

Profile 16
Flight Modes 16
Aircraft Status Inticators 17
Return to Launch (RTL) 17
RTK Functions 21
Flight Recorder 23
Propellers 23
Flight Battery 24

Remote Controller

Profile 26
Preparing the Remote Controller 27
Remote Controller Operations 28
Video Transmission Descriptions 31

Fly Dynamics App

Manual Flight 33
Mission Flight 37
Aircraft Settings 48
Sensors Calibration 49
Radio Calibration 51
Application Settings 52

Flight

Flight Environment Requirements 56
Preflight Checklist 56
Starting/Stopping the Motors 57

Appendix

Specifications 59
Firmware Update 62
Extended Screw Holes Description 62

After-Sales Service Policies 63

Product Profile

This Section describes the features of the product, guide the preparation of the aircraft before flight, and lists the components of the aircraft and remote controller.

Product Profile

Introduction

AQUILA series is a quad-rotor, high-precision aerial survey drone with IP3 waterproofing. Upgrade your next mapping mission with the AQUILA – the most compact and accurate low altitude mapping solution.

Based on the new H7 flight control system, it is compatible with PX4 and ArduPilot dual-system open source architecture.A new dual RTK module is integrated directly into the AQUILA, providing real-time, centimeter-level positioning data for improved absolute accuracy on image metadata. As the same time, It has stronger anti-magnetic interference ability and precise positioning ability.The AQUILA stores satellite observation data to be used for Post Processed Kinematics (PPK). In addition to optimized flight safety and precise data collection. Fit the AQUILA to any workflow, with the ability to connect this positioning system to the NTRIP (Network Transport of RTCM via Internet Protocol) using a 4G dongle or WiFi hotspot.

CodevDynamics has rethought its drone technology from the ground-up, revolutionizing its systems to achieve a new standard for drone accuracy offering customers centimeter-accurate data while requiring fewer ground control points. Simplify workflow and reduce time cost.

Users can also create customized solutions through the newly added Phalanx G1 expansion board module and customized auxiliary equipment according to business characteristics, so that AQUILA can be closely integrated with the operation scene.

Preparing the Aircraft

1. Installing the Landing Gears

Install the landing gears,tighten the latch clockwise,and make sure it's tight.

2. Mounting the Gimbal and Camera

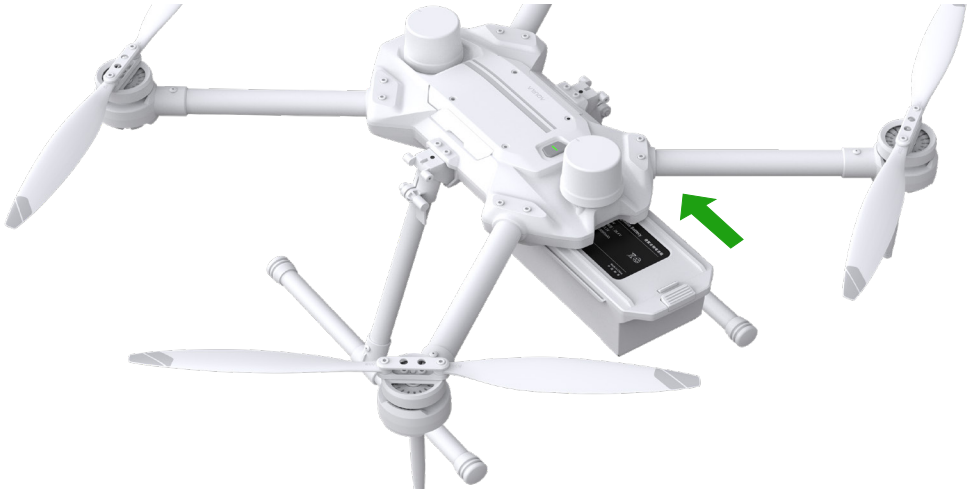
1. Align the white and red dots and insert the gimbal.
2. Rolate the gimbal lock to the locked position.

After installation, make sure that the gimbal lock is locked in place.
Make sure to press down the Gimbal Detachment button when rotating the gimbal lock to remove the gimbal and camera. The gimbal lock should be fully rolated when removing the gimbal for next installation.

3. Battery Installation

Slide battery into the battery compartment according to the arrow's direction as shown below.

When the upper and lower buckles on the battery are in place, a click sound indicates the battery is securely installed. Failure to do so may affect the flight safely of your aircraft.



Make sure to use included batteries, Do not use any other type of batteries.

4. Turning on the Aircraft

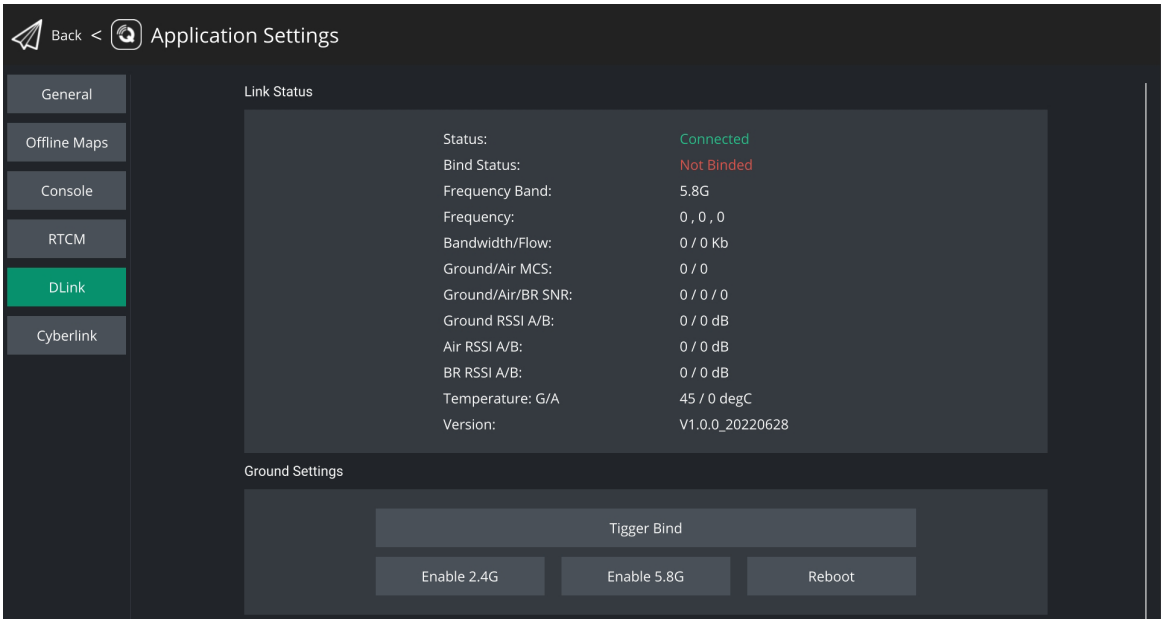
Turn on/off :

Short press the power button on the aircraft once to turn on the battery; long press for 2 seconds to turn off the battery. The indicator light is always on after turning on the power.

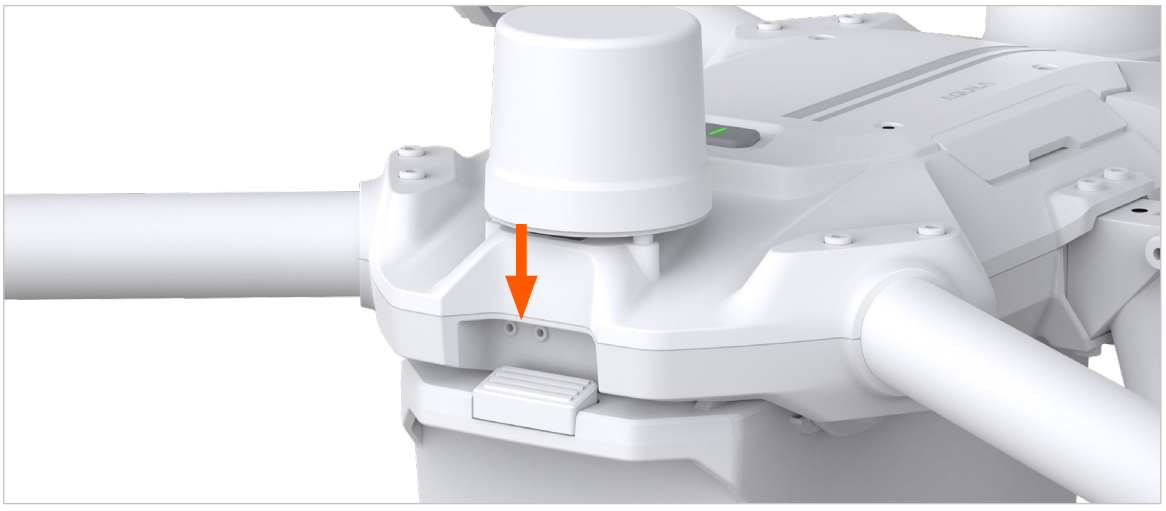
Linking The Remote Controller

The aircraft and remote controller must be linked before use. Follow these steps to link a new remote controller.

1.Turn on the remote control and enter the main interface, as shown in the figure below, slide down the screen to start setting the binding, click to enter the App Settings option, and select the Dlink option.

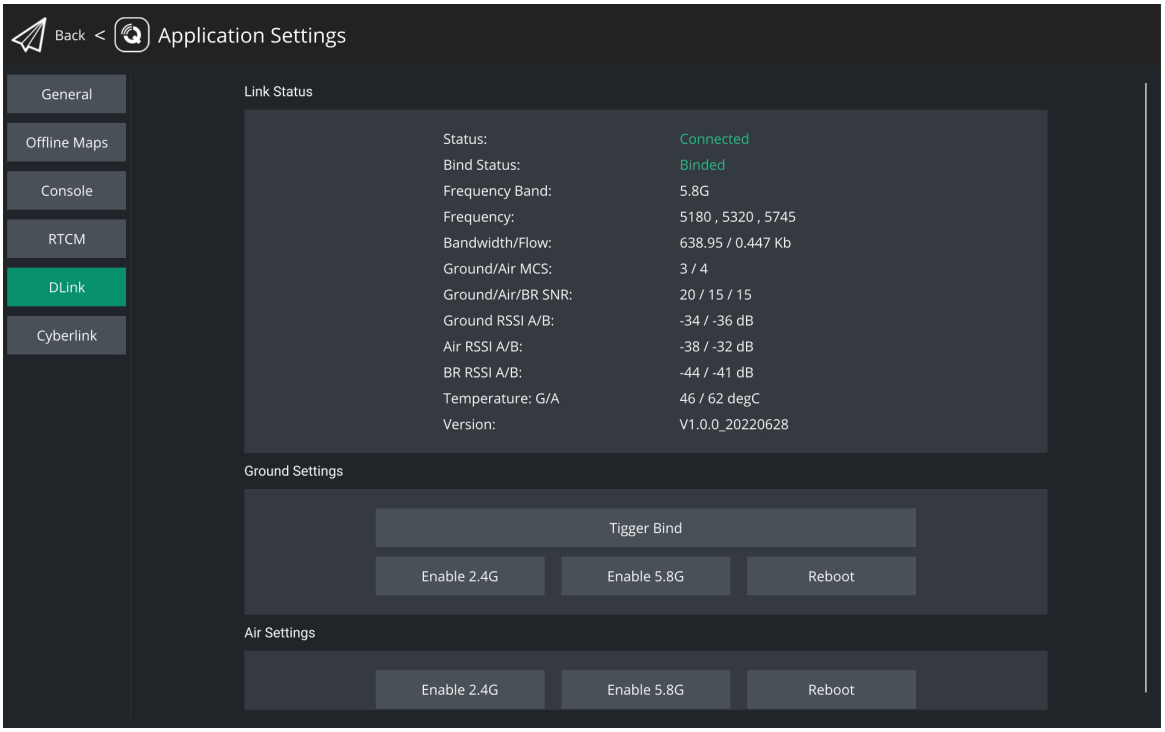


2.Align the tail of the aircraft to open a hole with slender hard objects like a screwd river, reach forward to press connect button of theTransmission Module for 2 seconds until the indicator fashes quickly.The aircraft is ready to be connected.



