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ACECORE ZOE M4

FLIGHT MANUAL

AC-ZO-FLIGHTMANUAL-002

Version 1.1.02
25 September 2023

Thank you for purchasing this product. Please read this Flight Manual carefully before operating the RPAS and pay special attention to the recommendations given. Information in this manual is subject to change without notice in line with product upgrades and updates. Visit our web page www.acecoretechnologies.com regularly to keep up with product information, technical updates and Flight Manual revisions.

The ZOE RPAS is a light weight multipurpose Remotely Operated Aerial Vehicle for commercial use. Its four- or eight-rotor supported frame is designed to give the Pilot in Command the opportunity to use it for almost every mission in various weather conditions. The powerful and custom designed brushless motors increase the level of redundancy and make the system incredibly resistant for strong wind gusts and high payloads. Due to the flexibility of mounting different battery capacity packs, it enables you to swap payloads.

The ZOE RPAS is built using aircraft grade carbon fiber and uses a unique 3d carbon fiber production method resulting in a strong & stiff airframe. Vibrations passing through the airframe are being reduced due to its shape and construction.

The ZOE RPAS is all weather capable and all electronic components are shielded from electromagnetic interference. All critical electronics are integrated in the carbon center-piece and are sufficiently cooled using the partial vacuum created by the motors. Operations in high ambient temperatures or moderate rain conditions are no boundaries for the ZOE RPAS platform.

ZOE RPAS has an optional retractable landing gear which allows clear 360-degree camera views.

A special mount enables the ZOE RPAS to even position camera systems on top of the aircraft to enable unobstructed camera views upwards from horizontal.

The Cube flight control system is built into the ZOE RPAS for accurate and stable flight performance. The double modules and IMUs add triple modular redundancy to greatly reduce the risk of a system failure.

An additional RTK unit could be added to obtain an even more accurate GPS positioning.

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Legend

The following definitions apply to warnings, cautions, and notes used in this RPAS Flight Manual:

WARNING	Disregarding the following instructions leads to an immediate or severe deterioration of flight safety and hazardous situations, including such resulting in personal injury and damage to property.
CAUTION	Disregarding the following instructions leads to a serious or long-term deterioration of flight safety.
NOTE	Draws the attention to any special item not directly related to safety but which is important or unusual.

Disclaimer

This flight manual contains operational instructions that should be complied with by the owner and/or users of the RPAS. In using this RPAS, you hereby agree to this disclaimer and signify that you have understood all points completely.

The manufacturer and seller assume no liability for any damage or injury arising from the use of this product. We would like to point out that the ZOE RPAS is not a toy and should be operated with care, as improper operation can cause serious personal injury and damage to property. When assembling the ZOE RPAS, follow all instructions carefully.

Be aware that it is not allowed to open, maintain or modify the RPAS and/or parameters and/or firmware and/or software without notice and prior written consent or authorization of Acecore Technologies JL B.V. If you do not meet this requirement, every kind of liability and warranty will be declared invalid.

It is your responsibility to learn how to safely operate the RPAS! A flight simulator is a good way to start building up experience, but cannot be a substitute for real life!

Description of operation

The RPAS system is designed for but not limited to the following activities:

- Inspection: Landscape-, agricultural- and industrial inspections
- Aerial surveying: Cartography, mapping
- Security

Regulations

The RPAS as described in this Flight Manual is subject to Civil Aviation regulations. Regulations may vary depending on the country where you intend to operate the RPAS as do the terms and conditions of permission for aerial work.

Any use of the RPAS in breach of the laws of the country where the RPAS is operated is under the sole responsibility of the RPAS operator. We expect RPAS operators to have the proper exemptions and/or the applicable RPAS operator certificate.

Inform yourself before operating the RPAS. Some countries may have laws that limit the use of unmanned aircraft to 'Line-of-Sight' operations and/or prohibit the use of unmanned aircraft at all or in specific areas.

Privacy

The RPAS as described in this Flight Manual is subject to Civil Aviation regulations. Regulations may vary depending on the country where you intend to operate the RPAS as do the terms and conditions of permission for aerial work.

Any use of the RPAS in breach of the laws of the country where the RPAS is operated is under the sole responsibility of the RPAS operator. We expect RPAS operators to have the proper exemptions and/or the applicable RPAS operator certificate.

Inform yourself before operating the RPAS. Some countries may have laws that limit the use of unmanned aircraft to 'Line-of-Sight' operations and/or prohibit the use of unmanned aircraft at all or in specific areas.

Warnings

Assembly

1. Ensure that all parts are fixed properly before operating the RPAS.
2. Ensure that all other parts are installed before inserting the flight batteries. DO NOT power on the RPAS before attaching the antennas.
3. Ensure all screws are tightened.
4. DO NOT remove any screw(s).
5. Ensure the GPS spoiler is pushed downwards after inserting the flight batteries.
6. The RPAS should be lifted off the ground when testing the retractable landing gear.

Flight

7. Ensure that all parts are in good condition before each flight. DO NOT fly with worn or damaged parts.
8. GPS compass barometer used Flight modes (loiter, auto, RTL, land or altitude hold mode) are modes which can help the pilot fly easier. BUT cannot be trusted 100% as the pilot always needs to be able to fly the UAV in Stabilize/Manual mode to take over the UAV and land safely in cause a sensor fails.
9. Ensure that the propellers and landing gear are installed correctly and propellers are unfolded before each flight.
10. Ensure that all cables are connected correctly and firmly before each flight. Pay extra attention to the battery cables, ensuring they are fully inserted.
11. Maintain a safe distance from people, buildings, high voltage power lines, tall trees, water, other aircrafts and other hazards when flying the RPAS. Make sure to follow the local laws.
12. Only use the batteries specified in the spec sheet.
13. DO NOT overload the system, please refer to the spec sheet.
14. DO NOT go near or touch the motors or propellers when they are spinning, as this can cause serious injury.
15. DO NOT exceed any specification in the spec sheet, such as environmental conditions and maximum speeds of the RPAS.
16. Disconnect the payload, batteries and landing gear during transport to avoid damage or injury.
17. Only use compatible Acecore parts.

Maintenance

18. DO NOT neglect any given information in the Maintenance manual.

Revisions

Revision number	Revision date	Reason for revision	Approval
1.1.01	31 Augustus 2023	M4 base	Jorrit Linders Koen Vrints
1.1.02	25 September 2023	Next vision Manuel	Koen Vrints

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List of abbreviations

AGL	above ground level
ASAP	as soon as possible
CCW	counter clockwise
CG	center of gravity
CW	clockwise
C2	command and control
ESC	electric speed controller
FC	flight controller
FPV	first person view
RPA	remotely piloted aircraft
RPAS	remotely piloted aircraft system(s)
RTL	return to launch
PIC	pilot in command
VFR	visual flight rules
VLOS	visual line-of-sight
VMC	visual meteorological conditions

Specifications

This RPAS is subjected to limitations. You will find all limitations in the spec sheet. Below we have enumerated a few important specs.

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Maximum windspeed X4: 54 km/h (29 knots)
Maximum operating voltage: 26.1 V
Minimum operating voltage: 21.0 V
Maximum weight before takeoff X4: 10.5 kg
Minimum weight before takeoff X4: 8.1 kg
Maximum payload X4: 2.8 kg standard batteries and respecting MTOW
Maximum payload X4: 5.0 kg * respecting MTOW

Please refer to the specifications sheet for more detailed information.

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Flight modes

The following flight modes are available for the ZOE RPAS. By using the appropriate switch on the Pilot controller the flight modes of the RPAS can be changed, please refer to the manual of your Pilot controller. We will only describe the function of each flight mode, how to operate the RPAS is described at page 39.

Loiter

In Loiter Mode the RPAS automatically attempts to maintain the current position, heading and altitude while also stabilizing itself. The PIC may fly the RPAS in Loiter mode as if it were in a more manual flight mode but when the sticks are released, the vehicle will slow to a stop and hold position.
A good GPS lock and low magnetic interference on the compass are all important in achieving good loiter performance.

Altitude Hold

In altitude hold mode the RPAS maintains a consistent altitude while allowing roll, pitch, and yaw to be controlled manually. The RPAS will also stabilize itself.
When altitude hold mode (a.k.a. AltHold) is selected, the throttle is automatically controlled to maintain the current altitude. The PIC directly controls the roll and pitch lean angles and the heading.

Brake

This very simple flight mode simply stops the vehicle as soon as possible. Once invoked, this mode does not accept any input from the PIC. A good GPS lock and low magnetic interference on the compass are all important in achieving good Brake performance.

Auto

In Auto mode the RPAS will follow a pre-programmed mission script stored in the autopilot which is made up of navigation commands (i.e. waypoints) and “do” commands (i.e. commands that do not affect the location of the copter including triggering a camera shutter). A good GPS lock and low magnetic interference on the compass are all important in achieving good Auto performance. Please refer to the manual of your Pilot controller to learn how to plan missions.

RTL

RTL mode (Return To Launch mode) navigates the RPAS from its current position to hover above the home position and finally land on the home position. The RPAS will first climb to an altitude of 35 meters before navigating to the home position. The home position is equal to the takeoff position. A good GPS lock and low magnetic interference on the compass are all important in achieving good RTL performance. Be aware that the drone will not climb to 35 meters when it’s within a radius of 5 meters of the home point.

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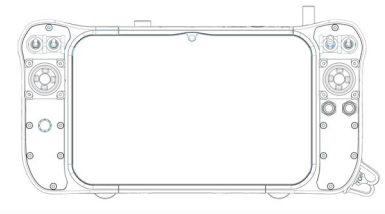
Assembly

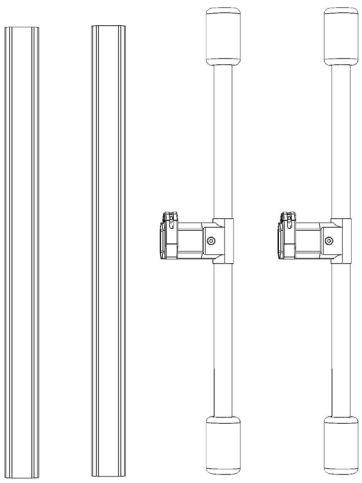
In this chapter we will prepare the RPAS so it's ready to fly.

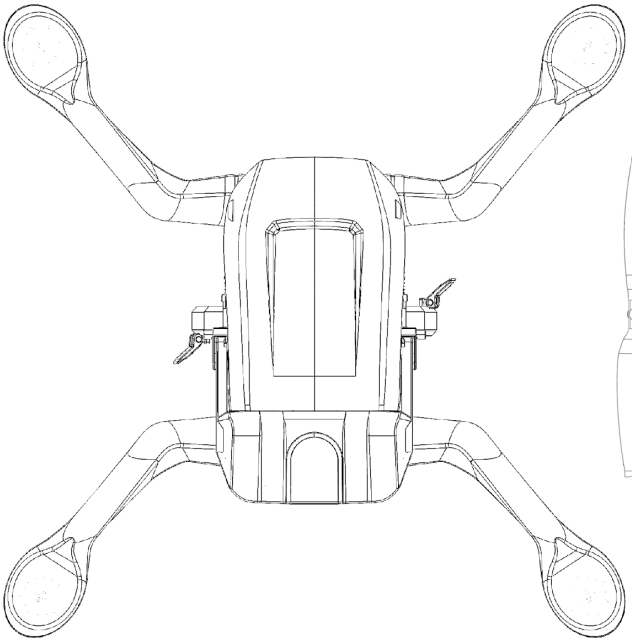
Unboxing

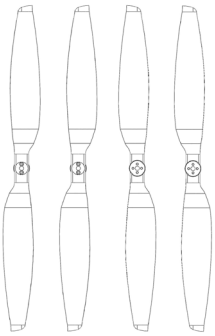
During transport the RPAS will be fitted in the Acecore flight case. You must open the flight case using the rotary handles. Make sure these parts are at least in the flight case:

- ZOE M4 RPAS
- Propellor tool
- 4 propellers
- 2 landing gear horizontal stands
- 2 landing gear vertical stands
- 2 fully charged batteries
- LiPo voltage checker
- Pilot controller
- Payload