3.Click Tigger Bind to bind.

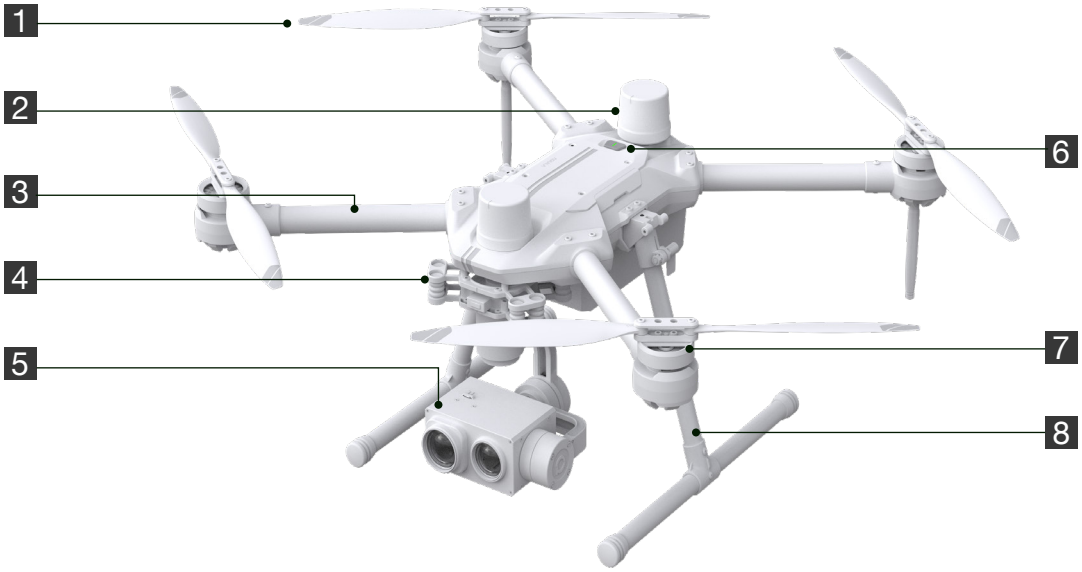
4.When conection is completed, the Transmission Module indicator will be solid and then be off. The controller will receive data from Aircraft. Ground Status will show as "**Binded**" in green.



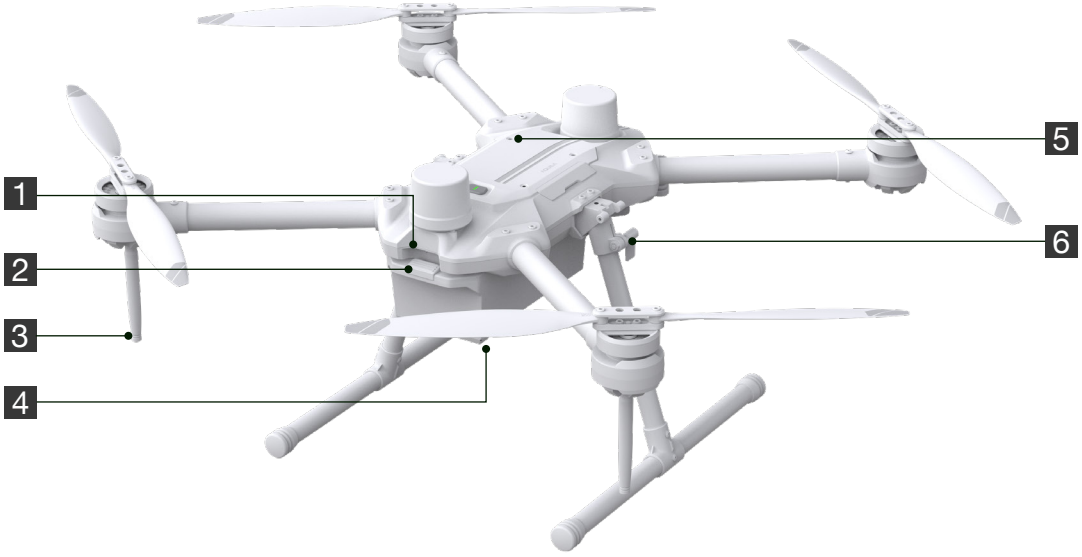
Note:

The factory default is 5.8Ghz frequency band. If you need to switch to 2.4Ghz frequency band, please click Enable 2.4G in Air Settings and Reboot. After the setting is completed, switch the Groud terminal to 2.4G in the same way, the aircraft and the remote control will be automatically bound, and the Frequency Band will be displayed as 2.4G.

Aircraft Overview



1.Propellers
2.RTK Modules
3.Frame Arms
4.Gimbal Detachment Button
5.Gimbal and Camera
6.Power Button
7.Motors
8.Landing Gears



1.Binding Trigger Port
2.Battery Locker
3.Transmission Antennas
4.Flight Battery
5.Expansion Port
6.Landing Gear Latch

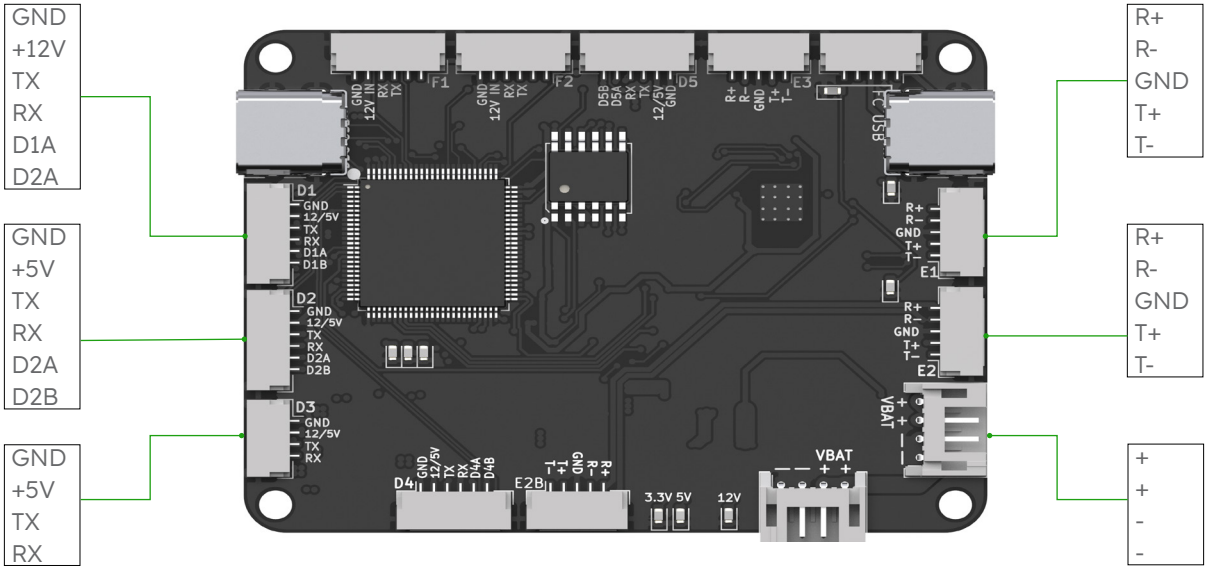
Expansion Port Overview

Phalanx G1

1.Expansion Board USB-C Port
2.Serial Interface D1
3.Serial Interface D2
4.Serial Interface D3

1.External Output Power Port（21V-26V)
2.Ethernet Port E1
3.Ethernet Port E2
4.FC USB-C Port


Phalanx USB-C
Serial Interface D1
Serial Interface D2
Serial Interface D3
FC USB-C
Ethernet Port E2
Ethernet Port E1
Output Power
COEV
DYNAMICS
AQUILA
D1 D2 D3
VBAT E1 E2 FC


GND
+12V
TX
RX
D1A
D2A
GND
+5V
TX
RX
D2A
D2B
GND
+5V
TX
RX
R+
R-
GND
T+
T-
R+
R-
GND
T+
T-
+
+
-
-
D1
D2
D3
E1
E2
VBAT

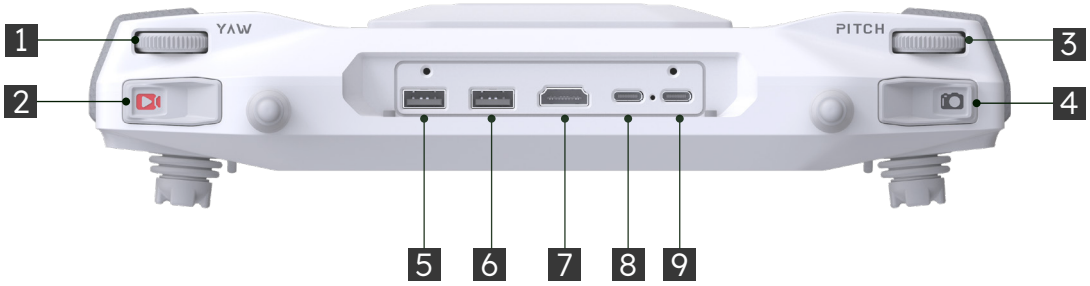
Remote Controller Overview

1.Antennas
2.Left Control Sticks
3.Flight Pause Button
4.RTL Button
5.Power Button
6.Battery Level Indicators
7.Touch Screen
8.Right Control Sticks
9.Function Button 1
10.Function Button 2
11.Mission Start/Stop Button

1.Tripod mounting hole

1.Customizable C2 Button

2.Customizable C1 Button



1.Gimbal Yaw Control Dial
2.Record Button
3.Gimbal Pitch Control Dial
4.Photo Button
5.USB Port
6.USB Port
7.HDMI Port
8.Charging USB-C Port
9.External Data Port

Aircraft

This section introduces the aircraft components,features and functions.

Aircraft

Profile

The AQUILA includes a flight controller,a communication system,a positioning system and an Flight Battery. This section describes the functions of these components.

Flight Modes

The AQUILA uses a CodevDynamics dedicated flight controller,which provides the flight modes below:

Position Mode :

The aircraft utilizes the GNSS/RTK module to automatically stabilize itself. When the GNSS signal is strong, the aircraft uses GNSS for positioning. When RTK module is enabled and the differential data transmission is good, it provides centimeter-level positioning.

Altitude Mode :

GNSS not used for positioning and aircraft can only maintain altitude using the barometer. It enters Altitude mode only when there is weak GNSS signal or when the compass experiences interference .

Altitude Mode Warning

The aircraft will fly in Position Mode by default.It enters Altitude mode only when there is weak GNSS signal or when the compass experiences interference .
In Altitude Mode,the aircraft cannot position or outo-brake in this mode and easily affected by its surroundings, which may result in horizontal shifting, User need to use the remote contoller to posituon the aircraft.

Maneuvering the aircraft in Altitude Mode can be difficult. Avoid flying in areas where GNSS signal is weak, or in confined spaces. The aircraft will otherwise be forced to enter Altitude mode, leading to potential flight risks, please land it in a safe place as soon as possible.

RTL Mode (Return To Launch)

In RTL Mode, the aircraft will automatically fly back to the point and land.

Mission Mode

In Mission Mode, the aircraft will perform the mission automatically.

Aircraft Status Indicators

The AQUILA has Front LEDs and Aircraft Status Indicators.
The positions of these LEDs are shown in the figure below:

The Front LEDs show the orientation of the aircraft. The Front LEDs glow solid white when the aircraft is turned on to indicate the front (or nose) of the aircraft. The Aircraft Status Indicators communicate the system status of the flight controller. Refer to the table below for more information about the Aircraft Status Indicators.

Aircraft Status Indicator Description

Normal:

Altitude Mode: Fast blue flashing
Position Mode: Alternate red and green flashing
RTL Mode: Fast yellow flashing
Mission Mode: Fast purple flashing

Warning !