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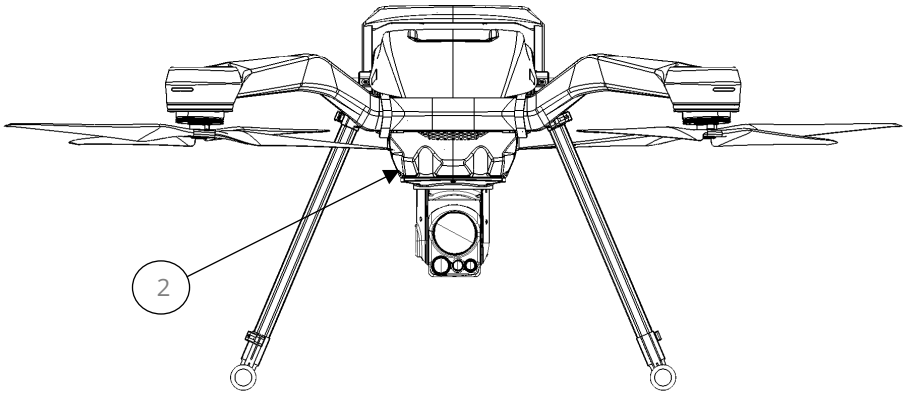
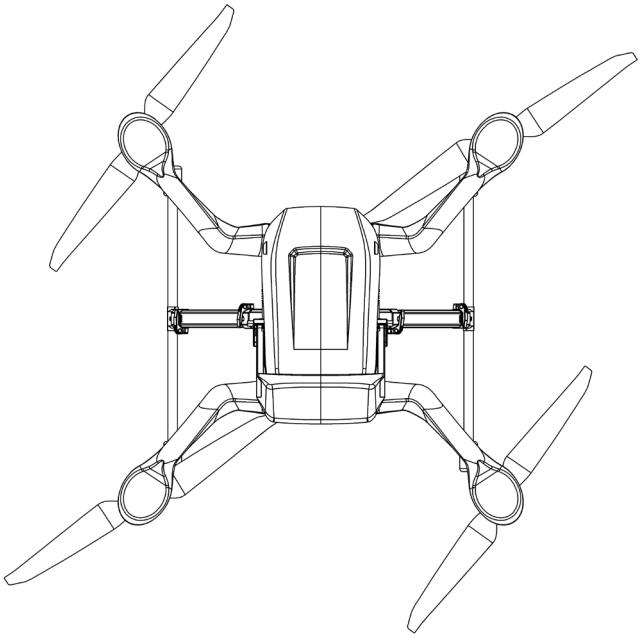
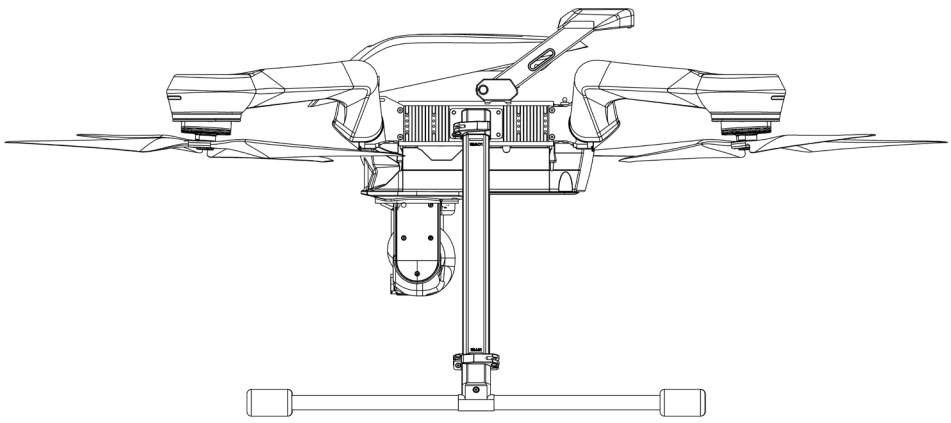
Installation

Overview tech







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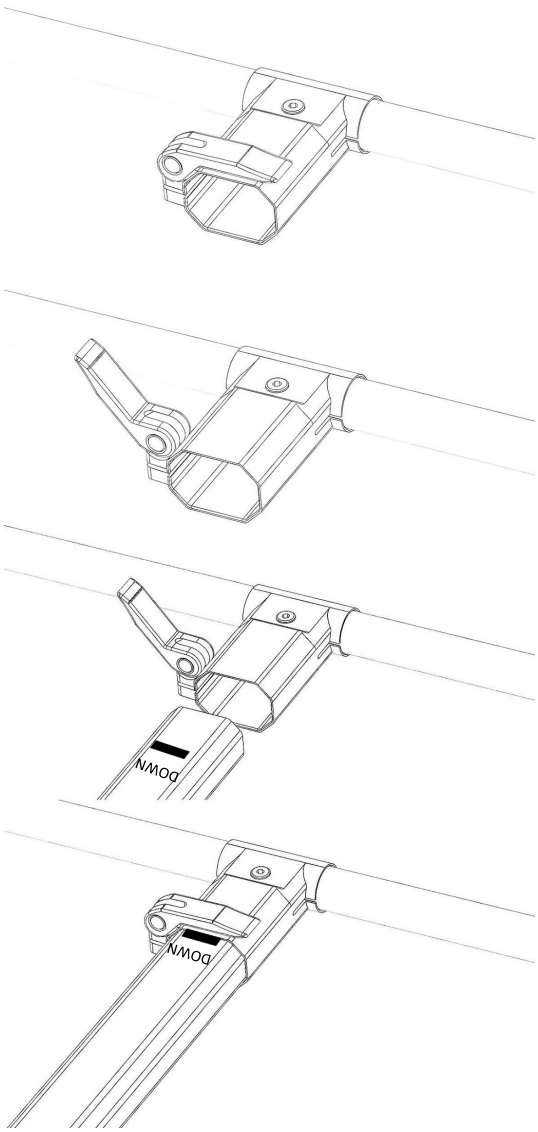
Airframe landing gear and antennas

After you made sure everything is in the flight case, you should take out the ZOE RPAS center piece. Let someone else hold the ZOE RPAS center piece or place it on a table where it will not damage. Now take out the 2 landing gear horizontal stands and the 2 landing gear vertical stands. Open the clips of the landing gear horizontal stand. Push both landing gear parts into each other and fasten the clip.

On the ZOE RPAS center piece you will also find two clips, open both clips and push the landing gear assembly into the center piece. Lastly, close the two clips. Make sure the landing gear is properly secured and does not come loose during the flight.
You can put the RPAS on his landing gear.

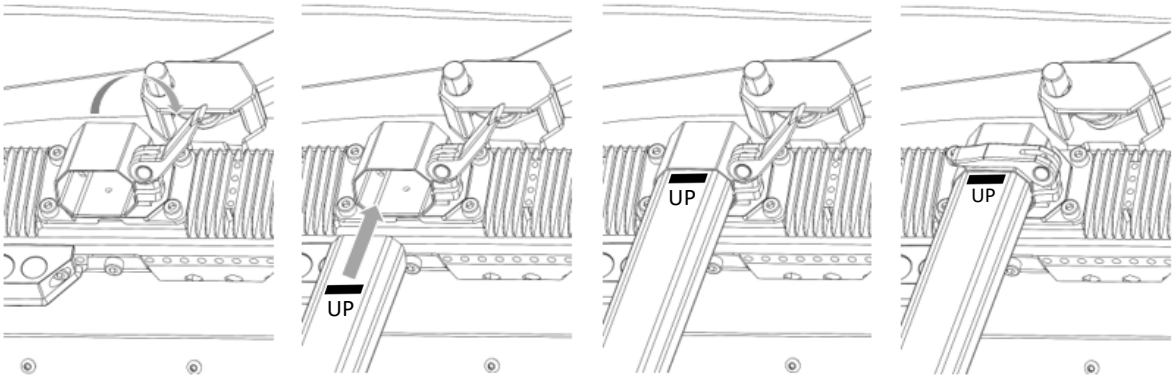


NOTE

Markings have been applied on the landing gear vertical stand. Markings will indicate which side is up and down. Make sure the landing gear is pushed in as far as the markings suggest.

NOTE

Lift the ZOE RPAS by holding the booms, preferably at the connection between the centerpiece and boom.



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Verify that the antennas on the drone are facing down- and backwards away from obstructions to avoid loss of control due to signal loss.

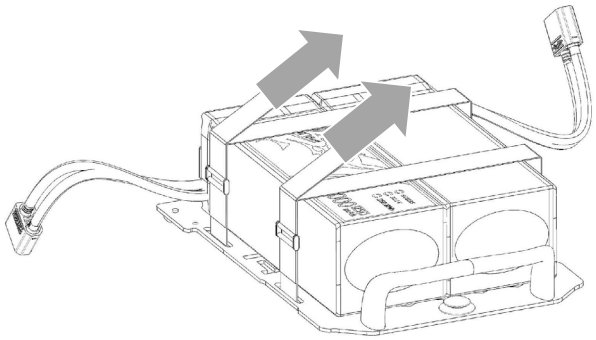
WARNING Make sure the antennas cannot be hit by a propeller.

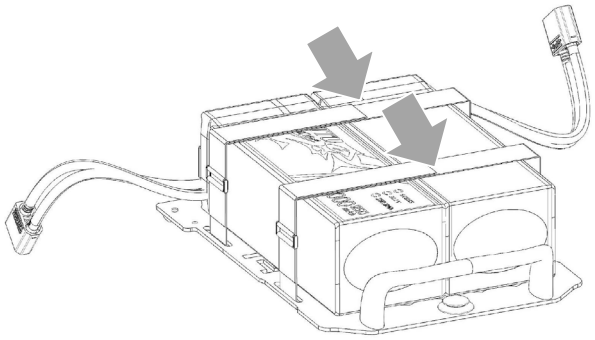
Pilot controller

Please refer to the manual of your Pilot controller(s) for detailed information on how to use the Pilot controller(s) appropriate.

Batteries

Make sure you use one of the specified batteries in the specifications sheet. Please take a look at the Charging manual for detailed information on how to charge your batteries.
After your batteries are fully charged (26.1 V maximum) you must place it on the battery tray. Attach the batteries using the velcro straps. Make sure the batteries cannot come off the plate while flying.





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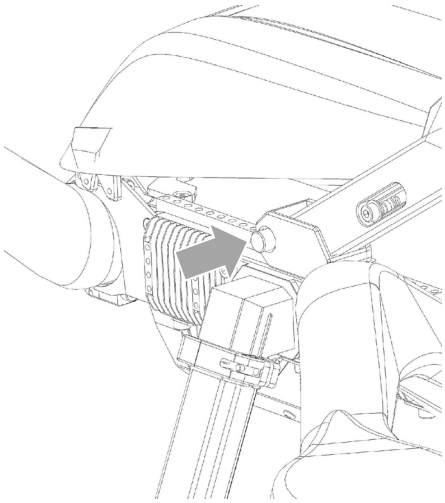
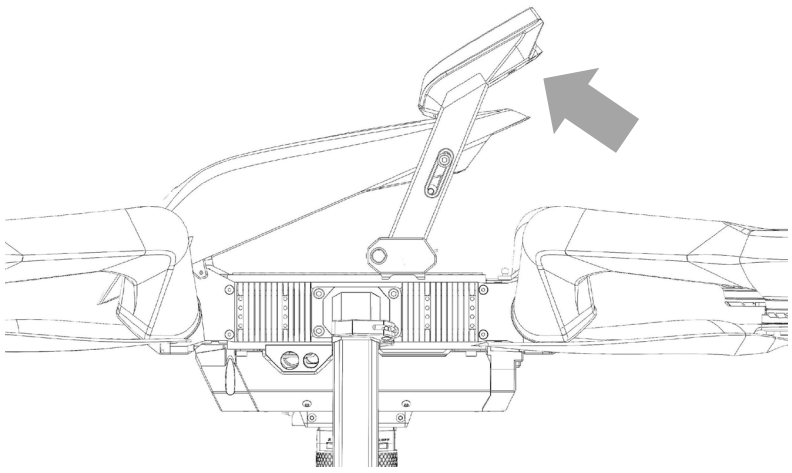
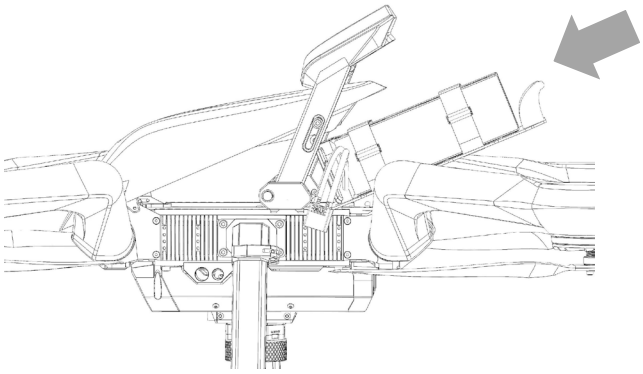
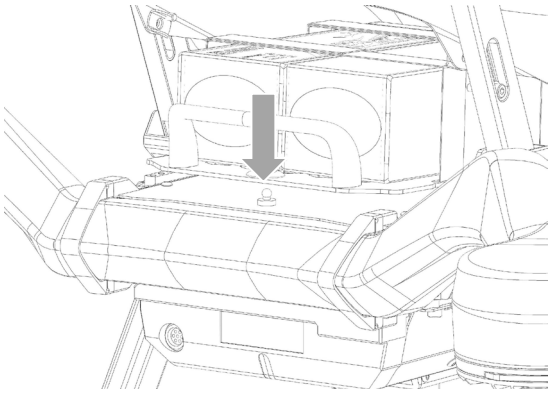
Now place the battery tray in the drone. First push both buttons on the side of the RPAS so the GPS spoiler can be lifted.



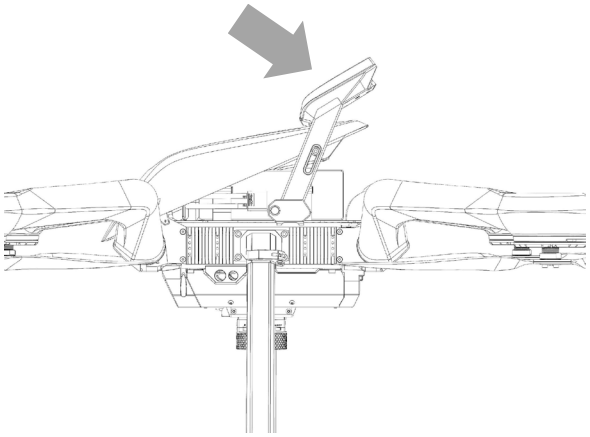


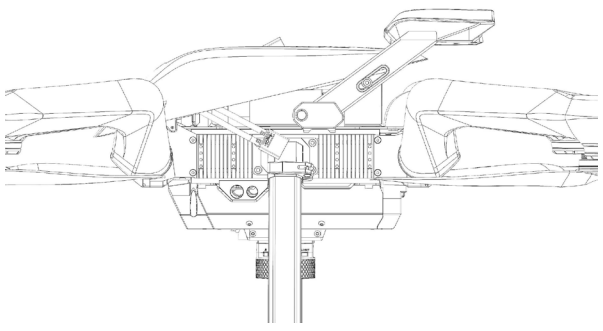
Then slide the battery tray into the dome until the end slides into the slot. Now lift the button on the battery tray, lower it onto the metal mounting point and release the button. Make sure the battery tray slides correctly into the slot. The battery tray should not come loose during flight.





Lastly, close the dome by pushing gently on the GPS spoiler until both buttons on the side of the RPAS are jumped out again.





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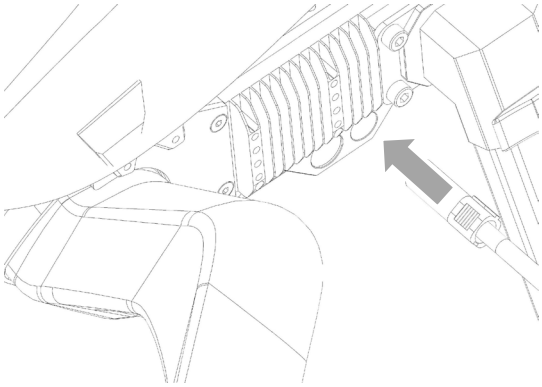
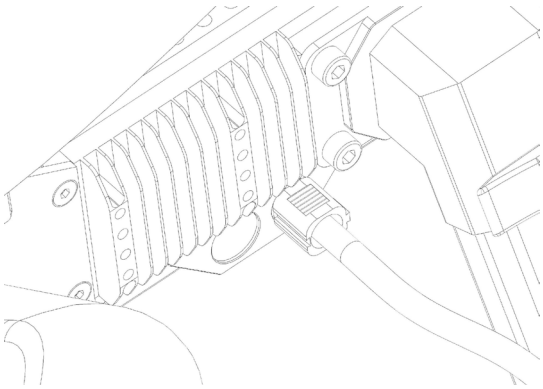
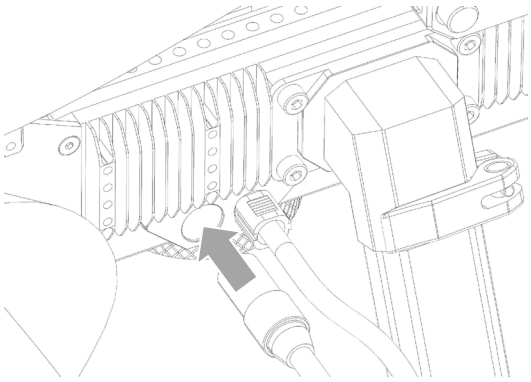
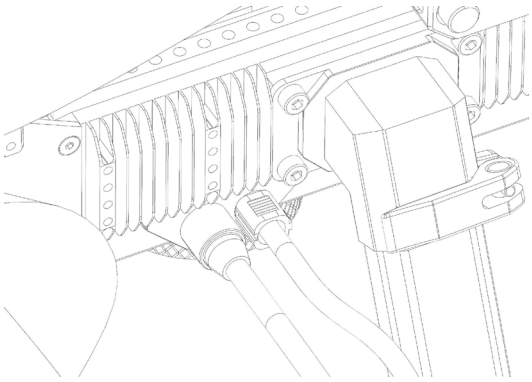
After the batteries are placed correctly, connect the batteries to the drone. Make sure you connect both batteries and you have not triggered the retractable landing gear switch. First connect the minus (black) wire, then connect the plus (red) wire. Make sure all 4 connectors are pushed all the way in. Guarantee that there is no tension on the cable and the cables are not pinched between the hood and the center piece.









WARNING Make sure you have not triggered the retractable landing gear switch when plugging in the batteries.

WARNING It is not allowed to place an adapter between the battery and the RPAS.

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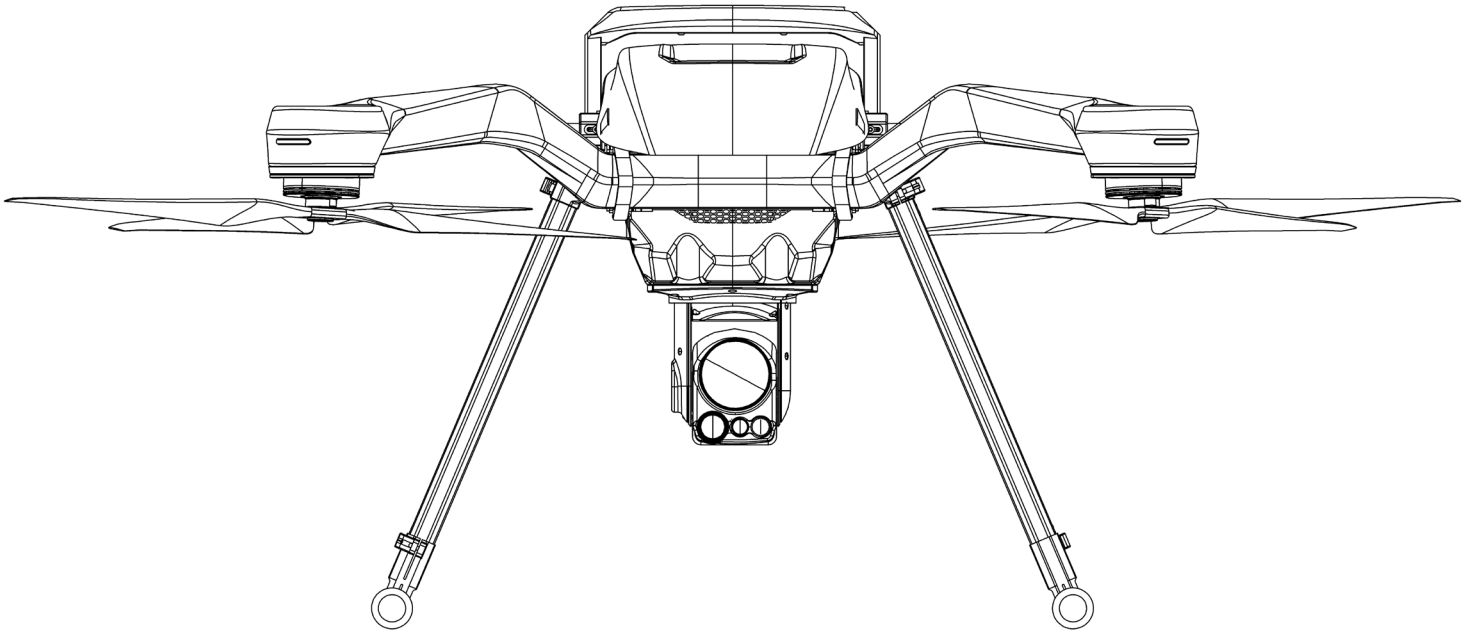
The RPAS will now startup and connect to the Pilot controller.
Make sure the retractable landing gear functions as normal (in case your ZOE has retractable landing gear). To test this, you should lift RPAS from the ground. Then place the right stick to the top right hand corner and trigger the landing gear switch. Everything is fine if the landing gear retracts. Now trigger the landing gear switch to lower the landing gear.



Unplug the batteries after testing the retractable landing gear.

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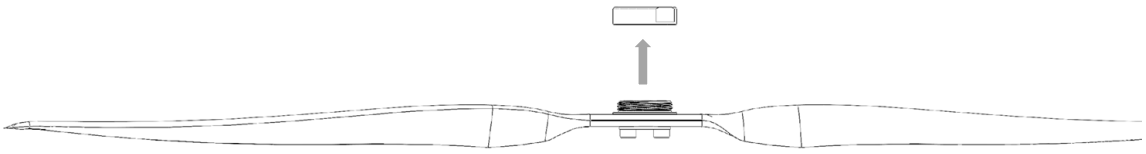
Payload

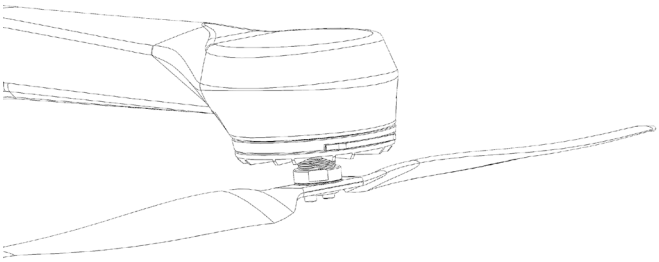
Please refer to the manual of your payload(s) for detailed information on how to install the payload(s) appropriately. Make sure your payload is connected appropriately.

Airframe propellors

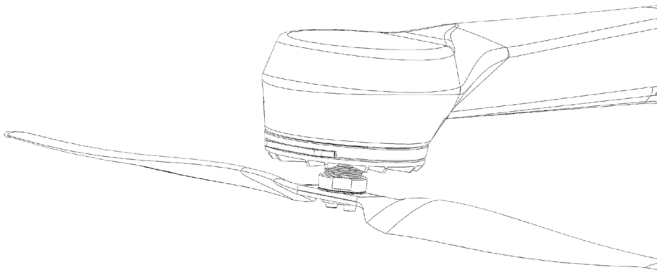
Now connect all 4 propellers. Two propellers have a silver quick release and the other two have a black quick release. The quick release color corresponds with the motor quick release color. Turn the 4 propellers all the way onto the motors. For assembly you should turn the silver quick release CW and the black quick release CCW. You will not need the propeller tool to fasten the propellers, fasten it finger tight.



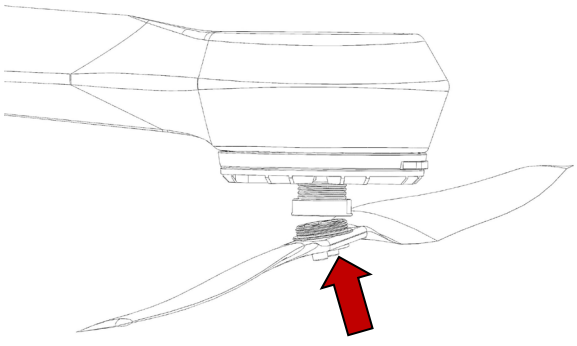
Direction to lock the propeller CW (silver quick release):



Direction to lock the propeller CCW (black quick release):



WARNING Don't try to turn on the propeller when the propeller quick release is not inline.



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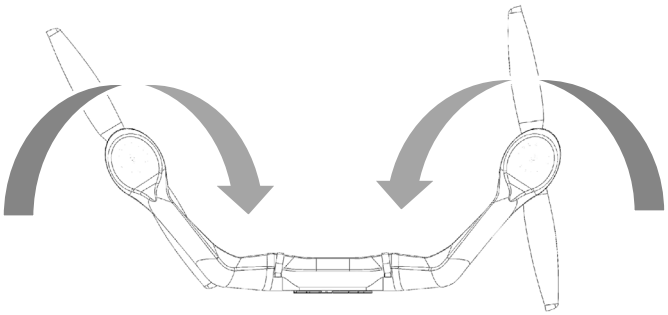
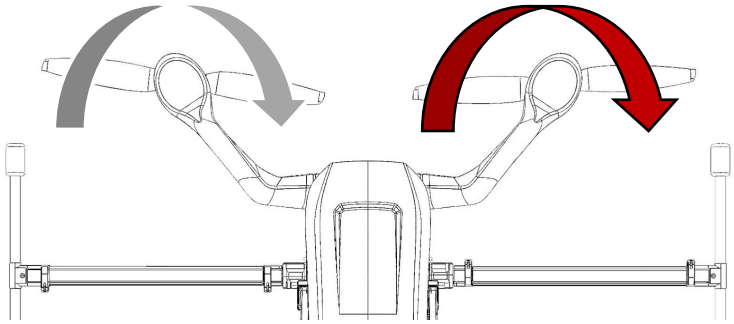
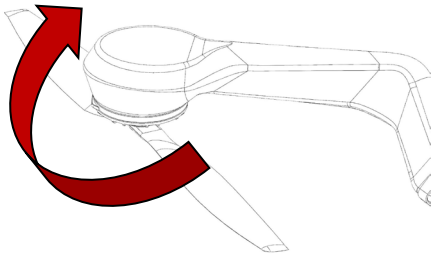
Motor direction:



WARNING Don’t try to install the propellers the wrong way.





WARNING Make sure the propellors can rotate freely. Nothing should come near the propellors.

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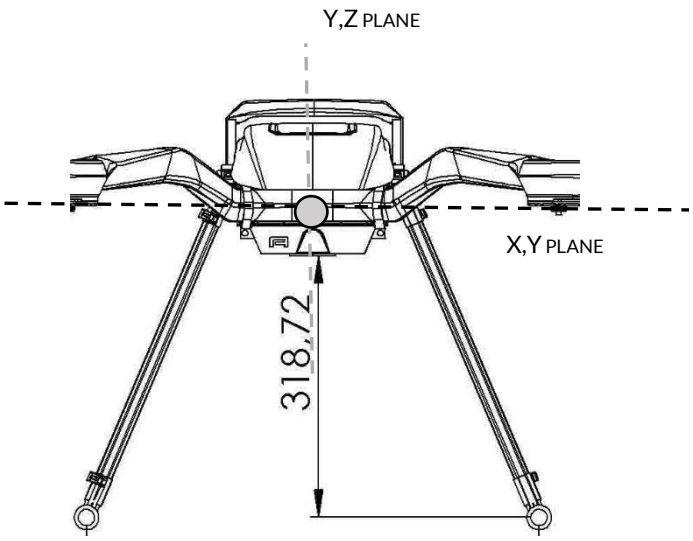
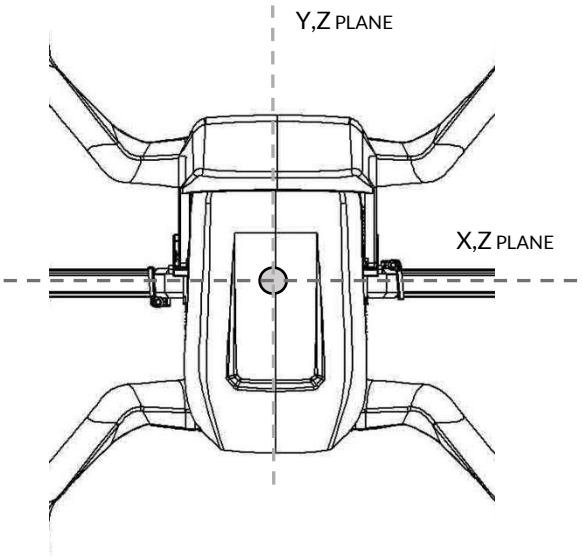
Center of gravity CG

The CG is very important for a safe flight! Make sure the CG is within the limits. Never fly when the CG is not within the specified limits.