Remote Controller Signal Lost：	Fast red flashing
Low Battery Warning：	Fast red flashing
CPU Warning:	Fast purple flashing

Return to Launch (RTL)

The Return to Launch (RTL) function brings the aircraft back to the last recorded Home Point when there is a strong GNSS signal. There are three types of RTL: Smart RTL, Low Battery RTL, and Failsafe RTL.

Smart RTL:

Use the RTL button on the remote controller when GNSS is available to initiate Smart RTL(Long press for 2s).After booting up, the aircraft status indicator will be a yellow LED blinking continuously. In the process of RTL, press the Smart RTL button again to terminate the procedure and full contro of aircraft.

Low Battery RTL:

When the flight battery power is too low, there is not enough power to return home. At this time, the user should land the aircraft as soon as possible.In order to prevent unnecessary danger due to insufficient battery power, the aircraft will intelligently determine whether the current battery power is sufficient based on the flight position information.

When the battery level drops to 23%, if the aircraft's current position is greater than 500 meters from the take-off point, the aircraft will automatically return to home (if the aircraft's current position is less than 500 meters away from the take-off point, the aircraft will automatically return to home at 16% battery level). During the return home process, the user can cancel the return home mode by switching the mode switch. If the user cancels the low-voltage return to home reminder and continues to fly, when the battery level drops to 5%, the aircraft will make a forced landing at its current position, which may cause the aircraft to be lost or crashed.

Current Battery	Remark	Aircraft Status Indicator	FlyDynamics App	Flight Instructions
30%	Low battery Warning.	Fast red flashing.	Voice prompt low battery warning.	Flying normally.
23%	When the current position of the aircraft is greater than 500m from the take-off point, the battery is sufficient to return home safely.		Voice prompt low batterywarning, and automatically enter RTL moded.	The aircraft will return to the Home Point and land automatically. Users can also cancer the RTL process and land manually.
16%	When the current position of the aircraft is less than 500m from the take-off point, the battery is sufficient to return home safely.		Voice prompt low battery warning, and automatically enter RTL mode.	The aircraft will return to the Home Point and land automatically. Users can also cancer the RTL process and land manually.
5%	The aircraft must land immediately.		Voice prompt low battery warning, and automatically enter Land mode.	The aircraft will slowly land at the original position and stop the motors.

Failsafe RTL:

Failsafe RTL is automatically activated if the remote controller and the aircraft are disconnected over 5 seconds. The aircraft will return in a straight line to the takeoff point and land. When the remote controller is connected to the aircraft during return to home , the aircraft will continue to return home,But users can cancel RTL by switching the mode switch.

RTL Procedure:

1. Home Point is recorded automatically.
2. RTL procedure is triggered, i.e., Smart RTL, Low battery RTL, and Failsafe RTL.
3. Home point is confirmed and the aircraft adjusts its orientation.
4. When less than 30m from the Home Point, the aircraft will fly to the Home Point at the currunt altitude. If more than 30m from the Home Point and below the pre-set RTL altitude, the aircraft will ascend to the pre-set RTL altitude before flying to the Home Point. The aircraft will fly directly to the Home Point if it is above the pre-set RTL altitude.
5. The Aircraft will return to the Home Point, and Landing.

Safety precautions for RTL:

Set the return altitude in the settings menu to ensure that there are no dangerous objects in the aircraft's flight area before the RTL mode is activated.

In the RTLmode, the aircraft will land automatically, and the aircraft can also manually assist the landing of the Talon 1000 sRTK. Once the aircraft is close to the ground, the user should reduce the manual control to prevent the aircraft from tipping over. Under normal circumstances, the aircraft will automatically turn off the motors when landing, but the user should be prepared to slow down manually.

RTK Functions

Profile

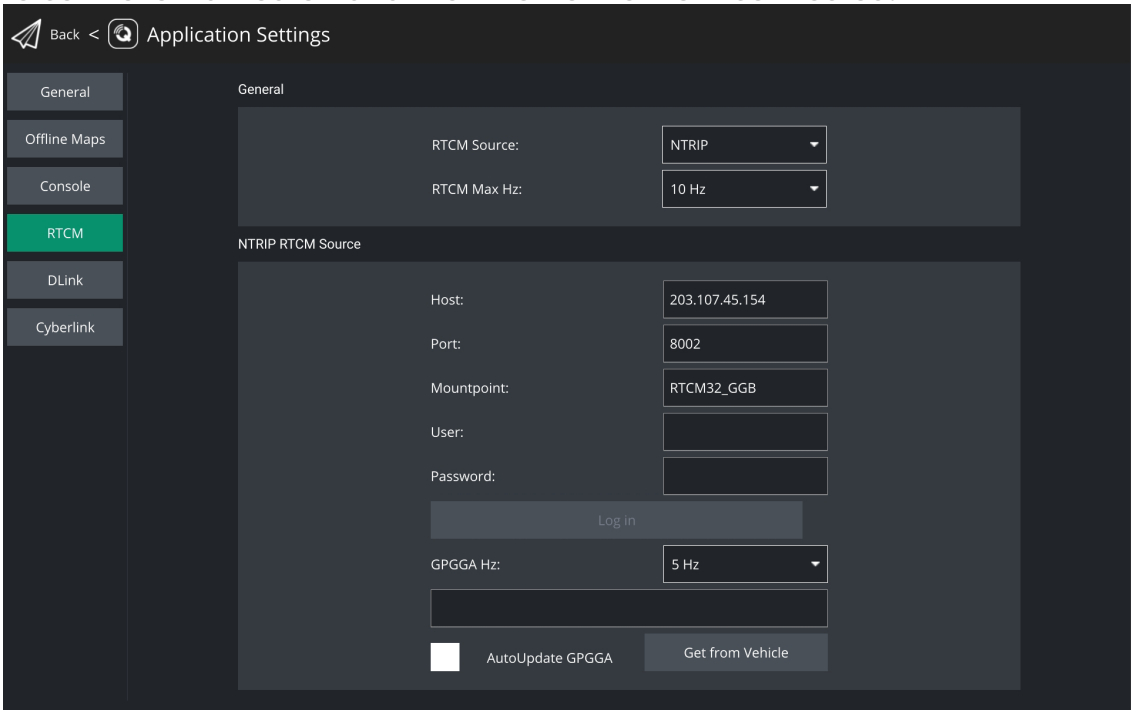
The aircraft has a built-in RTK , which can withstand magnetic interference from metal structures, ensuring stable flight. More accurate positioning data can be achieved when using a high precision GNSS Mobile Station or Internet network RTK service.

Enable/Disable RTK

Ensure that the "NTRIP RTCM Source"is log in and the RTK service type is correctly set (Mobile Station or Custom Network RTK service) before each use. Go to" RTCM" View to view and set.

Using the Custom Network RTK

You can mount a SIM Card to remote controller or use the app to connect to a wifi,and enable Internet network to use Custom Network RTK. Custom Network RTK can be used to replace the RTK base station. Connect the Custom Network RTK accound to the designated Ntrip serve to sent and receive differential data. Keep the remote controller turned on and the Internet network connected.



1. Make sure the remote controller turned on and the aircraft are linked , and the app is connected to the Internet network.

2. In RTCM interface, select the RTCM Source type as "NTRIP", fill in NTRIP's Host,Port,Mountpoint,User and Password,and then tap to set by following the instructions.

3. Wait to connect to the Ntrip server. In the Flight main pages, the status of the aircraft's positioning in the status table will show "FIX" to indicate that the aircraft has obtained and used the differential data from the mobile station.

Flight Recorder

FLight data is automatically recorded to the internal storge of the aircraft. You can connect the aircraft to a computer via the USB port and export this date via FlyDynamics App.

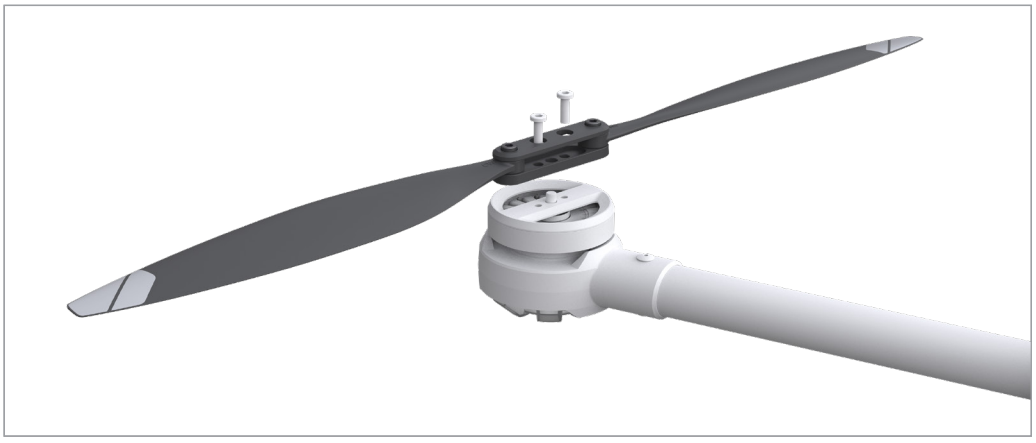
Propellers

Propellers Usage Guide

Only use Codev Dynamics approved propellers. Do not mix propeller types.
Ensure to check that the propellers and motors are installed firmly and correctly before each flight.
Ensure that all propellers are in good condition before each flight. Do not use aged, chipped, or broken propellers.
To avoid injury, stand clear of and do not touch propellers or motors when they are spinnning.

Replaceing the Propellers

In order to replace the propellers, use the H2.5 hex key with ball-end.



Propeller blades are sharp, please handle with care.

Flight Battery

The flight battery is specially designed for AQUILA. It uses a brand-new high-performance battery. Please be sure to fully charge the battery before using it for the first time. Must use the special charger provided by Codev Dynamics for charging.

Capacity：	10000mAh
Voltage：	26.1V
Battery Type：	Lipo 6S
Energy：	270wh

Please read carefully and strictly abide by the requirements of Codev Dynamics in this manual, disclaimer, and battery surface before using the battery. The user shall bear the consequences caused by failure to use it as required.

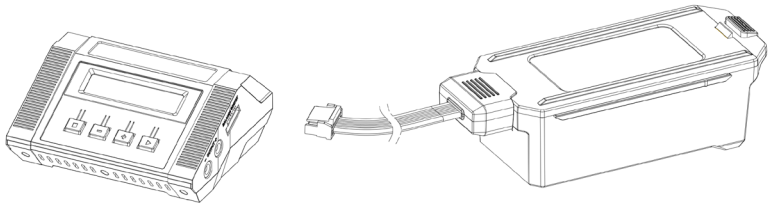
Warnings:

1. The Flight Battery is asignificantyl reduced when flying in low temperature environments (temperatures below 5˚C).
2. Ensure that the battery is fully charged and the cell voltage is at 4.4V before each flight.
3. Enter the flight as soon as FLyDynamics App displays the "Low Battery Level Warning" in low temperature environments. You will still be able to control the aircraft's movement when this warning is triggered.
4. In extremely cold weather, the battery tempereture may not be high enough even after warming up. In this cases, insulate the battery as required.
5. In ensure optimal performance of the battery, keep the battery temperature above 16˚C.
6. In low temperature environments, it will take a longger time for the batteries to warm up. It is recommended to keep the battery warm before use to reduce the warm-up time.

Charger

Charge

1. Use the AC power cord to connect the power interface of the charger to an AC power source.
2. Press the power button to turn on the charger.
3. Connect the battery.
4. Set up and start charging.



Do not frequently charge in a low temperature environment, as the charging time will become longer and the battery life may be impaired.

Do not use charging settings greater than 1C to charge.

Remote Controller

This section describes the features of the remote controller and includes instructions for controlling the aircraft and the camera.

Remote Controller

Profile

The Remote Controller has a transmission range of up to 10km with controls for camera tilt and photo capture, Has a built-in 7-inch high brightness 1000 cd/m2 screen has a resolution of 1920x 1080 pixels, featuring an Android system with multiple functions such as Bluetooth and GNSS. In addition to supporting WI-Fi connectivity, it is also compatible with other mobile devices for more flexible usaage. The Remote Controller has a maximum working time of 6 hours with the built-in battery.

The Remote Controller can reach maximum transmission distance (FCC) in an unobstructed area with no electromagnetic interference at an altitude of about 400 feet (120 meters). The actual maximum transmission distance may be less than the distance mentioned above due to interference in the operating environment, and the actual value will fluctuate according to the strength of interference.

Maxed operating time is estimated in a lab environment at room tempreture, for reference only. When the Remote Controller is powering other devies, the run time will be reduced.

Compliance Standards: The remote controller is compliant with local laws and regulations.
Stick Mode: Controls can be set to Mode 1, Mode 2, Can be customized in FlyDynamics (the default is Mode 2).

Do not operate more than three aircrafts within the same area (roughly the size of a soccer field) to prevent transmission interference.

Preparing the Remote Controller

Charging

Using the official charger, it takes about 2 hours to fully charge under normal temperature shutdown.

Warnings:

Please use the official charger to charge the remote controller.

To keep the remote controller battery in the best condition, please make sure to fully charge the remote controller every 3 months.

Remote Controller Operations

Checking the Battery Level and Turning On

Checking the Battery Level

Check the bartery level according to the Battery Levels LEDs. Press the power button once to check it while turned off.

Press the power button once, press again and hold a few seconds to turn on/off the Remote Controller.

Controlling the Aircraft

This section explains how to control the orientation of aircraft through the remote controller, Control can be set to Mode 1 or Mode 2.

Mode1

Mode2

The stick mode is set to mode 2 by defaul,This manual takes Mode2 as an example to illustrate the control method of the remote control.

RTL Button

Press and hold the RTL button to start Return to Launch(RTL) and the aircraft will return to the last recorded Home Point. Press the button again to cance RTL.

Optimal Transmission Zone

Make sure the antennas are facing towards the aircraft .

Oprerating the Camera

Shoot videos and photos with the Photo button and Record button on the remote controller.

Photo Button:

Press to take a photo.

Record Button:

Press once to start recording and press again to stop.

Opreating the Gimbal

Use the left dial and right dial to adjust the pitch and pan.

The left dial controls the gimbal pan. Turn the dial to the right, and the gimbal will shift clockwise. Turn the dial to the left , and the gimbal will shift counter clockwise. The camera will remain in its current position when the dial is static.

The right dial controls the gimbal tilt. Turn the dial to the right, and the gimbal will shift to point upwards. Turn the dial to the left , and the gimbal will shift to point downwards. The camera will remain in its current position when the dial is static.

Video Transmission Description

AQUILA uses CodevDynamics industry video transmission technology, video, data, and control three-in-one. End-to-end equipment is not restricted by wire control, and maintains a high degree of freedom and mobility in space and distance. With the complete function buttons of the remote control, the operation and setting of the aircraft and the camera can be completed within a maximum communication distance of 10 kilometers. The image transmission system has two communication frequency bands, 5.8GHz and 2.4GHz, and users can switch according to the environmental interference.

Ultra-high bandwidth and bit stream support can easily cope with 4K resolution video data streams. The 200ms screen-to-screen low delay and delay jitter sensitive control are better, which meets the end-to-end real-time requirements of video data. Support H265/H264 video compression, AES encryption.

The adaptive retransmission mechanism implemented at the bottom layer is not only much better than the application layer retransmission mechanism in terms of efficiency and delay, but also greatly improves the performance and user experience of the link in an interference environment.

The module continuously detects the interference status of all available channels in real time, and when the current working channel is interfered, it automatically selects and switches to the channel with the lowest interference to ensure continuous and reliable communication.

Fly Dynamics App

This section introduces the main functions of the FlyDynamics app.

Fly Dynamics App

FlyDynamics App is specially designed for industry applications. Manual flight integrates a variety of professional functions, and the operation is simple and efficient. Route flight can set the route through the flight planning function, control the drone to operate autonomously, simplify the workflow and improve work efficiency.

Manual Flight

Camera View

The description below use a Z40TIR gimbal and camera as an example. The Camera View may vary when using other gimbals and cameras.

1.Main menu

Sliding down the menu, choose to enter the Aircraft Settings、App Settings.

2.Flight Mode

Display the current flight mode. Sliding down the menu to switch the flight mode (Altitude/Position/Mission/Return).

3.Aircraft status

Display the current aircraft status. Sliding down the menu to check the status of each sensor.

4.GNSS Status

Shows the strength of the GNSS signal. If the RTK function of the aircraft is turned on, "RTK" will be displayed. Sliding down the menu to display the GPS Count, GPS lock, HDOP, VDOP and Course Over Ground.

5.Battery Status

Remaining battery percent. Sliding down the menu to display the current Battery Voltage and Accumulated Consumption.

6.Operating Frequency

Display the communication frequency band and signal strength.

7.Message Box

Sliding down the menu to read all warning messages.

8.Smart Track

Click to disable/enable Smart Track. When using the Z10TIR/Z40TIR or Q10T, the Smart track function can be used to lock and track targets such as people, cars, boats,or other objects. After locking the targe, it will automatically contro the gimbal to rotate, so that the target can be located in the center of screen, and adjust the camera focal length to an appropriate focus rate to track and view the target.

9.Wide Camera View

Display the Wide Camera view.

10.Map
Tap to view the map. Read the "Map flight View" section for more information.

11.Infrared Camera View
Display the Infrared Camera view.

12.Zoom
Display the camera zoom rate, Click "+" and "-" to adjust the zoom magnification of the zoom camera. Click "reset zoom" and the camera will automatically return to its original state.

13.Display the current remaining capacity of the memory card.

14.Grid
Display the tilt axis angle of the gimbal.（-90˚ ～ 45˚）

15.Shutter/Record Button
Tap to shoot photos or start/stop recording.

16.Display the current camera model and the number of photos/recording time.

17.Parameter Settings
Tap to enter the photo and video settings.

18.Parameter Settings
Tap to enter the photo and video settings.

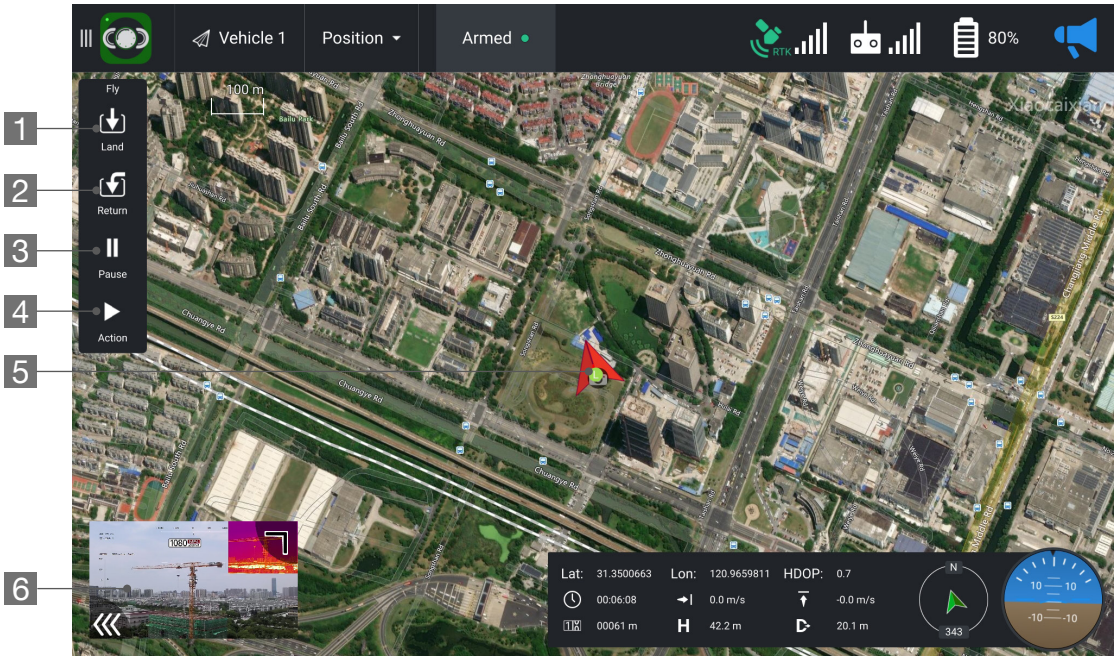
19.Fusion method
Tap to switch the view of Infrated Camera and Wide Camere.

20.Primary Flight DIsplay/Navigaton Display
Display the current total flight time, total flight mileage, flight speed, ascent speed, descent speed, the altitude , and the relative distance between the aircraft and the remote control.

Map Flight View

Quickly switch to the map interface by tapping the map icon in the lower left corner of the main screen.

Note: To ensure the normal use of the map function, please connect to the network in advance to cache the map.



1.Land

You can land at the current position at any time while flying.

2.Return

Return to the home position at any time while flying.

3.Pause

You can pause most operations, including taking off, landing, RTL, missions, Orbit at location.

4.Action

Tap to continue the mission.

5.The position of the aircraft

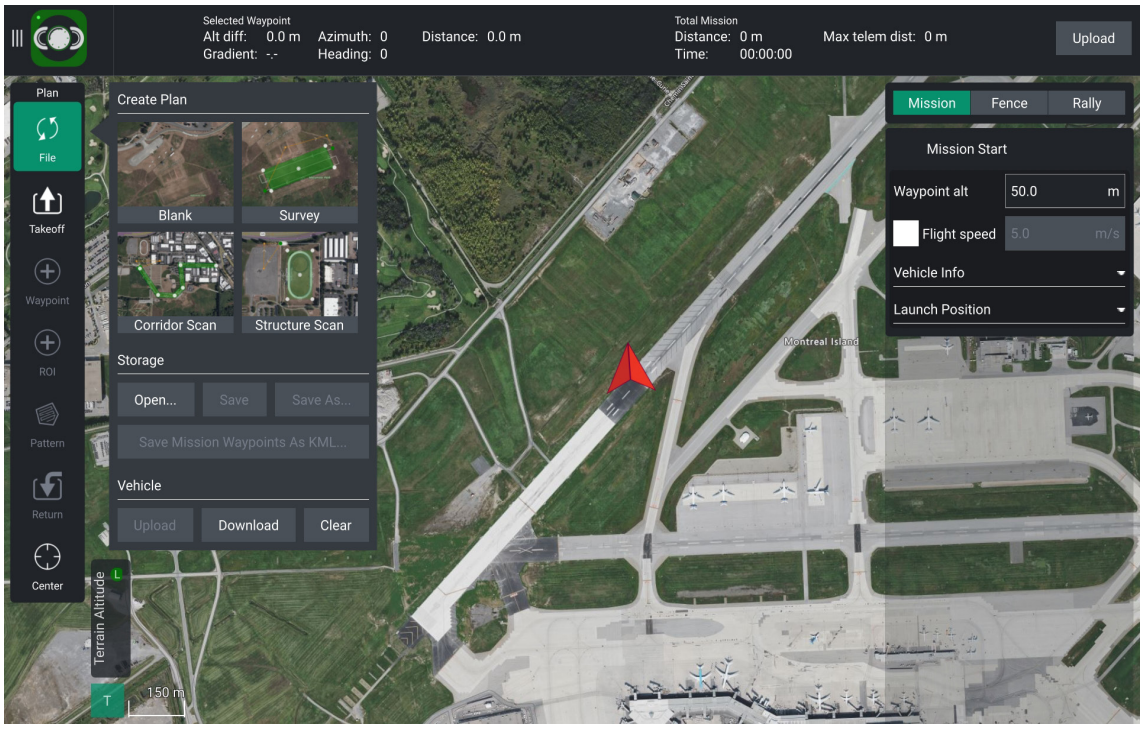
The GPS module in the aircraft can record the current position of the aircraft in real time.