This is the CG of the ZOE RPAS (for reference): The CG is located at the point where the three cross-sectional planes intersect each other.



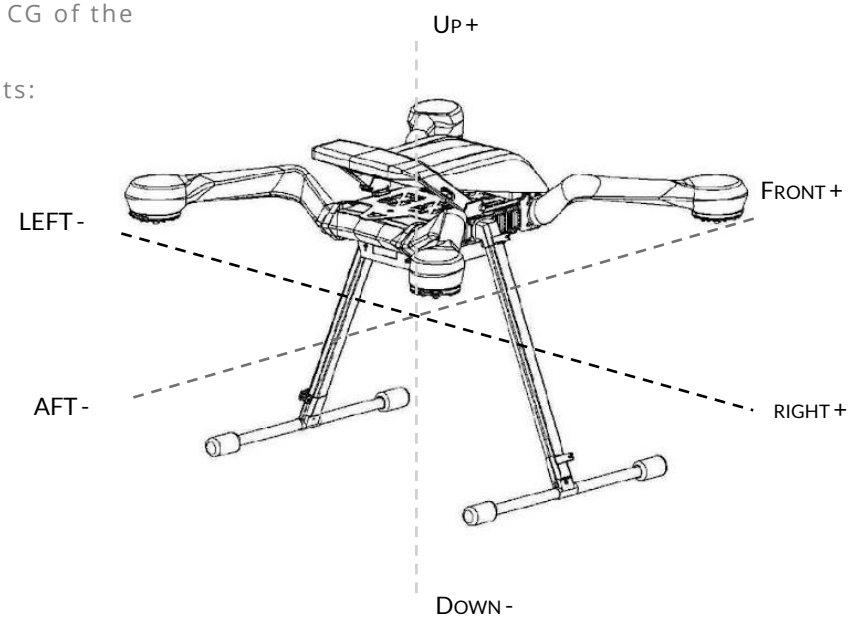


(319 is in millimeters)

These are the limits relative to the CG of the ZOE RPAS (as described above):
Longitudinal Centre of Gravity Limits:
Forward: 10 mm Aft: -10 mm

Vertical Centre of Gravity Limits:
Down: -175 mm Up: 100 mm

Lateral Centre of Gravity Limits:
Left: -10 mm Right: 10 mm



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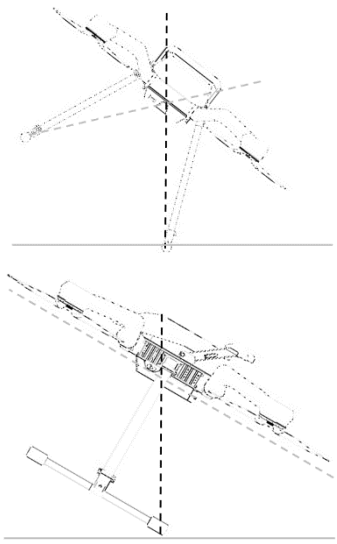
Besides the limits of the CG we will also explain to you how to find the CG. This method is a general method for finding the CG of your RPAS independent of your configuration's shape or mass.

1. Perform this step with the RPAS preferably with the front or back view towards you. Find an edge on which you can tilt the RPAS. If the RPAS is in its balanced position, determine a line vertical through the balancing edge.
2. Find a different edge to balance the RPAS in the same view and again find it's balance point as described in the first step. Also determine a vertical line once the balance point is found. The point where the two lines meet is the CG from the front or back view.
3. Now turn your RPAS 90 degrees so you have a side view of the RPAS.
4. Repeat the step again from this view. The vertical line from the edge on which the drone is balanced should cross the fictional horizontal line through the CG point from the front view. The point where these two lines meet should be the CG of your RPAS configuration.



The point that you just found is the CG of your ZOE RPAS. This point should not exceed the given limits above.

Pre-flight checklist

Always use the pre-flight checklist before operating the ZOE RPAS. Please refer to the Maintenance manual. When all the boxes are checked, you are able to safely operate the system.

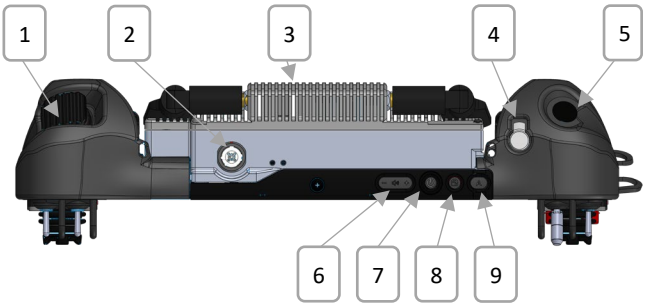
NOTE

You can plug in the batteries after you successfully completed the installation.

Remote controller

Operating the UXV remote controller.

The remote controller will be used to operate the Zoe and Nextvision.



Top view

1.	single axis joystick	Zoom camera
2.	Lemo connector	ODP cable
3.	Transmission unit	MPU5, Doodle labs
4.	Touch screen pen	
5.	4-way joystick	Gimbal control
6.	Volume	sound volume up or down
7.	Power button	Power on the remote
8.	Rotating button	to allow or lock the rotating screen
9.	Button	

Front view

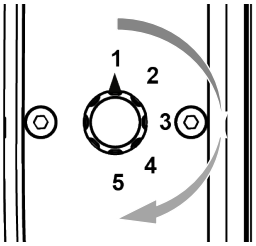
10.	3-way switch	RTL
11.	3-way switch	Land
12.	M4 control ICON	Start up connection
13.	Selfie camera	
14.	Windows screen	
15.	2-way Safety switch	Kill switch
16.	3-way switch	Camera recenter
17.	8-way joystick	Control the Zoe
18.	5-way switch	Flight modes
19.	8-way joystick	Control the Zoe
20.	Button	
21.	Button	
22.	USB-A connector (2)	connect a USB devise to the Remote

Start up the remote

To start up the remote you have to press and hold the power button (**7**) for couple seconds.
The remote will start-up Be sure to know that this can take couple minutes.
After starting up the remote you have to log in, this is the password from the remote that is chosen by you. Standard is the Password: micronav
When on the home screen you can start up the communication by clicking on the M4 control ICON (**12**). Everything will start up to communicate with the Zoe M4.

Controls

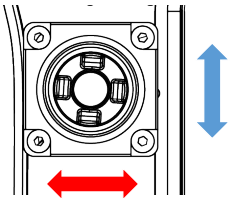
Flight modes can be changed by the 5-way switch (**18**). Mode switch from left as flight mode 1 to the right up to flight mode 5



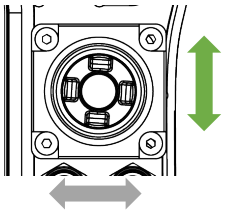
1. Loiter flight mode — Holds altitude and position, uses GPS for movements
2. Altitude hold mode — Holds altitude and self-levels the roll & pitch
3. Brake mode — Brings copter to an immediate stop
4. Auto mode — Executes pre-defined mission
5. Brake mode — Brings copter to an immediate stop

Controlling the Zoe M4

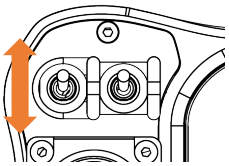
Mode 2 (standard)



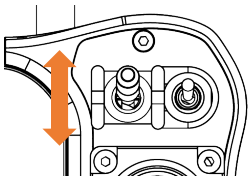
your throttle is in the left joystick (**17**) up and down shown in Blue.
YAW is controlled on the left joystick (**17**) left or right shown in Red.



Your pitch is on the right joystick (**19**) to move the Zoe M4 forward and backward shown in green.
Your roll is on the right joystick (**19**) to move the Zoe M4 left and right shown in grey.



The top 3-way switches (**10,11,16**) are inactive when they are switched to the top. To activate the function pull them down all the way.



On the top right 2-way switch (**15**) is different. Here you have a safety switch. You have to pull the top to move the switch down to the activate the function. In this function you have the KILL SWITCH function. Here you will command the Flight controller to stop the motors immediately

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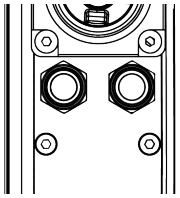
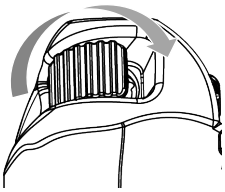
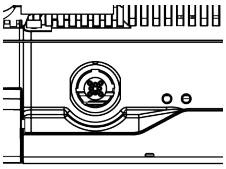


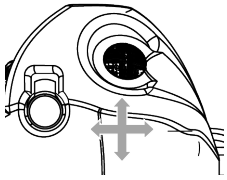
Push button (**20,21**). This will be assigned for gimbal use



On the top of the remote you have a single axis joystick (**1**) with smooth responsiveness to zoom in an out the camera



Lemo connector (**2**), you can get an Lemo to ODB connector for external connection



4-way joystick (**5**) is used to pan and tilt the gimbal

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Procedure of operation

Take-off

NOTE Never release your fingers from the sticks. Always keep control of both sticks in order to ensure a safe operation.

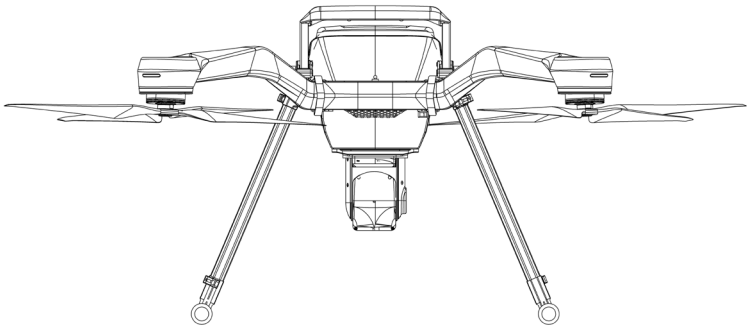
NOTE Always keep visual contact with the RPAS during any flight maneuver to verify RPAS status.

NOTE The PIC should ensure that the RPAS can safely perform a RTL mission (without running in any obstacles).

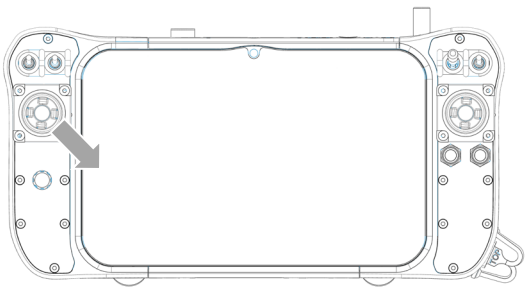
CAUTION Takeoff within 3 seconds after the motors have started.

At the first flight of the day, Acecore advises PIC to takeoff in Altitude Hold mode in order to avoid any GPS induced movements. Switch to Altitude Hold mode by flipping/pressing the appropriate switch/button on your Pilot controller, please refer to your Pilot controller manual. During the rest of the day Acecore advises PICS to takeoff in Loiter mode. Never take-off using the auto-take-off option of QGC!

1. Place the drone on an appropriate takeoff spot, make sure the PIC faces the back of the drone.



The takeoff spot should be free of any obstacles and persons. The takeoff spot should be a flat terrain, which may be slightly angled, but no more than a 5-degree angle.



2. Place the left stick to the bottom right to startup the motors. Make sure the right stick is centered (otherwise the RPAS will try to roll or pitch while still on the ground, please refer to page 39 for further information on the RPAS behavior).

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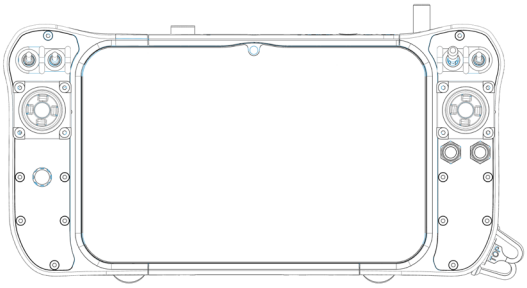
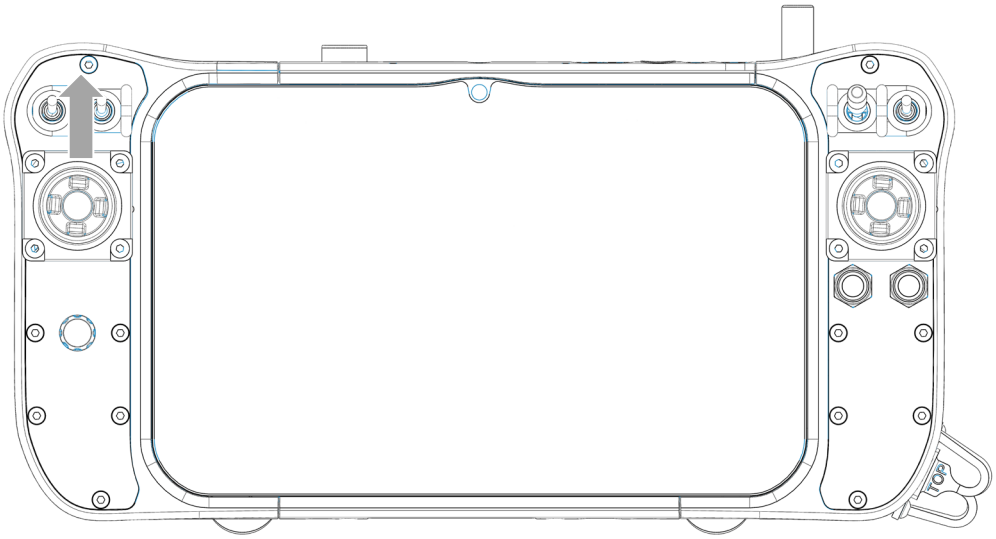
3. After about 1 second you will hear a high beep noise, now gently move the left stick to the center position. The motors will now start to rotate stationary.