6.Camera View

Mission Flight

Introduction

AQUILA is designed for automatic flight, scanning, mapping, surveying and other stable flight modes, and is used for high-precision image acquisition and post-processing preparation.



1.File

The File tools are used to move missions between the ground station and vehicle, and to save/restore them from files.

The File tools provide the following functionality:
Upload (Send to vehicle);
Download (Load from vehicle);
Save/Save as to File, including as KML file;Load from File;
Clear All (Clear all mission waypoints from Plan view and from vehicle).

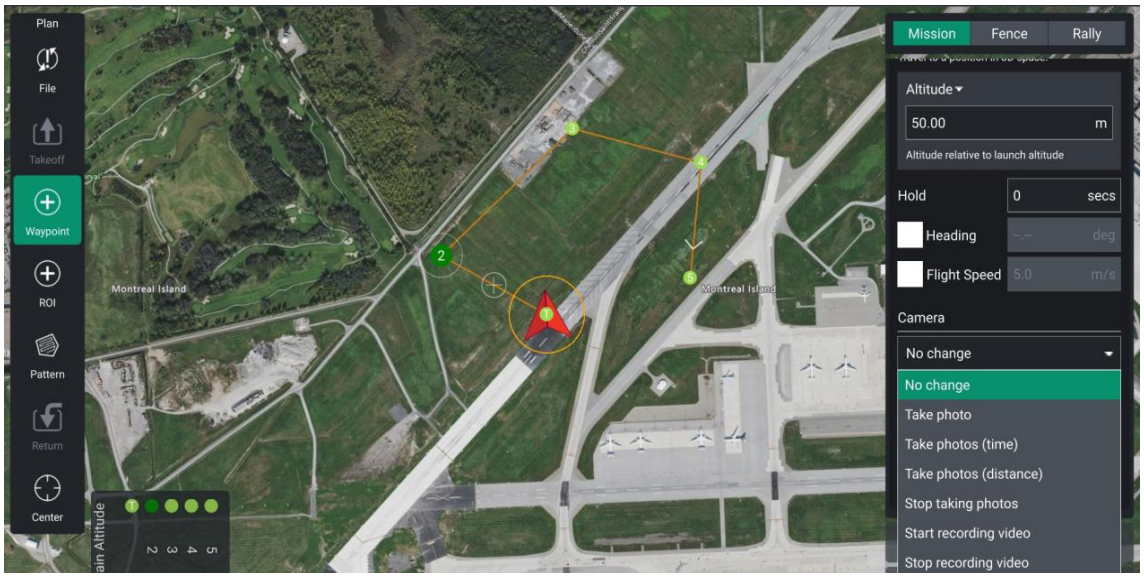
2.Take off

Tap to set the mission Takeoff point.

3.Waypoint

Click on the Add Waypoint tool to activate it. While active, clicking on the map will add new mission waypoint at the clicked location. The tool will stay active until you select it again. Once you have added a waypoint, you can select it and drag it around to change its position.

Each waypoint mission contains mission instructions, such as Take photo or Start recording video at a certain waypoint, setting zoom multiple, setting the pitch and yaw angles of the Gimbal , flight speed, and altitude, etc.



4.ROI

Tap to add a ROI point, tthe front of aircraft (or nose) will always towards to the ROI point all along during the mission flight.

5.Pattern

The Pattern tool simplifies the creation of missions for flying complex geometries, including Survey、Corridor Scan and Structure Scan, Which can provide a full solution for any surveying, mapping or inspection workflow.

Survey

A survey allows you to create a grid flight pattern over a polygonal area. You can specify an arbitrary polygon, the angle and other properties of the grid, and camera settings appropriate for creating geotagged images.

Corridor Scan

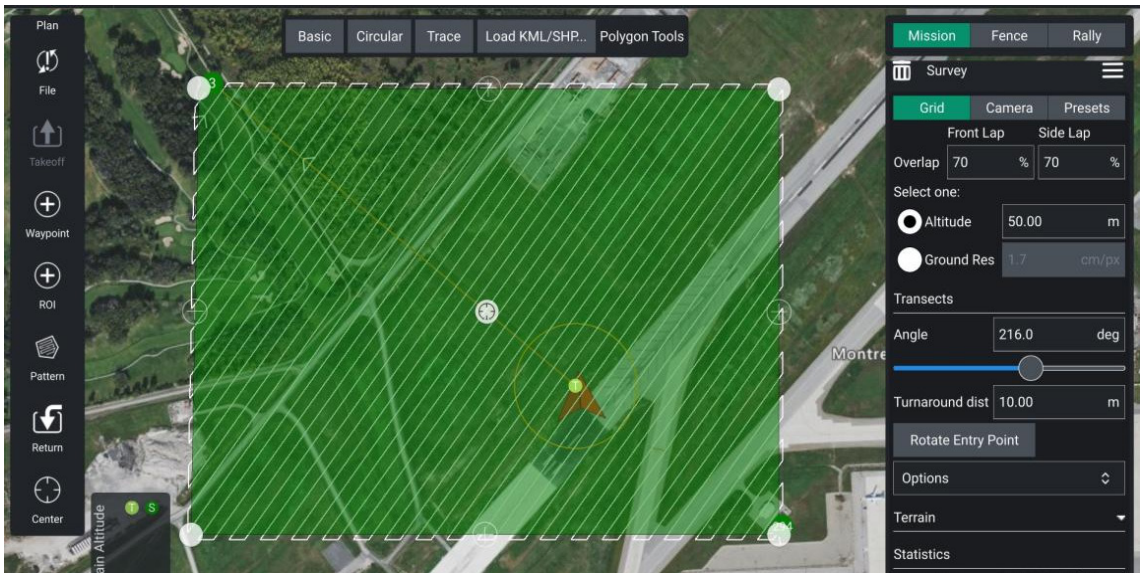
A corridor scan allows you to create a flight pattern that follows a poly-line. This can be used to, for example, survey a road.

Structure Scan

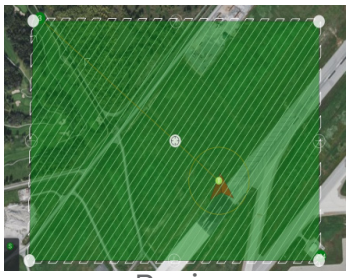
A Structure Scan allows you to create a grid flight pattern that captures images over vertical surfaces (e.g. walls) around a structure with an arbitrary polygonal (or circular) ground footprint. Structure Scans are typically used for the visual inspection or creating 3d models of structures.

A. Survey:

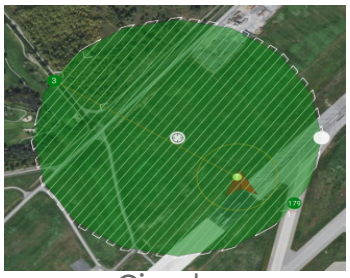
Choose the Pattern Tool from the Plan Tools and then select Survey.



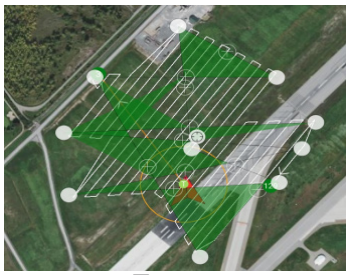
For different operating environments, in the Survey, we provide three graphics options, Basic, Circular, Trace, and you can also choose to import KML files.



Basic



Circular



Trace

This will add a survey grid to the map, and a Survey item to the mission list (on the right).
On the map drag the vertices to the change the shape of the polygon.

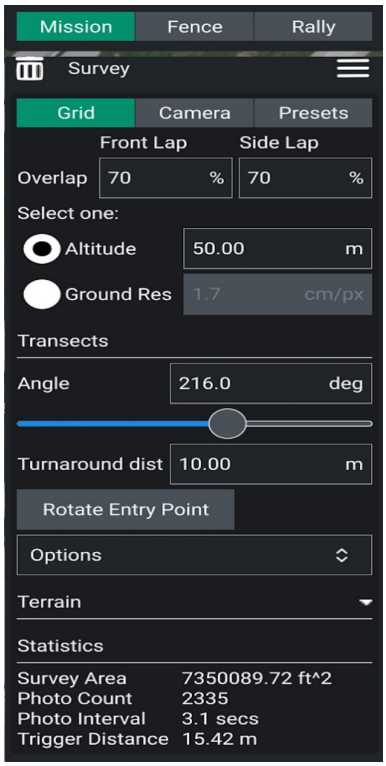
Click the (+) symbol between existing vertices to create a new vertix. The new vertix can then be dragged into a new position.

The survey can be further configured in the associated mission item (in the mission item list on the right hand side of the Plan View).

Front Lap/Side Lap: Overlap between each image capture. This can be configured separately for when flying along grid lines or across them.

Altitude: Survey altitude (ground resolution will be calculated/displayed for this altitude).

Ground Res: Ground resolution for each image (altitude required to achieve this resolution calculated and shown).



Transects: The Transects section is used for grid settings that are independent of the camera used.
The configurable options are:
Angle: The angle of the grid lines, relative to North.
Turnaround dist: Amount of additional distance to add outside the survey area for vehicle turn around.
Rotate Entry Point: Press button to swap the start and end point of the survey.

Hover and capture image:
Hover to capture images (multicopter only).
Refly at 90 degree offset:
Check to refly the whole mission at a 90 degree offset.
Images in turnarounds:
Check to take images when turning.
Terrain: By default, a flying vehicle will follow the survey path at a fixed altitude. Enabling Terrain Following makes the vehicle maintain a constant height relative to ground.

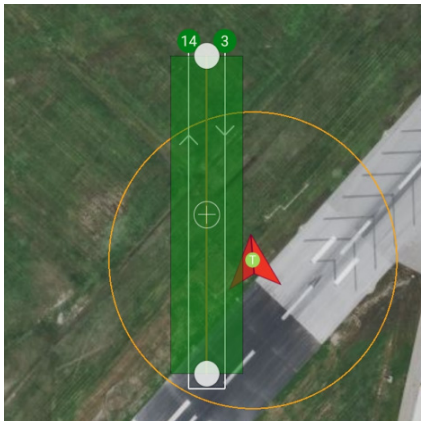
Statistics: The Statistics section shows the calculated survey area, photo interval, trigger distance, photo spacing and planned photo count.

Camera: Camera triggering behaviour depends on the camera/camera settings. You can select an existing camera, custom camera, or manually enter the settings.

B. Corridor Scan

Choose the Pattern Tool from the Plan Tools and then select Corridor Scan.

In the Corridor Scan, we can choose the Basic /Trace graphics or import KML files.



Basic

Trace

This will add a corridor to the map, and a Corridor Scan item to the mission list (on the right).On the map drag the ends of the corridor to the start and end positions of the scan, respectively

.

Click the (+) symbol at the centre of a line to create a new vertix. The new vertix can then be dragged into position to follow the path of the desired corridor.

The corridor scan can be further configured in the associated mission item (in the mission item list on the right hand side of the Plan View).

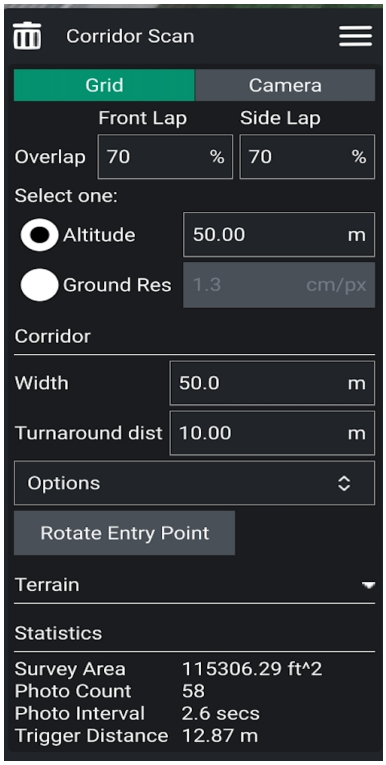
Front Lap/Side Lap: Overlap between each image capture. This can be configured separately for when flying along grid lines or across them.

Altitude: Survey altitude (ground resolution will be calculated/displayed for this altitude).

Ground Res: Ground resolution for each image (altitude required to achieve this resolution calculated and shown).

Width: Set the width of the scan around the polyline that defines the path.

Turnaround dist: Amount of additional distance to add outside the survey area for vehicle turn around.Options: Check to enable image capture a turnaround points.



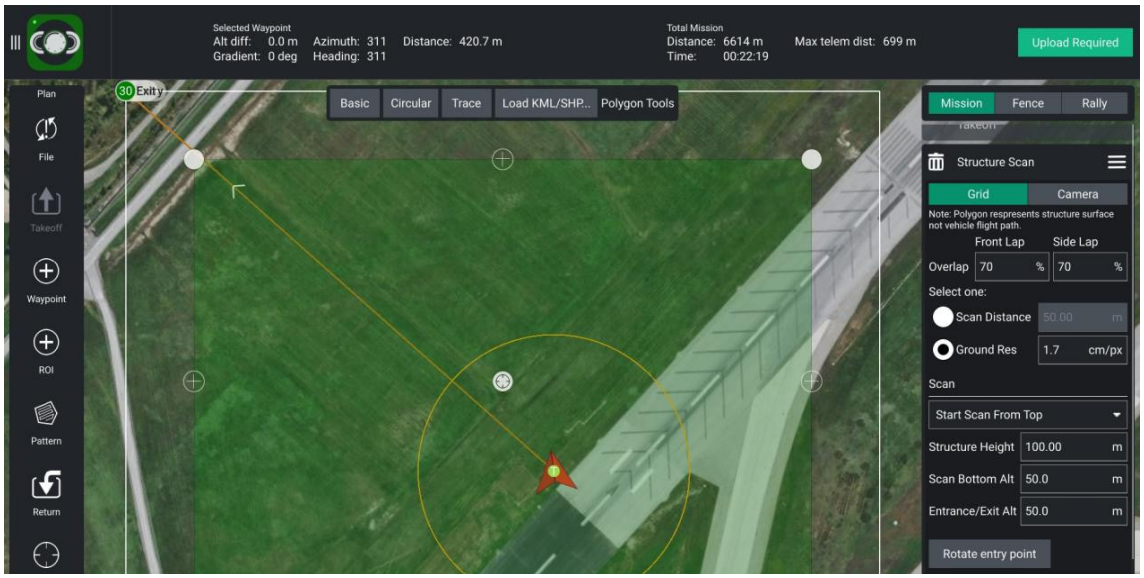
Terrain: By default a flying vehicle will follow the corridor path at a fixed altitude. Enabling Terrain makes the vehicle maintain a constant height relative to ground.

Statistics: The Statistics section shows the calculated survey area, photo interval, photo spacing and planned photo count.

Camera: Camera triggering behaviour depends on the camera/camera settings. You can select an existing camera or manually enter the settings.

C. Structure Scan:

Choose the Pattern Tool from the Plan Tools and then select Structure Scan.



In the Structure Scan, we can choose the Basic/Circular/Trace graphics or import KML files.

Basic Circular Trace

This will create a simple square structure scan on the map.The region shown in green must be modified so that it surrounds the structure.

You can also change to a circular footprint by clicking on the central "vertix" (marked in white) and selecting Circle in the popup menu.

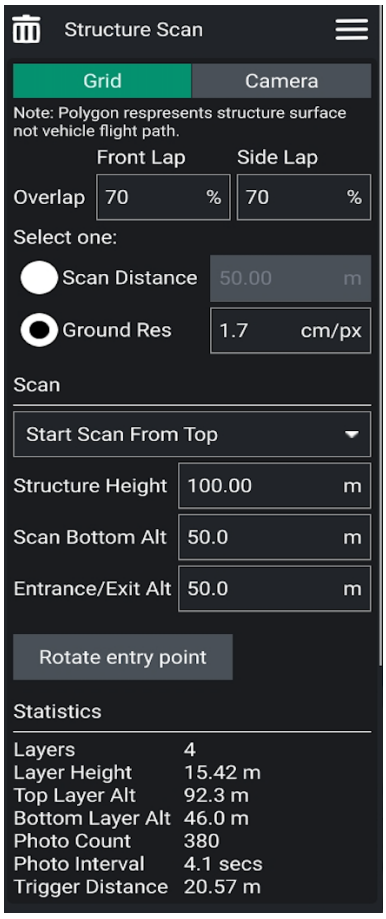
The rest of the configuration is handled using the Structure Scan editor on the right hand side of the view. First select whether you want to perform a manual scan, a scan using a particular camera, or a scan using a custom camera definition.

Front Lap: Image overlap from top to bottom (increasing shrinks layer height and increases layer count).
Side Lap: Image overlap at sides (increasing takes more images in each lap/layer scan).

Scan distance: Distance from the structure of the flight path.

Ground Res: Required image resolution/sample quality of surface.

Start scan from top/bottom: The direction in which layers are scanned.



Structure Height: The height of the object being scanned.

Scan Bottom Alt: Use this setting to avoid obstacles around the base of the structure. This adjust the bottom of the structure to be above the ground, and hence the altitude of the first scan (the height of the lowest layer flight path is shown in the scan statistics as Bottom Layer Alt.

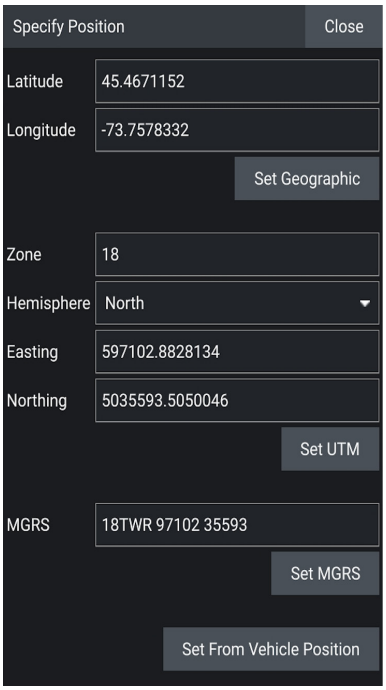
Entrance/Exit Alt: Use this setting to avoid obstacles between the last/next waypoint and the structure to be scanned.
The vehicle will fly to the Entrance/Exit point at this altitude and then descend to the initial layer to start the scan.
The vehicle will ascend to this altitude after completing the scan and then move to the next waypoint.

Rotate entry point: Move the start/finish point to the next vertix/position on the flight path.

Statistics: The Statistics section shows the Layers、Layer Height、Top Layer Alt、Bottom Layer Alt、Photo Count、Photo Interval and Trigger Distance.

6.Return

Tap to "Return" to set the automatic return to the take-off point after completing the mission.



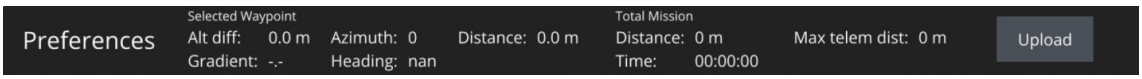
7.Center

Tap to "Center" can navigate to the center of the map。 Center map on Mission， All items, Launch, Vehicle, Current Location or Specified Location （As shown on the right, if you choose, you can input detailed coordinate points and locate the target point).

8.Plan Toolbar

Status information for the currently selected waypoint relative to the previous waypoint, as well as statistics for the entire mission (e.g. horizontal distance and time for mission).Max telem dist is the distance between the Planned Home and the furthest waypoint.

When connected to a vehicle it also shows an Upload button, can be used to upload the plan to the vehicle.



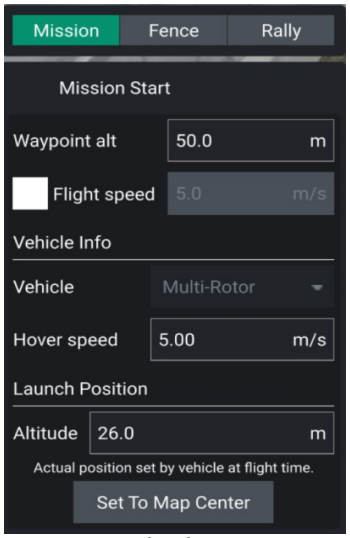
9.Mission Command List

Mission commands for the current mission are listed on the right side of the view. At the top are a set of options to switch between editing the mission, GeoFence and rally points. Within the list you can select individual mission items to edit their values.

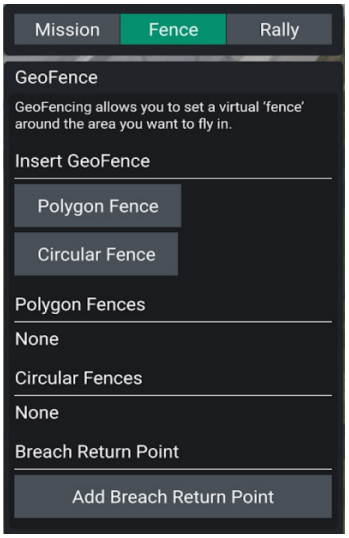
Mission Start：The Mission Start panel is the first item that appears in the mission command list. It may be used to specify a number default settings that may affect the start or end of the mission.

Fence：GeoFences allow you to create virtual regions within which the vehicle can fly, or in which it is not allowed to fly. You can also configure the action taken if you fly outside permitted areas.

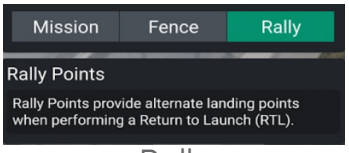
Rally: Rally Points are alternative landing or loiter locations. They are typically used to provide a safer or more convenient (e.g. closer) destination than the home position in Return/RTL mode.



Mission



Fence



Rally

Aircraft Settings

Summary

An overview of all the important setup options for your vehicle. Similar to the individual setup buttons, the summary blocks show a red indicator when those settings are not fully configured.

Airframe

Specify the airframe type for the vehicle.This page allows you to configure the main airframe selection associated with your vehicle. The view/process differs slightly based on the flight controller firmware used.

Sensors

The Sensor Setup section allows you to configure and calibrate the vehicle's compass, gyroscope, accelerometer and any other sensors.

Available sensors are displayed as a list of buttons beside the sidebar. Sensors marked with green are already calibrated, while sensors marked with red require calibration prior to flight. Sensors with no light are simple settings with default values that you may choose not to calibrate.Please refer to the section "Sensor Calibration" for specific usage.

Radio

Radio Setup is used to configure the mapping of your main transmitter attitude control sticks (roll, pitch, yaw, throttle) to channels, and to calibrate the minimum, maximum, trim and reverse settings for all other transmitter controls/RC channels. Please refer to the section **"Radio Calibration"** for specific usage.

Sensors Calibration

The Sensor Setup section allows you to configure and calibrate the vehicle's compass, gyroscope, accelerometer and any other sensors (the available sensors will depend on the vehicle type).

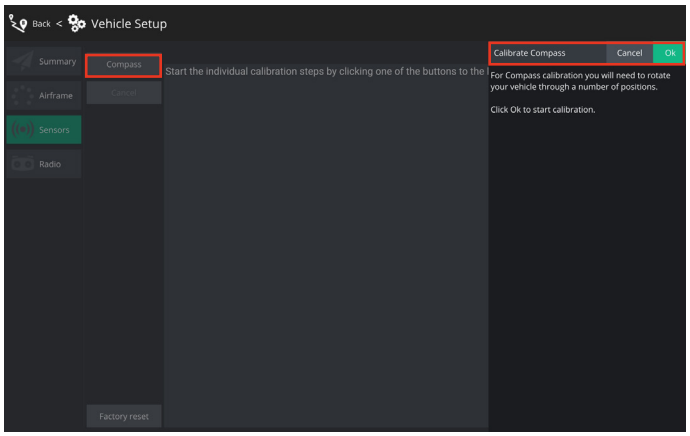
Available sensors are displayed as a list of buttons beside the sidebar. Sensors marked with green are already calibrated, while sensors marked with red require calibration prior to flight. Sensors with no light are simple settings with default values that you may choose not to calibrate.