4. Move the throttle stick slowly but confidently upwards (within 3 seconds after the motors are started) to takeoff. More than 75% throttle input shouldn't be necessary for takeoff.



Now your RPAS safely took off. Be aware in which flight mode the RPAS is. Please refer to page 10 for further information on the flight mode's behavior.

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Inflight monitoring

During the flight (a.k.a. operation) you must monitor the RPAS to make sure everything is fine. The PIC should always know what to do when something is going wrong or something unexpected happens.
Inflight the PIC should frequently monitor the status of the RPAS. This should be done visually by watching the RPAS and using the Pilot controller. Pay special attention to the GPS signal when Loiter, Brake, Auto or RTL flight mode is selected. Also keep a close eye on the battery voltage. Please refer to page 37 for more info.
When something is going wrong or something unexpected happens, the PIC should react to it. Please refer to page 29 for more information.

Inflight mode switch

The flight mode of the ZOE RPAS can be changed inflight. When switching between flight modes the following procedure is recommended.

1. Terminate any flight maneuver.
2. Hold the RPAS in one position with a sufficient distance from any possible objects. The RPAS should be at least at a height of 10 meters.
3. Check the telemetry monitor if the GPS signal is sufficient (when switching to Loiter, Brake, Auto, land or RTL flight mode).
4. Ensure the orientation LEDs are visible.
5. Use the appropriate switch to change the flight mode. Please refer to the manual of your Pilot controller.
6. Verify the flight mode through the telemetry monitor.
7. Continue the flight.

CAUTION

Make sure the right mission is stored on the RPAS when the PIC intends to switch to Auto mode. The RPAS will directly fly to the first waypoint in the shortest route.

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Emergency

System errors

TOILET BOIL

Detection of a toilet boil is easy. The RPAS will circle around an area while the PIC doesn't give this input. A toilet boil can only happen when using a GPS based flight mode.

A toilet boil effect is caused by the GPS and compass. The GPS and compass aren't calibrated correctly or there is an electromagnetic field near the GPS and compass.

The PIC should perform the following actions:

- Terminate any flight maneuver.
- Switch to Altitude Hold mode by using the appropriate switch on the Pilot controller, please refer to your Pilot controller manual.
- Hold the RPAS in cruise position with sufficient distance from any possible objects.
- Move the RPAS towards the landing spot on an appropriate altitude to prevent collisions and move at a safe distance from objects.
- Initiate the landing procedure.
- If for any reason the landing spot cannot be reached, find an appropriate spot to safely land the ZOE RPAS. Make sure no objects or people are near that landing spot. Land the ZOE RPAS as soon as possible.

After the RPAS is safely landed, perform a good compass calibration. Please refer to page 44.

DRIFT

Detection of drift is easy. The RPAS will deviate from the PIC input (a.k.a. not flying in a straight line) and/or the RPAS will move slightly while the PIC doesn't give this input. A drift can only happen when using a GPS based flight mode.

A drift effect is caused by the GPS and compass. The GPS and compass aren't calibrated correctly or there is an electromagnetic field near the GPS and compass.

The PIC should perform the following actions:

- Terminate any flight maneuver.
- Switch to Altitude Hold mode by using the appropriate switch on the Pilot controller, please refer to your Pilot controller manual.
- Hold the RPAS in cruise position with sufficient distance from any possible objects.
- Move the RPAS towards the landing spot on an appropriate altitude to prevent collisions and move at a safe distance from objects.
- Initiate the landing procedure.
- If for any reason the landing spot cannot be reached, find an appropriate spot to safely land the ZOE RPAS. Make sure no objects or people are near that landing spot. Land the ZOE RPAS as soon as possible.

After the RPAS is safely landed, perform a good compass calibration. Please refer to page 44.

LOSS OF PROPULSION X4

In case that the ZOE X4 RPAS experiences a loss of propulsion the RPAS will inevitably crash.

Detection is simple. The RPAS motor(s)/propeller(s) will stop turning and the RPAS will start falling. The PIC has no control in the situation.

There are a couple of situations which could lead to a total loss of propulsion: both flight batteries failure, shorting of the flight battery, flight controller failure and/or PMU failure.

The PIC should perform the following actions:

- Always press the kill-switch, this may reduce injuries and/or damage.
- Stay away from the RPAS if the batteries have caught fire. Leave the RPAS alone till the smoke/fire has been gone. Call the local emergency number if the fire ignites nature or something else.
- Call the local emergency number if there are people involved in the situation who are hurt.
- If the RPAS does not show any smoke or fire, then you are allowed to walk to the RPAS and take the batteries out of the drone asap.
- Inform your local air force authority and report the crash.
- Inform your local dealer.

LOSS OF PROPULSION X8

In case that the ZOE X8 RPAS experiences a loss of propulsion, the RPAS is able to perform a safe emergency landing without one motor. If more than one motors are not working, the RPAS will inevitably crash.

Detection is simple. The RPAS motor(s)/propeller(s) will stop turning and/or the RPAS will start falling. The PIC has no control in the situation if the RPAS starts falling.

There are a couple of situations which could lead to a loss of propulsion: both flight batteries failure, shorting of the flight battery, flight controller failure and/or PMU failure.

The PIC should perform the following actions when the RPAS will not crash:

- Terminate any flight maneuver.
- Hold the RPAS in cruise position with sufficient distance from any possible objects.
- Move the RPAS towards the landing spot on an appropriate altitude to prevent collisions and move at a safe distance from objects.
- Initiate the landing procedure.
- If for any reason the landing spot cannot be reached, find an appropriate spot to safely land the ZOE RPAS. Make sure no objects or people are near that landing spot. Land the ZOE RPAS as soon as possible.
- Inform your local dealer.

The PIC should perform the following actions when the RPAS will crash:

- Always press the kill-switch, this may reduce injuries and/or damage.
- Stay away from the RPAS if the batteries have caught fire. Leave the RPAS alone till the smoke/fire has been gone. Call the local emergency number if the fire ignites nature or something else.
- Call the local emergency number if there are people involved in the situation who are hurt.
- If the RPAS does not show any smoke or fire, then you are allowed to walk to the RPAS and take the batteries out of the drone asap.
- Inform your local air force authority and report the crash.
- Inform your local dealer.

LOSS OF GPS SIGNAL

A loss of GPS signal can be detected in two ways:

- The Pilot controller(s) indicate an insufficient GPS signal, please refer to your Pilot controller manual for detailed information on how to review this data
- The RPAS is in a GPS based mode and it begins to drift and/or stops holding its current position

When the PIC detects a GPS signal loss, the following procedure should be followed:

- Terminate any flight maneuver.
- Switch to Altitude Hold mode by using the appropriate switch on the Pilot controller, please refer to your Pilot controller manual.
- Hold the RPAS in cruise position with sufficient distance from any possible objects.
- Move the RPAS towards the landing spot on an appropriate altitude to prevent collisions and move at a safe distance from objects.
- Initiate the landing procedure.
- If for any reason the landing spot cannot be reached, find an appropriate spot to safely land the ZOE RPAS. Make sure no objects or people are near that landing spot. Land the ZOE RPAS as soon as possible.

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TELEMETRY LOSS

Detection of a telemetry loss is easy. All the telemetry data (e.g. altitude, GPS and battery data) doesn't refresh anymore.

Telemetry loss can be caused by a Pilot controller failure or a jammed signal between the Pilot controller and the RPAS. A jammed signal can be caused by electromagnetic influences.

When the PIC detects a telemetry loss AND the RPAS is in visual line of sight, the following procedure should be followed:

- Terminate any flight maneuver.
- Hold the RPAS in cruise position with sufficient distance from any possible objects.
- Move the RPAS towards the landing spot on an appropriate altitude to prevent collisions and move at a safe distance from objects.
- Initiate the landing procedure.
- If for any reason the landing spot cannot be reached, find an appropriate spot to safely land the ZOE RPAS. Make sure no objects or people are near that landing spot. Land the ZOE RPAS as soon as possible.

When the PIC detects a telemetry loss AND the RPAS is not in visual line of sight, the following procedure should be followed:

- Terminate any flight maneuver.
- Make sure the RPAS RTL path is always free of any obstacles. Switch to RTL flight mode by using the appropriate switch on the Pilot controller, please refer to your Pilot controller manual.
- Wait until the RPAS has landed itself.

OBSTACLE COLLISION

If during a flight an obstacle has been hit with the consequence of a crash, do the following:

- Try lower the crash impact of the RPAS while falling from air to ground by switching to Altitude-hold mode and try to gain some control. In case the RPAS is stuck somewhere in the air (for example in a tree), press the kill-switch to avoid even more damage.
- When the RPAS has hit the ground, terminate all motors by using the kill-switch. If not already stopped during the crash.
- Stay away from the RPAS if the batteries have caught fire. And leave them alone till the smoke/fire has been gone.
- Call the local emergency number if there are people involved in the situation who are hurt.
- If the RPAS does not show any smoke or fire, then you are allowed to walk to the RPAS and take the batteries out of the RPAS asap.
- Inform your local air force authority and report the crash.

RPAS IS NOT CONTROLLABLE

When the RPAS initiates a flight maneuver which is not performed by the PIC, the procedure will depend on the situation. It is important not to perform any drastic procedures like performing a power cut off immediately. If the RPAS moves without any input from the PIC there could be a couple of reasons for this.

It could be possible that the RPAS is in a toilet boil. The RPAS will circle around an area while the PIC doesn't give this input. A toilet boil can only happen when using a GPS based flight mode. Please refer to page 29.

It could be possible that the RPAS is drifting. The RPAS will deviate from the PIC input (a.k.a. not flying in a straight line) and/or the RPAS will move slightly while the PIC doesn't give this input. A drift can only happen when using a GPS based flight mode. Please refer to page 30.

If the RPAS maneuvers are more violent. Try correcting the RPAS using the Pilot controller and try to land.

If the RPAS doesn't respond to control inputs. When in loiter mode, switch to Altitude-hold mode and try to control the RPAS again.

When the RPAS is still not responding to control inputs. Switch to loiter mode if the RPAS is in Altitude-hold mode and try to control the RPAS again. If that doesn't work, toggle the RTL switch on the RPS. In case the RPAS movements are too dangerous for the environment (people, animals or something else) and the PIC cannot control the RPAS, use the kill-switch when there is nothing below the RPAS.

Abnormal weather conditions

STORM

Please refer to the above described wind speed limits (or take a look at the specifications sheet). Be aware that the wind speed limit is different for a top mounted payload. You should never takeoff when the windspeed exceeds this limit or the weather forecast predicts windspeeds that exceeds this limit. In case the weather changes and the wind speed is exceeded while you are flying, you must follow these steps:

- Terminate any flight maneuver.
- Hold the RPAS in cruise position with sufficient distance from any possible objects. Please note that the RPAS may not be able to fight against the extreme wind, in this case you must adjust the RPAS as much as possible.
- Move the RPAS towards the landing spot on an appropriate altitude to prevent collisions and move at a safe distance from objects.
- Initiate the landing procedure.
- If for any reason the landing spot cannot be reached (for example when the wind is too strong), find an appropriate spot to safely land the ZOE RPAS. Make sure no objects or people are near that landing spot. Land the ZOE RPAS as soon as possible.

LIGHTNING

In case that the ZOE RPAS experiences a lightning strike, the RPAS will inevitably crash. You should never takeoff when the weather forecast predicts lightning or when there is lightning close. In case the weather changes and lightning occurs while you are flying, you must follow these steps:

- Terminate any flight maneuver.
- Hold the RPAS in cruise position with sufficient distance from any possible objects.
- Lower the RPAS as much as possible with sufficient distance from any possible objects (because lightning strikes the closest point relative to the clouds).
- Move the RPAS towards the landing spot, prevent collisions and move at a safe distance from objects.
- Initiate the landing procedure.
- If for any reason the landing spot cannot be reached, find an appropriate spot to safely land the ZOE RPAS. Make sure no objects or people are near that landing spot. Land the ZOE RPAS as soon as possible.

In case the lightning strikes the ZOE RPAS, you must follow these steps:

- Always press the kill-switch, this may reduce injuries and/or damage.
- Stay away from the RPAS. Leave the RPAS alone. Call the local emergency number and explain the situation.
- The local emergency responders must take out the batteries asap.
- Inform your local air force authority and report the crash.
- Inform your local dealer.

EXTREME RAINFALL

As described in the specifications sheet, the ZOE RPAS cannot withstand rainfall more than 10 mm/h. You should never takeoff when the rainfall exceeds this limit or the weather forecast predicts rainfall that exceeds this limit. In case the weather changes and the rainfall is exceeded while you are flying, you must follow these steps:

- Terminate any flight maneuver.
- Hold the RPAS in cruise position with sufficient distance from any possible objects.
- Move the RPAS towards the landing spot on an appropriate altitude to prevent collisions and move at a safe distance from objects.
- Initiate the landing procedure.
- If for any reason the landing spot cannot be reached (for example when the landing spot is too far away), find an appropriate spot to safely land the ZOE RPAS. Make sure no objects or people are near that landing spot. Land the ZOE RPAS as soon as possible.
- Dry the RPAS as much as possible and make sure the RPAS is still in good conditions to fly. Please also refer to page 48.

CAUTION You should never perform a compass calibration when these weather conditions appear.

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Hail

Hail can occur in all shapes and sizes. All hailstones, even the smallest ones, can be a danger for the ZOE RPAS. A hailstone can easily hit and split a carbon fiber propeller. You should never takeoff when hail occurs or the weather forecast predicts hail. In case the weather changes and hail occurs while you are flying, you must follow these steps:

- Terminate any flight maneuver.
- Hold the RPAS in cruise position with sufficient distance from any possible objects.
- Move the RPAS towards the landing spot on an appropriate altitude to prevent collisions and move at a safe distance from objects.
- Initiate the landing procedure.
- If for any reason the landing spot cannot be reached, find an appropriate spot to safely land the ZOE RPAS. Make sure no objects or people are near that landing spot. Land the ZOE RPAS as soon as possible.

CAUTION You should never perform a compass calibration when these weather conditions appear.

Snow

Snow is not a problem for the RPAS once it has already fallen. You must only make sure it's not too cold to fly and the lading spot is free of snow. In case it's snowing while you are flying you must make sure it's not exceeding the limit of 10 mm/h. You should never takeoff when the snowfall exceeds this limit or the weather forecast predicts snowfall that exceeds this limit. In case the weather changes and the snowfall is exceeded while you are flying, you must follow these steps:

- Terminate any flight maneuver.
- Hold the RPAS in cruise position with sufficient distance from any possible objects.
- Move the RPAS towards the landing spot on an appropriate altitude to prevent collisions and move at a safe distance from objects.
- Initiate the landing procedure. Make sure the landing spot is still free of snow.
- If for any reason the landing spot cannot be reached (for example when the landing spot is too far away), find an appropriate spot to safely land the ZOE RPAS. Make sure no objects or people are near that landing spot. Land the ZOE RPAS as soon as possible.
- Dry the RPAS as much as possible and make sure the RPAS is still in good conditions to fly. Please also refer to page 48.

CAUTION You should never perform a compass calibration when these weather conditions appear.

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BATTERY LOW

The Cube flight controller enables voltage monitoring for the ZOE RPAS. The FC will automatically trigger the RTL procedures when the power level of the RPAS drops below a certain value. The standard warning level for a low battery is 21.7 V. The parameter of 21.7 V is set to have sufficient flight battery capacity left to return to the recorded home point and land automatically.

Besides monitoring the voltage through the FC, the voltage can also be verified on the Pilot controller. A voltage sensor on the RPAS will transmit the voltage and display the value on the Pilot controller.
If the PIC detects a low voltage warning and the RPAS doesn't start a RTL procedure/the PIC doesn't want to start a RTL procedure:

- Stop any flight maneuver.
- Hold the RPAS in cruise position with sufficient distance from any possible objects.
- Move the RPAS towards the Home point/landing spot while descending at the same time.
- Initiate the landing procedure as soon as possible.

Please refer to page 10, for more information on the RTL procedure.

CAUTION

As with all fail safes, the user can re-take control of the RPAS by changing the flight mode switch to another mode. This means that if the PIC overrides the failsafe it will not trigger anymore. However, this is not advised by Acecore, only in emergency situations when the PIC needs to regain control to avoid any obstacles for example. If the PIC exceeds a failsafe, Acecore is not liable for any damage of any kind.

If for any reason the landing spot cannot be reached, find an appropriate spot to safely land the ZOE RPAS. Make sure no objects or people are near that landing spot. Land the ZOE RPAS as soon as possible.

BATTERY CRITICAL

If the PIC, for some reason, cancels the normal battery low failsafe and the battery voltage drops below 21.3 V, the RPAS will directly land.

CAUTION

As with all fail safes, the user can re-take control of the RPAS by changing the flight mode switch to another mode. This means that if the PIC overrides the failsafe it will not trigger anymore. However, this is not advised by Acecore, only in emergency situations when the PIC needs to regain control to avoid any obstacles for example. If the PIC exceeds a failsafe, Acecore is not liable for any damage of any kind.

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LOSS OF CONTROL

If the Pilot controller experiences a failure, catches fire or the battery is empty/dead the control signal for the RPAS will be lost. Besides experiencing a Pilot controller failure the situation could occasionally occur when the control signal between Pilot controller and the RPAS is temporarily lost or is jammed. This might occur in situations with EM (electromagnetic) influences.

The loss of control signal can be detected through the Pilot controller.

The failsafe RTL procedure is activated if the remote controller signal is lost for more than 3 seconds. Please refer to page 10, for more information on the RTL procedure.

NOTE

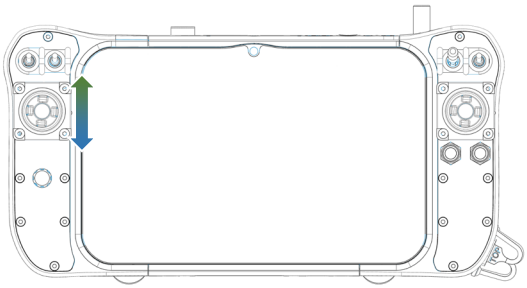
If during the failsafe RTL procedure the Pilot control signal is restored, the RPAS will remain in a random flight mode depending on the situation. It will not automatically return to the flight mode that was active before the failsafe was triggered. If the PIC wants to retake control, the flight mode switch needs to be switched to another position and then back to the desired mode.

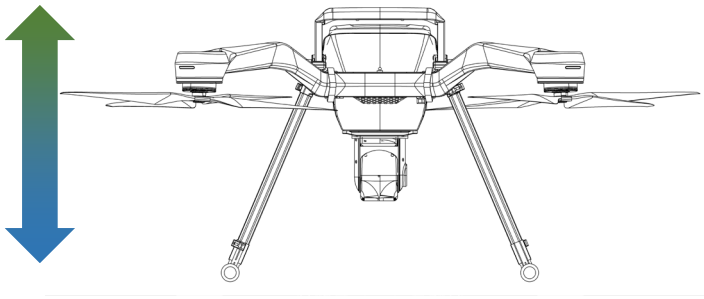
CAUTION

As with all fail safes, the user can re-take control of the RPAS by changing the flight mode switch to another mode. This means that if the PIC overrides the failsafe it will not trigger anymore. However, this is not advised by Acecore, only in emergency situations when the PIC needs to regain control to avoid any obstacles for example. If the PIC exceeds a failsafe, Acecore is not liable for any damage of any kind.

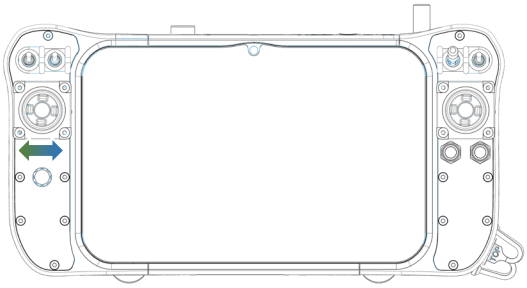
Movements RPAS

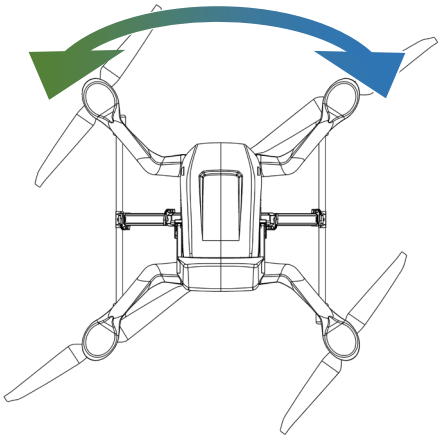
We will zoom in to the standard movements of the RPAS. Be aware of how a flight mode may override the standard movements.
By pushing the throttle stick upwards, the RPAS will rise. Pulling the throttle stick down will lower the RPAS.





By moving the yaw stick to the left, the RPAS will turn CCW. Moving the yaw stick to the right will turn the RPAS CW.





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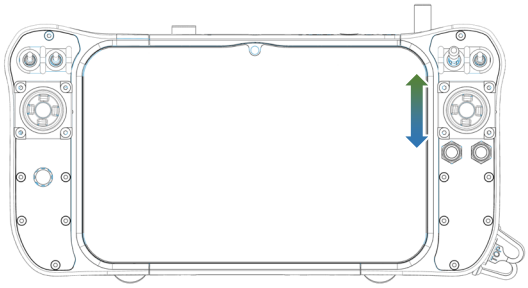
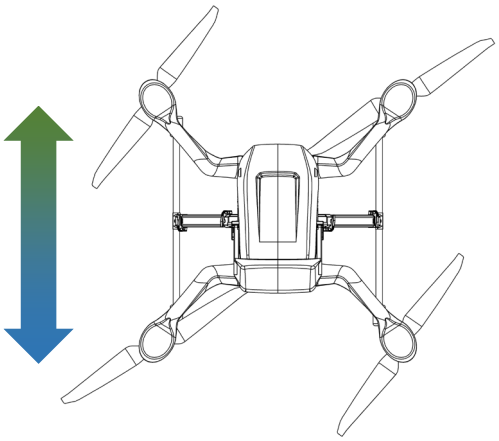
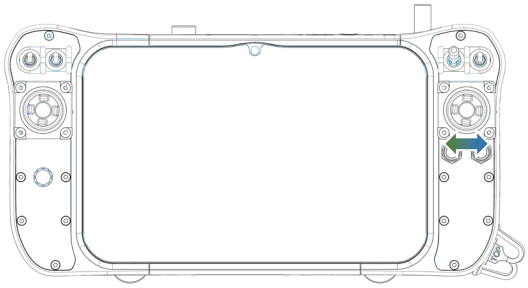
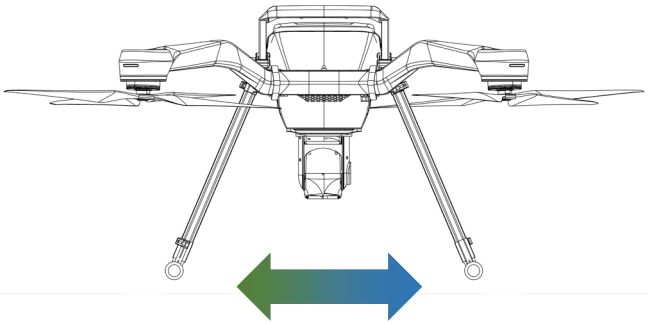
By pushing the pitch stick upward, the RPAS will move forward. Pulling the pitch stick down will move the RPAS backward.





By moving the roll stick to the left, the RPAS will move to the left. Moving the roll stick to the right will move the RPAS to the right.





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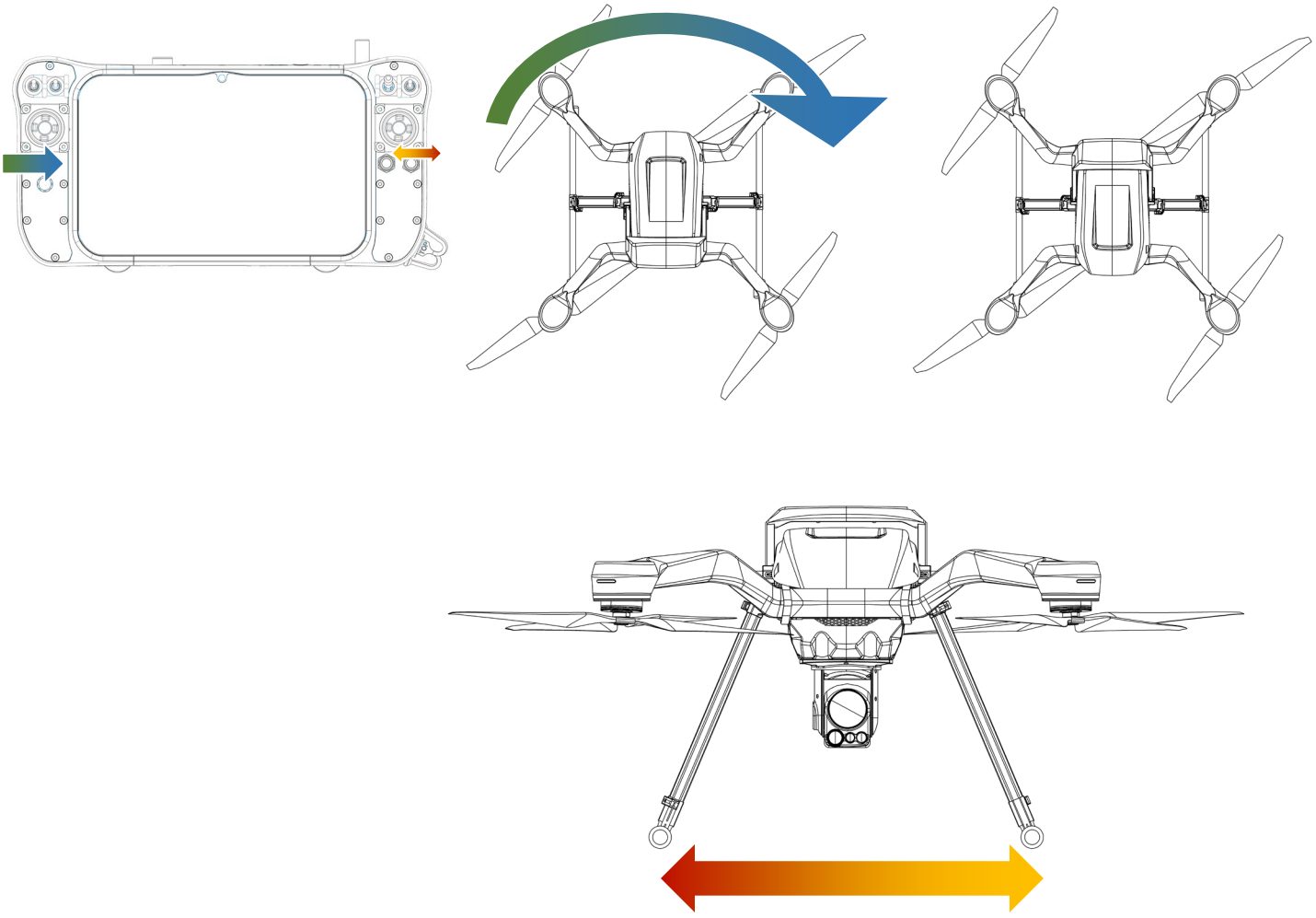
WARNING

These movements are relative to the RPAS, so not relative to the PIC. That means that the PIC has to focus on the LEDs, which will indicate which side is the front, back, left and right.