Click on the button for each sensor to start its calibration sequence.

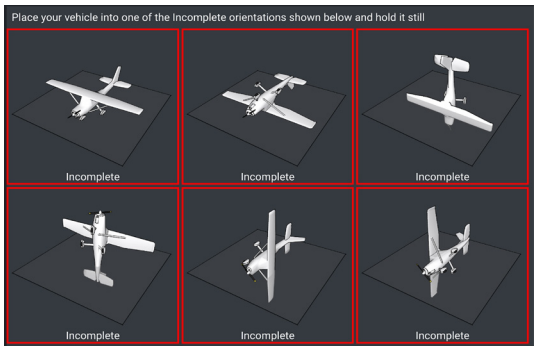
Compass :

The process guides you to position the vehicle in a number of set orientations and rotate the vehicle about the specified axis.

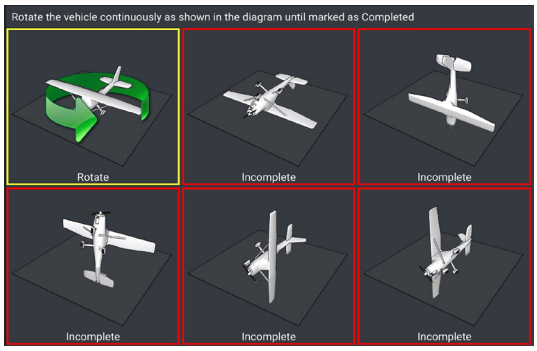
The calibration steps are:
1.Click the Compass sensor button and click OK to start the calibration.



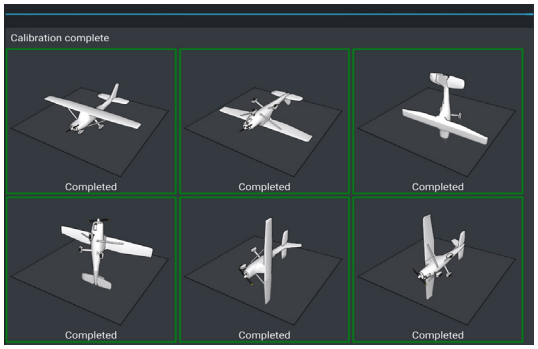
2.Place the vehicle in any of the orientations shown in red (incomplete) and hold it still. Once prompted (the orientation-image turns yellow) rotate the vehicle around the specified axis in either/both directions. Once the calibration is complete in that orientation the associated image on the screen will turn green.



1



2



3

3.Repeat the calibration process for all vehicle orientations.
Once you've rotated the vehicle in all the positions FlyDynamics App will display Calibration complete (all orientation images will be displayed in green) .You can then proceed to the next sensor.

If the calibration fails, keep the aircraft away from metal objects and perform the calibration again.
Note: If all the LED lights flash red quickly, it indicates that the geomagnetic calibration has failed, and the calibration process can be repeated. If the calibration continues to fail, please select the calibration location again.
Important note: Do not calibrate in areas with strong magnetic fields or near large pieces of metal, and do not carry ferromagnetic materials with you.

Radio Calibration

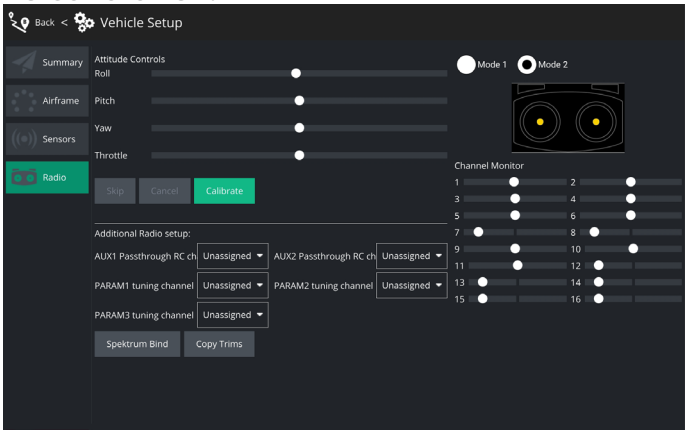
You need to move the sticks in a specific pattern that is shown on the transmitter diagram on the top right of the screen. Simply follow the instructions to complete calibration.

To calibrate the radio:

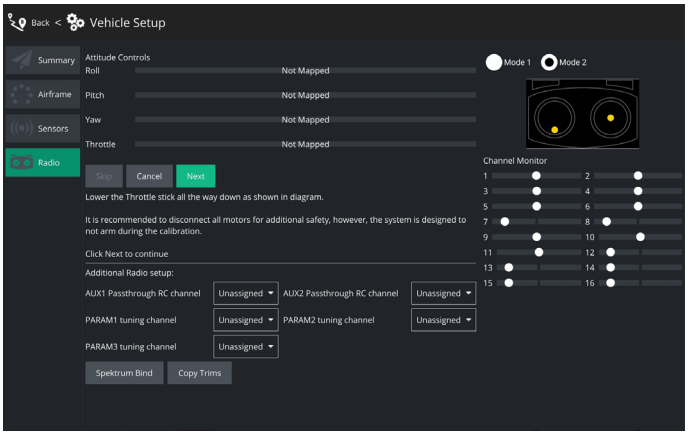
1.Select the Gear icon (Vehicle Setup) in the top toolbar and then Radio in the sidebar.

2.Turn on your RC transmitter.

3.Press OK to start the calibration.



4.Set the transmitter mode radio button that matches your transmitter configuration (this ensures that FlyDynamics displays the correct stick positions for you to follow during calibration).



5.Move the sticks to the positions indicated in the text (and on the transmitter image). Press Next when the sticks are in position. Repeat for all positions.

6.When prompted, move all other switches and dials through their full range (you will be able to observe them moving on the Channel Monitor).Press Next to save the settings.

Application Settings

General

The main application configuration settings. These are used to specify: display units, autoconnection devices, video display and storage, RTK GPS, etc.

Fly View:

Use Preflight Checklist:

Enable pre-flight checklist in Fly toolbar.

Enforce Preflight Checklist:

Checklist completion is a pre-condition for arming.

Keep Map Centered on Vehicle:

Forces map to center on the currently selected vehicle.

Show Telemetry Log Replay Status Bar:

Display status bar for Replaying Flight Data.

Virtual Joystick:

Enable virtual joysticks (PX4 only).

Use Vertical Instrument Panel:

Align instrument panel vertically rather than horizontally (default).

Show additional heading indicators on Compass:

Adds additional indicators to the compass rose:

Blue arrow: course over ground.

White house: direction back to home.

Green line: Direction to next waypoint.

Lock Compass Nose-Up:

Check to rotate the compass rose (default is to rotate the vehicle inside the compass indicateor).

Guided Minimum Altitude:

Minimum value for guided actions altitude slider.

Guided Maximum Altitude:

Minimum value for guided actions altitude slider.

Go To Location Max Distance:

The maximum distance that a Go To location can be set from the current vehicle location (in guided mode).

Plan View：

The default altitude used for the Missi·on Start Panel, and hence for the first waypoint.

Units:
This section defines the display units used in the application.

Miscellaneous:
This section defines a number of miscellaneous settings, related to (non exhaustively): font sizes, colour schemes, map providers, map types, telemetry logging, audio output, low battery announcement levels, default mission altitude, virtual joysticks, mission autoloading, default application file load/save path etc.

Telemetry Logs from Vehicle
Save log after each flight:
Telemetry logs (.tlog) automatically saved to the Application Load/Save Path (above) after flight.
Save logs even if vehicle was not armed:
Logs when a vehicle connects to FlyDynamics App. Stops logging when the last vehicle disconnects.
Save CSV log of telemetry data:
Log subset of telemetry data to a CSV file.

AutoConnect to the following devives:
Settings include:
Pixhawk: Autoconnect to Pixhawk-series device
SiK Radio: Autoconnect to SiK (Telemetry) radio
PX4 Flow: Autoconnect to PX4Flow device
LibrePilot: Autoconnect to Libre Pilot autopilot
UDP: Autoconnect to UDP
RTK GPS: Autoconnect to RTK GPS device

RTK GPS:
This section allows you to specify the RTK GPS "Survey-in" settings, to save and reuse the result of a Survey-In operation, or to directly enter any other known position for the base station.

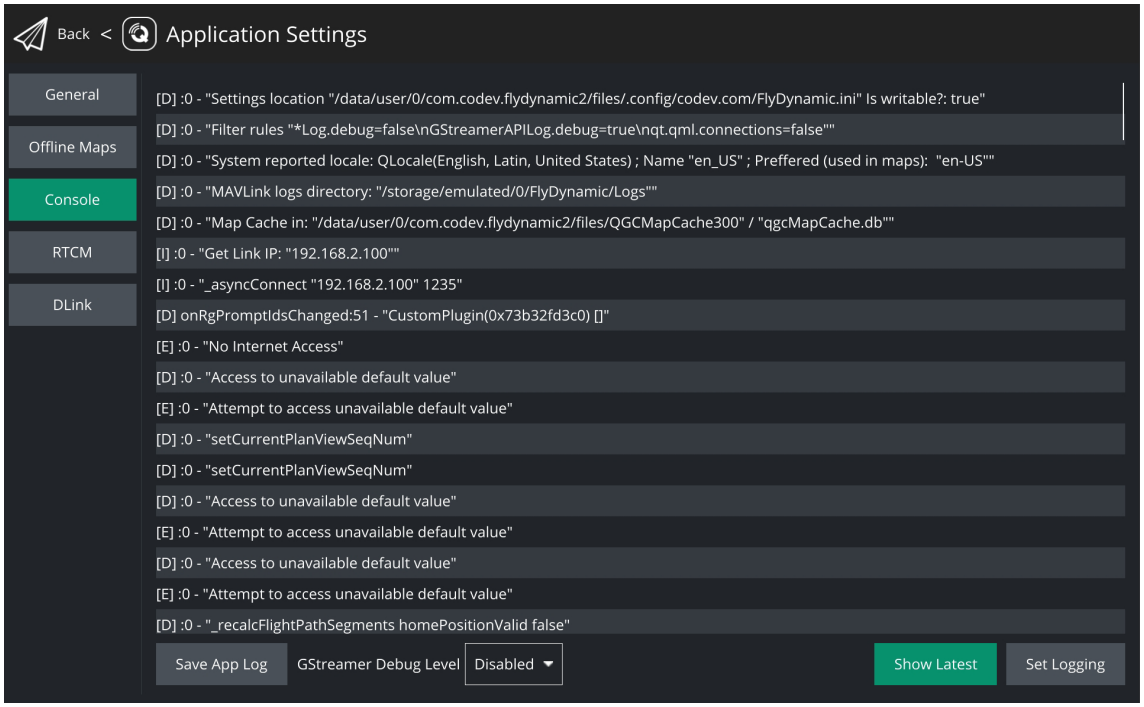
ADSB Server:
FlyDynamics can consume ADSB messages in SBS format from a remote or local server (at the specified IP address/port) and display detected vehicles on the Fly View map.

Offline Maps

Allows you to cache maps for use while you have no Internet connection.

Console

The Console can be helpful tool for diagnosing FlyDynamics problems.



Click the Set Logging button to enable/disable logging information displayed by FlyDynamics.

RTCM

RTK differential data transmission. Please refer to the section **"RTK Function"** for specific usage.

DLink

The aircraft is bound to the remote controller. For specific binding methods, please refer to the section **"Linking the Remote Controller"**.

Flight

This section describes flight restrictions and safe flight practices.

Flight Enviroment Requirements

1. Do not ues the aircraft in bad weather such as where wind speeds exceed 15m/s.
2. When flying in open areas , tall and largr metal structures may affect the accuracy of the on board compsaa and GNSS system. Make sure to operate the aircraft by following the prompts in the app.
3. Avoid obstacles, crowds, high voltage power lines, trees, and bodies of water.
4. MInimize interference by avoiding arears with elevated levels of electromagnetism, including base stations and radio transmission towers.
5. Aircraft and battery performance are subject to rnvironmental factors such as air density and temperature. Be very careful when flying at high altitudes, as battery and aircraft performance may be affected.

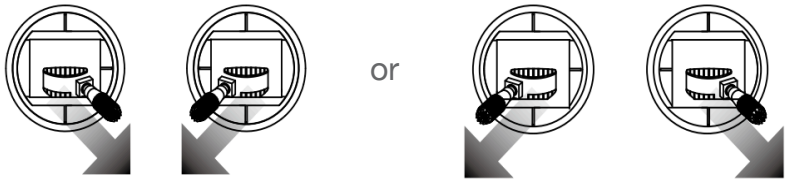
Preflight Checklist

1. Remote controller, Flight Battery, and display device are fully charged.
2. Landing gears are mounted firmly ,and batteries are locked firmly.
3. All the devices' firmware is up-to-date.
4. Ensure that a microSD card has been inserted.
5. The Camera and Gimbal work normally after the power is turned on.
6. Motors can start and are functioning normally.
7. The FlyDynamics App is successfully connected to the aircraft.
8. Do not face the battery connector downwards to the ground to avoid getting dust or water into the battery connecter.
9. Make sure that the gimbal dampener is without obvious wear and tear, and the gimbal anti-drop has been fastened.

Starting/Stopping the Motors

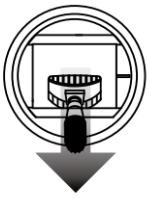
Starting Motors

Push both sticks to bottom inner or outer corners to start the motors.



Stopping Motors

When the aircraft has landed, push and hold the left stick down. The motors will stop after three seconds.



Emergency Propeller Stop

Click "Disarmed" can be used to execute the emergency propeller stop once the flight controller detects critical error during flight.

1. Place the aircraft in an open, flat area with the battery level indicators facing towards you.
2. Turn on the remote controller, then turn on the aircraft.
3. Launch FlyDynmics App, connect the display device and remote control, and enter the Camera View.
4. Wait until the Aircraft Status Indicators blink red and green alternately.
5. Turn on the motors and push the left stick up slowly to take off.
6. To land, hover over a level surface and gently pull down on the left stick to descend.
7. Turn off the aircraft, then the remote controller.

When the Aircraft Status Indicators blink yellow rapidly during flight , the aircraft has entered Failsafe mode.

A low battery level warning is indicated by the Aircraft Status Inducators appear red on the left and green on the right, and continuous fast blinking.

Appendix

Appendix

Specifications

Aircraft	**AQUILA**
Dimensions	500*450*300mm
Diagonal Wheelbase	600mm
Weight	Approx. 1.3 kg (without batteries) Approx. 2.5 kg (with one LPB610HV battery)
Max Payload	1.5kg
Operating Frequency	2.4000 - 2.4835 GHz; 5.725-5.850 GHz
Hovering Accuracy	Vertical： ±0.5 m (GPS enabled) ±0.1 m (RTK enabled) Horizontal： ±0.5 m (GPS enabled) ±0.1 m (RTK enabled)
RTK Positioning Accuracy	1cm + 1ppm（Horizontal) 1.5cm + 1ppm (Vertical)
Max Angular Velocity	120˚/s
Max Pitch Angle	30˚
Max Ascent Speed	5m/s
Max Descent Speed (vertical)	4m/s
Max Speed	12m/s
Service Ceiling Above Sea Level	5000m
Max Wind Resistance	15m/s
Max Flight Time	68min (no load)；33min (with 1500g load)
GNSS	GPS+GLONASS+BeiDou+Galileo
Operating Temperature	-20°C to 50°C (-4°F to 122° F)

Aircraft	**AQUILA 3**
Dimensions	600*600*300mm
Diagonal Wheelbase	735mm
Weight	Approx. 1.65 kg (without batteries) Approx. 2.85kg (with one LPB610HV battery)
Max Payload	3kg
Operating Frequency	2.4000 - 2.4835 GHz; 5.725-5.850 GHz
Hovering Accuracy	Vertical： ±0.5 m (GPS enabled) ±0.1 m (RTK enabled) Horizontal： ±0.5 m (GPS enabled) ±0.1 m (RTK enabled)
RTK Positioning Accuracy	1cm + 1ppm（Horizontal) 1.5cm + 1ppm (Vertical)
Max Angular Velocity	120˚/s
Max Pitch Angle	30˚
Max Ascent Speed	5m/s
Max Descent Speed (vertical)	4m/s
Max Speed	12m/s
Service Ceiling Above Sea Level	5000m
Max Wind Resistance	15m/s
Max Flight Time	80min (no load)；30min (with 3000g load)
GNSS	GPS+GLONASS+BeiDou+Galileo
Operating Temperature	-20°C to 50°C (-4°F to 122° F)

Remote Controller	**AVIATOR**
Operating Frequency	2.4000 - 2.4835 GHZ; 5.725-5.850 GHz
Max Transmitting Distance (unobstructed, free of interference)	10km
Dimensions	280x150x60mm
Weight	1100g
Operating system	Android10
Built-in battery	7.4V 10000mAh
Battery Life	4.5h
Touch screen	7 inch 1080P 1200nit
I/Os	2*USB、1*HDMI、2*USB-C
Operating Environment	-20°C to 50°C (-4°F to 122° F)

Flight Battery	**LPB610HV**
Capacity	10000mAh
Voltage	26.1V
Battery Type	Lipo 6S
Energy	231wh
Weight	1.2kg
Operating Environment	-20°C to 50°C (-4°F to 122° F)

Firmware Update

Aircraft firmware upgrade

Please download the latest Aircraft firmware from CodevDynamics official website before upgrading.

1. Connect the aircraft to a PC with a Type-C USB cable.
2. Run the FlyDynamics. First select the Gear icon (Vehicle Setup) in the top toolbar and then Firmware in the sidebar.
3. Please unplug your Pixhark and/or Radio from USB. Then plug your device via USB to start firmware upgrade.
4. Tap to Advanced settings , choose Custom firmware file, Click the OK button to start the upgrate.
5. Restart the deviece after the firmware update is complete.

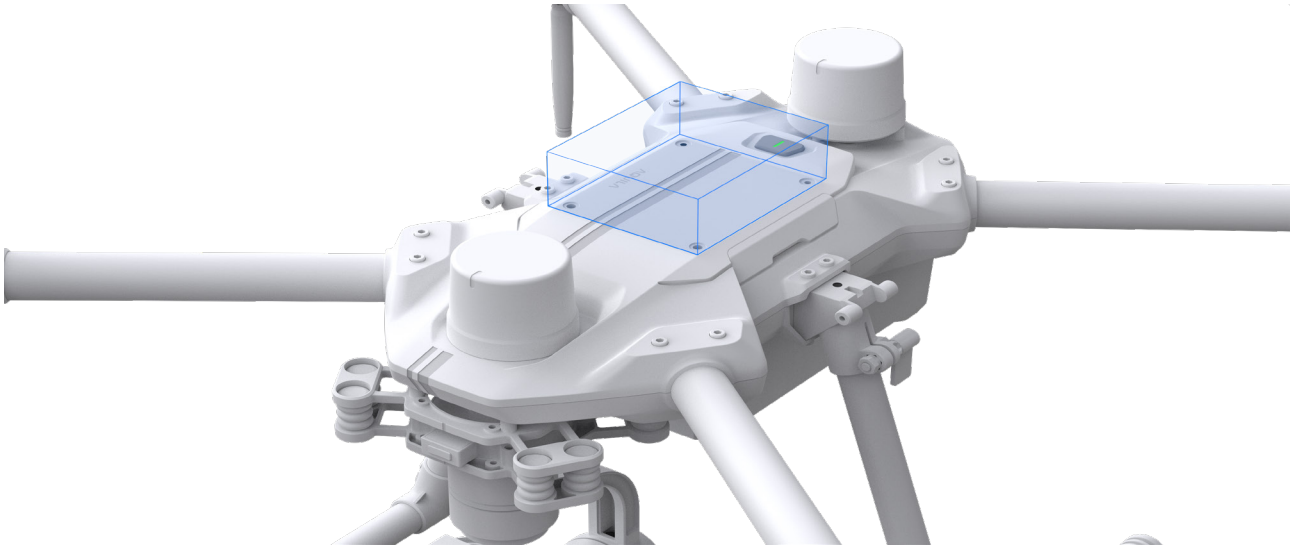
FlyDynamics APP firmware upgrade

Please download the latest FlyDynamics APP firmware from CodevDynamics official website before upgrading.

Please connect the latest App firmware to the remote control via a USB Flash Disk or SD card, select the installation file in the file manager, and overwrite the installation.

Extended Screw Holes Description

Be sure to use the specified type of screw to avoid damaging the screw hole thread and ensure that the accessories are installed firmly.



After-Sales Service Policies

Limited Warranty

Under this Limited Warranty, CodevDynamics warrants that each CodevDynamics product that you purchase will be free from material and workmanship defects under normal use in accordance with CodevDynamics's published product materials during the warranty period. CodevDynamics's published product materials include, but not limited to, user manuals, safety guidelines, specifications, in-app notifications, and service communications.

The warranty period for a product starts on the day such product is delivered, If you cannot provide invoice or other valid proof of purchase, then the warranty period will start from 60 days after the shipping date that shows on the product, unless otherwise agreed upon between you and CodevDynamics.

What This After-Sales Policy Does NOT Cover

1. Crashes or fire damage caused by non-manufacturing factors, including but not limited to, pilot errors.
2. Damage caused by unauthorized modification, disassembly, or shell opening not in accordance with official instructions or manuals.
3. Water damage or other damages caused by improper installation, incorrect use, or operation not in accordance with official instructions or manuals.
4. Damage caused by a non-authorized service provider.
5. Damage caused by unauthorized modification of circuits and mismatch or misuse of the battery and charger.
6. Damage caused by flights which did not follow instruction manual recommendations.
7. Damage caused by operation in bad weather (i.e. strong winds, rain, sand/dust storms, etc.)
8. Damage caused by operating the product in an environment with electromagnetic interference (i.e. in mining areas or close to radio transmission towers, high-voltage wires, substations, etc.).
9. Damage caused by operating the product in an environment suffering from interference from other wireless devices (i.e. transmitter, video-downlink, Wi-Fi signals, etc.).
10. Damage caused by operating the product at a weight greater than the safe takeoff weight, as specified by instruction manuals.

11.Damage caused by a forced flight when components have aged or been damaged.
12.Damage caused by reliability or compatibility issues when using unauthorized third-party parts.
13.Damage caused by operating the unit with a low-charged or defective battery.
14. Uninterrupted or error-free operation of a product.
15. Loss of, or damage to, your data by a product.
16. Any software programs, whether provided with the product or installed subsequently.
17. Failure of, or damage caused by, any third party products, including those that CodevDynamics may provide or integrate into the CodevDynamics product at your request.
18. Damage resulting from any non-CodevDynamics technical or other support, such as assistance with “how-to” questions or inaccurate product set-up and installation.
19. Products or parts with an altered identification label or from which the identification label has been removed.

Your Other Rights

This Limited Warranty provides you with extra and specific legal rights. You may have other rights according to the applicable laws of your state or jurisdiction. You may also have other rights under a written agreement with CodevDynamics. Nothing in this Limited Warranty affects your statutory rights, including rights of consumers under laws or regulations governing the sale of consumer products that cannot be waived or limited by agreement.