Example: the back of the RPAS is facing you, you yaw the RPAS 180° and then you push the pitch stick forward. The RPAS will now move towards you (and not away from you)! If you again yaw the RPAS 180° and push the pitch stick forward. The RPAS will move away from you.



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Loiter flight mode will not influence these movements. However the RPAS will try to maintain his position, altitude and heading when all sticks are centered. It will also stabilize itself. For further information on the Loiter flight mode, please refer to page 10.

Altitude Hold flight mode will not influence these movements. However the RPAS will try to maintain his altitude when the throttle stick is centered. It will also stabilize itself. For further information on the Altitude Hold flight mode, please refer to page 10.

Brake flight mode does influence these movements! When brake flight mode is selected the RPAS will stop as soon as possible. It will maintain his position, altitude and heading while also stabilizing itself. The Brake flight mode doesn't accept any input from the PIC. For further information on the Brake flight mode, please refer to page 10.

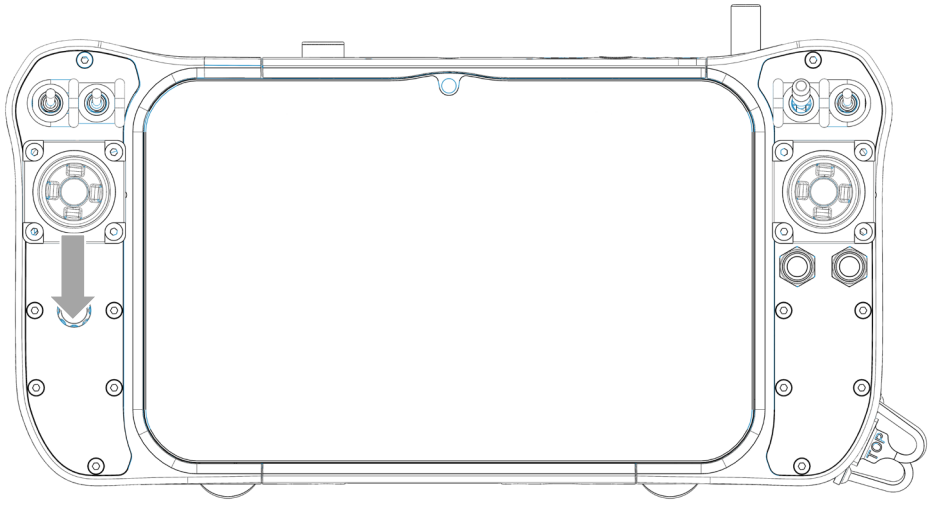
Auto flight mode does influence these movements! Auto flight mode is based on pre-programmed missions. While the Auto flight mode is selected the roll, pitch and throttle input from the PIC will be ignored. The yaw movement will work as described above. For further information on the Auto flight mode, please refer to page 10.

RTL flight mode does influence these movements! During the whole Return To Launch you are able to control the yaw as described above. During the whole Return To Launch you are not able to control the throttle, this stick will be ignored completely. Before the drone has reached the home position you are not able to control the roll and pitch, these sticks will be ignored completely. After the RPAS has reached the home position, you are able to control the roll and pitch as described above. For further information on the RTL flight mode, please refer to page 10.

Landing

Acecore advises PICS to always land in Altitude Hold mode in order to avoid any GPS induced movements. Switch to Altitude Hold mode according to page 28.
Once the landing spot is approached to about 1,5 meter AGL, the landing procedure is as follows:

1. Verify that the landing spot is secured and make sure there are no objects or persons near. The landing spot should meet the same requirements as the takeoff spot.
2. Check the RPAS overall status before initiating a landing.
3. Switch to Land flight mode. Please refer to the manual of your Pilot controller. Or move the left stick slowly backwards to start the descent (the RPAS should not descent faster than 0.4 m/s).
4. If necessary, use the right stick to correct any movements of the RPAS.
5. When the RPAS reaches a height of about 30 cm AGL, interrupt the descent and try to keep the RPAS steady in cruise. This step is not necessary if the PIC uses the Land flight mode.
6. Once the PIC has the RPAS in control and can maintain its position, move the left stick backwards slowly. This step is not necessary if the PIC uses the Land flight mode.
7. When the RPAS touches the ground, move the left stick all the way down in one movement. Keep the left stick completely down until the Pilot controller says “Motors disarmed”. This step is not necessary if the PIC uses the Land flight mode.



The RPAS is now landed and the motors are stopped.

CAUTION

Moving the sticks will always be inputted to the RPAS (except when in Brake flight mode), so never start this procedure in flight or when the PIC is absolutely sure that the RPAS is firmly on the ground.

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Calibrations

Compass

NOTE Do not calibrate your compass where there is a strong magnetic interference, such as magnet, car park, and underground steel reinforcements.

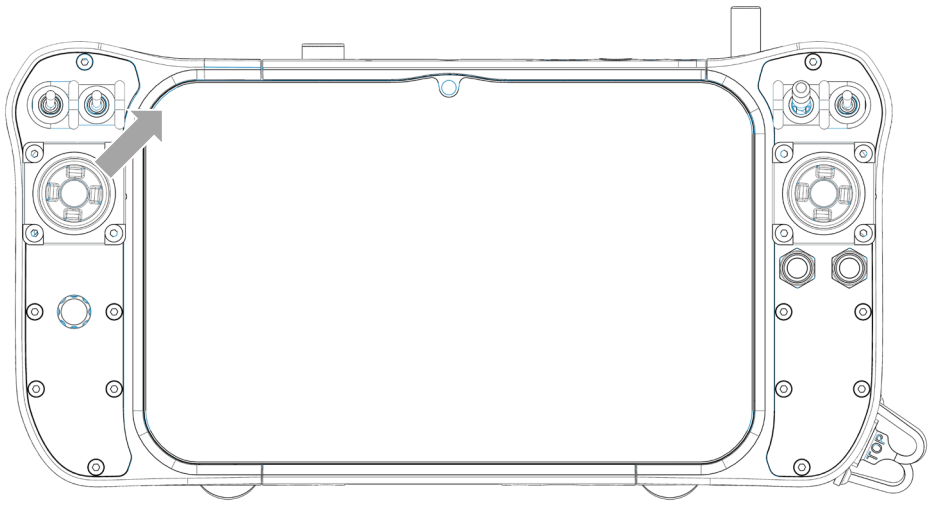
NOTE Do not carry ferromagnetic objects with you during calibration, such as keys or cell phones.

NOTE Always perform this procedure without any gimbal and propellers attached.

NOTE Do not perform a compass calibration when it rains, hails or snows.

A compass calibration is necessary if:

- The flight environment is changed
- The RPAS mechanical setup has changed, including the following situation:
  1. The GPS & Compass module is re-positioned
  2. Electronic devices added, removed or re-positioned (main controller, servos, batteries, etc.)
  3. The mechanical structure of the RPAS has changed
- The flight direction appears shifting (meaning the RPAS doesn't "fly straight")
- The HDOP is too high



Perform these steps to complete a compass calibration:

1. Turn on the RPAS and connect to Mission Planner (please refer to your Pilot controller manual for detailed information on how to connect to Mission Planner)
2. Go to SETUP > Mandatory Hardware > Compass
3. Select "Strict" at Fitness on the bottom of Mission Planner the screen
4. Close Mission Planner
5. Move the left stick of the Pilot controller to the upper right until you hear a single tone followed by short beeps once per second (these beeps confirm that the RPAS is in compass calibration mode)
6. Hold the RPAS in the air and rotate it so that each side (front, back, left, right, top and bottom) points down towards the earth for a few seconds in turn

7. Upon successful completion three rising tones will be emitted and you will need to reboot the autopilot before it is possible to arm the vehicle

If you keep having calibration failures, please try to select “Default” Fitness inside Mission Planner (instead of “Strict” Fitness).

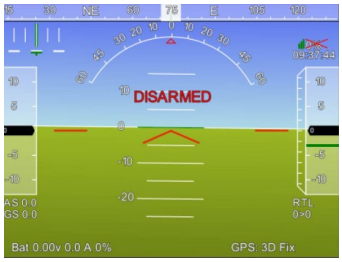
If you keep having calibration failures even with “Default” selected inside Mission Planner, it might suggest that there is very strong magnetic interference around the GPS & Compass module, please avoid flying in this area.

Accel

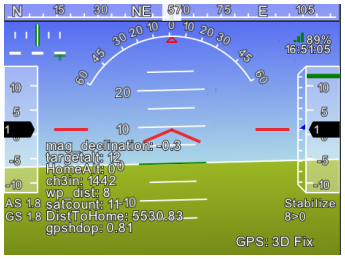
WARNING No one should perform the accel calibration without the prior written consent or authorization of Acecore Technologies.

Perform these steps to complete an accel calibration:

1. Turn on the RPAS and connect to Mission Planner (please refer to your Pilot controller manual for detailed information on how to connect to Mission Planner)
2. Go to SETUP > Mandatory Hardware > Accel Calibration
3. Click “Calibrate Accel” to start the calibration
4. Mission Planner will prompt you to place the RPAS at each calibration position. Press any key to indicate that the RPAS is in position and then proceed to the next orientation
5. The calibration positions are: level, right side, left side, nose down and on its back
6. Mission Planner should prompt “Calibration successful”
7. Place the RPAS leveled and go to DATA, the screen on the left upper hand should display something like this:



8. Tilt the RPAS to the back, the screen on the left upper hand should display something like this:



9. Roll the RPAS to the left, the screen on the left upper hand should display something like this:

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10. Close Mission Planner

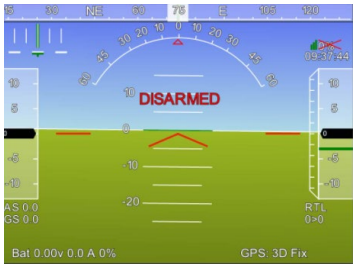
Level

A level calibration is necessary if:

- The RPAS drifts away more than 2 m/s on a day with less than 1 knot wind

Perform these steps to complete a accel calibration:

1. Turn on the RPAS and connect to Mission Planner (please refer to your Pilot controller manual for detailed information on how to connect to Mission Planner)
2. Go to SETUP > Mandatory Hardware > Accel Calibration
3. Make sure the RPAS is leveled very precisely (use a leveler)
4. Click “Calibrate Level” to start the calibration
5. Mission Planner should prompt “Calibration successful”
6. Place the RPAS leveled and go to DATA, the screen on the left upper hand should display something like this:



7. Close Mission Planner

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Storage

Storage is very important for maintaining a safe and reliable RPAS.
You will first have to disconnect the batteries. When both batteries are disconnected, take out the whole battery tray. Make sure the batteries are dry, clean and not too hot. Prepare the batteries for transport and/or storage.
After you have disconnected the batteries, you are able to turn off the Pilot controller. Please refer to the manual of your Pilot controller(s) for detailed information on how to store the Pilot controller(s) appropriate.
Now you are able to disconnect the payload. Please refer to the manual of your payload(s) for detailed information on how to store the payload(s) appropriate.
Disconnect the propellers. Turn the opposite way to disconnect the propellers. You may want to use the propellor tool. Make sure the propellers are dry, clean and not damaged. Put the propellers back in the flight case.
On the ZOE RPAS center piece you will find two clips near the landing gear. Open both clips and pull the landing gear assembly out of the centerpiece. Let someone else hold the RPAS, make sure it doesn't get damaged. Make sure the center piece is in good condition, dry and clean. On the landing gear horizontal stands you will also find a clip, open the clip. Pull both landing gear parts out of each other. Make sure all the four landing gear parts are dry and clean. Close the clips before you store the landing gear. Put the four landing gear parts in the flight case. If the motors have been in contact with water or rain, clean and protect the motors and motors housing for oxidation. Finally put the center piece in the flight case, make sure the antennas are folded so the center piece fits in the flight case.
Store the flight case(s) in a dry place.

CAUTION Remove any payload from the quick release before transporting the ZOE RPAS to avoid damage or injury.

NOTE Lift the ZOE RPAS by holding the booms, preferably at the connection between the centerpiece and boom.

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This content is subject to change.
The latest version can be requested on the website.
Please let us know if you miss any information or something is unclear.

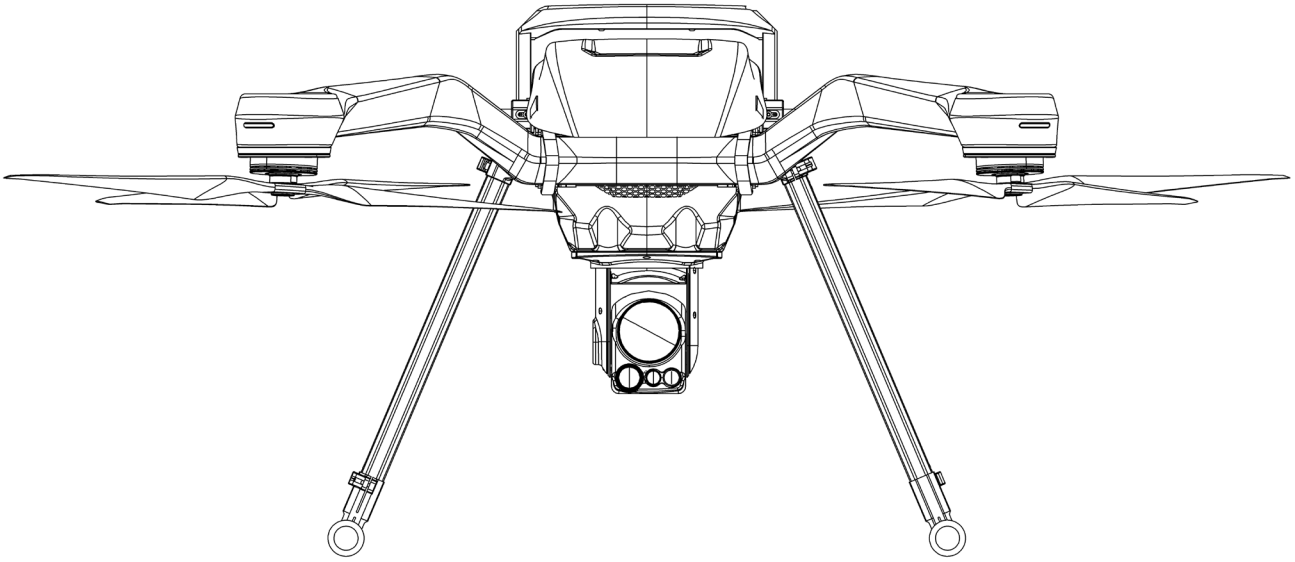
Appendix 1: Dimension RPAS

Frame dimensions	(lxwxh) 693x682x524 mm
Rotor to rotor diagonal	970 mm
Diameter with propellers	1310 mm
Height up to payload quick release	320 mm
Ground clearance top propeller	388 mm

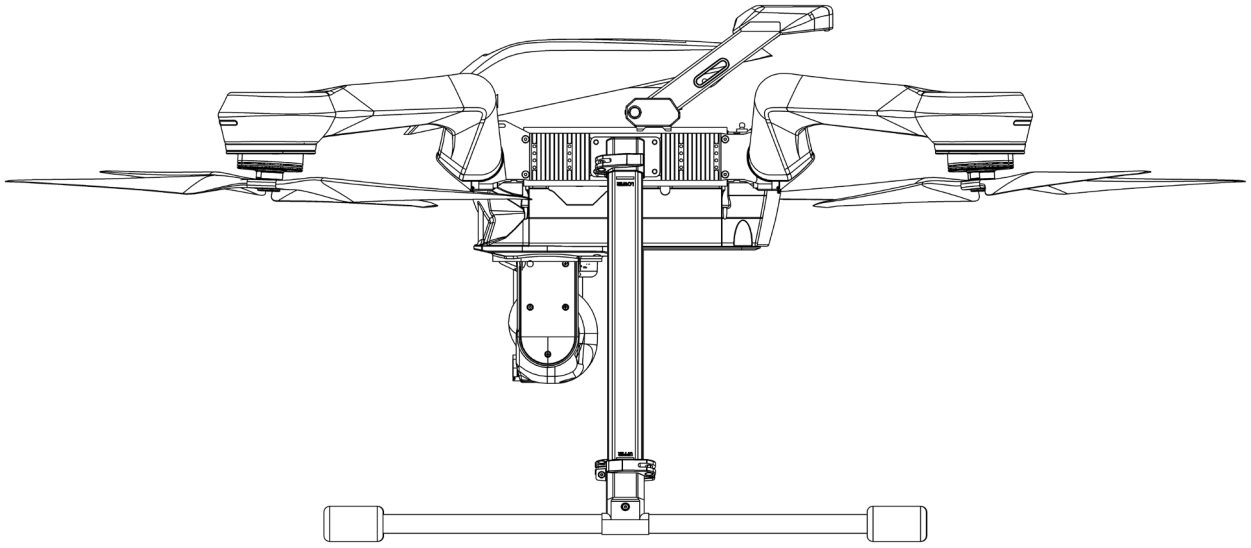
Sizes can change by adding options

Appendix 2: Two-View-Drawing RPAS

Front and left view ZOE M4



Front and left view ZOE M4



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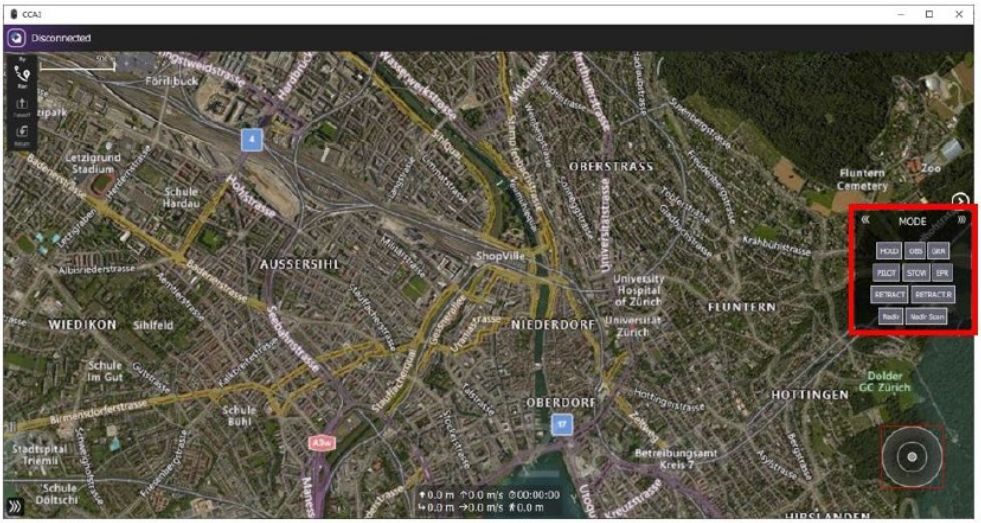
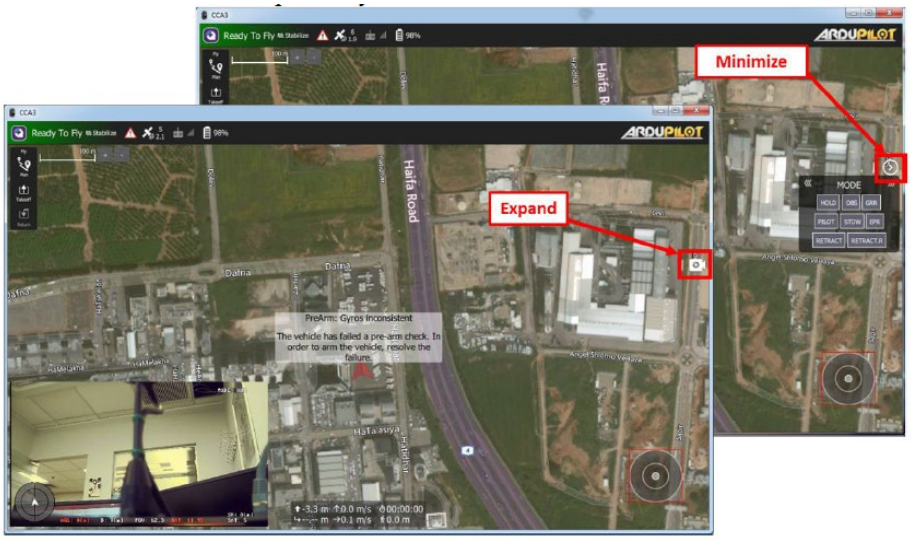
Next Vision Camera Control

The Quick panel

The Quick panel will be displayed in the main window of the application



The camera controls panel can be minimized and expanded by clicking the right circle arrow or camera icons respectively.



The camera control panel consists of 6 different controls. In order to navigate to the next/previous control, click on the right/left triple arrow icons respectively.

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Quick Panel

The QUICK panel holds useful actions for controlling the camera.

The button functions are explained in the following list:

OBS: Change the system mode to observation which will allow full camera control.

GRR: Stabilization compensates for angular movement and camera displacement.

STOW: Put the camera in Stow mode – (Pitch = 0°, Roll = 0°- relative to the camera)
Un-stabilized mode.

Day: Switch to day sensor

THERMAL: Switch to Thermal sensor

Zoom In: Zoom in while pressed.

Zoom Out: Zoom out while pressed.

Near: Focus near while pressed.

Far: Focus far while pressed.

Inf: A single press will set the camera's focus to infinity.

The QUICK control also allows to set the cameras field of view. In order to set the cameras FOV, enter the FOV value (degrees) in the **FOV** textbox and click on the **Set** button.

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Camera Modes

The MODE control, allows the user switch between camera modes.

The button functions are explained in the following list:

HOLD: Change the system mode to hold coordinate which will fixate on the current view point when camera is not moved by the joystick. View point will be altered when camera is moved by the joystick.

OBS: Change the system mode to observation which will allow full camera control.

GRR: Stabilization compensates for angular movement and camera displacement.

PILOT: Put the camera in Pilot mode – (Pitch = 80°, Roll = 0° - relative to the camera) Un-stabilized mode.

STOW: Put the camera in Stow mode – (Pitch = 0°, Roll = 0°- relative to the camera) Un-stabilized mode.

EPR: Extended Pitch Range. Pitch range is extended to -45° to 135° Roll movement is disabled.

Nadir: Fixate the camera to the nadir.

Nadir Scan: Fixate the camera on the Nadir and preform a predefined scan along the roll axel of the platform, for more information please check TRIP2/5 user manual.

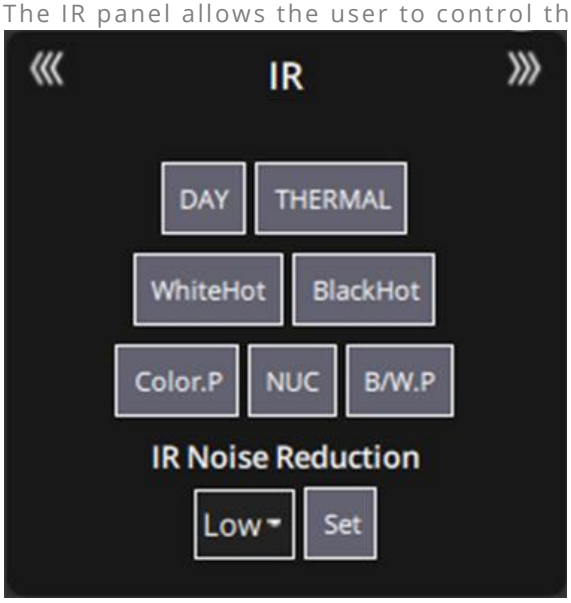
2D Scan: Puts the TRIP2/5 in 2D Scan system mode, for more information please check TRIP2/5 user manual.

Motors Off: Turn the camera motors off. (may require a restart to take place)

Motors On: Turn the camera motors on. (may require a restart to take place)

IR Panel

The IR panel allows the user to control the cameras thermal sensor.



The button functions are explained in the following list:

DAY: Switch to day sensor.

THERMAL: Switch to Thermal sensor.

WhiteHot: Switch to white hot view in thermal sensor.

BlackHot: Switch to black hot view in thermal sensor.

Color.P: Switch to color palette view in thermal sensor.

NUC: Will send NUC command to the camera.

B/W.P: Switch to B&W palette view in thermal sensor.

IR Noise Reduction: The IR noise reduction level can be selected using the IR Noise Reduction Levels Combobox, the available noise reduction levels are:

- **Low:** Low noise reduction level.
- **Medium:** Medium noise reduction level.
- **High:** High noise reduction level.

Clicking on the **Set** button on the right will set the selected noise reduction level.

NUC is non uniformity correction to the thermal channel. It is recommended to apply NUC ~90 seconds following power up. It is expected that the camera will reach steady state temperature within 90 seconds following power on (even with minimal airflow). The effect of NUC applied immediately following power up will be maintained for short time only since the temperature of the camera changes abruptly following power on.

IR Gain/Level panel

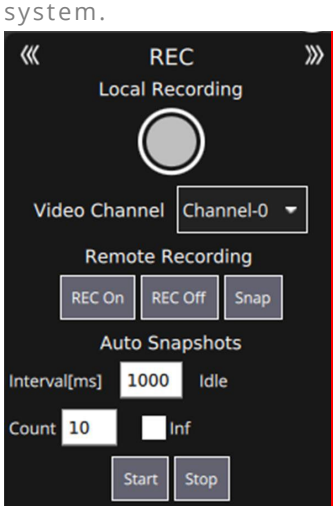
The IR Gain/Level panel allows the user to control the cameras thermal gain & level.

The button functions are explained in the following list:

Gain Inc: Increase the Gain of the thermal sensor
Gain Dec: Decrease the Gain of the thermal sensor
Level Inc: Increase the Level of the thermal sensor
Level Dec: Decrease the Level of the thermal sensor
Reset Gain/Level: Reset both Gain & Level to their default values

Record Panel

The Record Panel holds useful actions for controlling the recording features of the system.



The button functions are explained in the following list:
Pressing the red record button will Start/Stop local video recording on the GCS

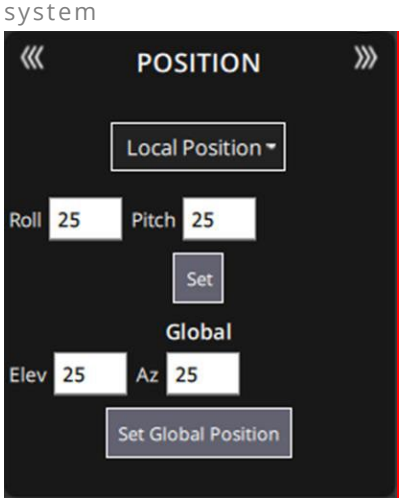
Video Channel: Selects which video channel will be affected by the remote recording and snapshot commands
REC On: Start recording video on the TRIP system
REC Off: Stop recording video on the TRIP system
Snap: Take a snapshot, executed on the TRIP system

Automatic snapshot s allow to configure the system for a predefined snapshot taking process. **The Interval[ms]** defines how much time show the system wait between each snap shot that is taken.
the **Count** defines how many snapshots to take, when the **Inf** checkbox is marked the system will take snapshots forever.

Start: Start the snapshot process
Stop: Stop the snapshot process

Position Panel

The Position panel holds useful actions for controlling the position modes of the system



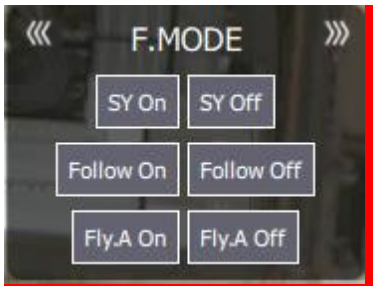
The button functions are explained in the following list:

Set Local/Un-stabilized Position: Place the system in local/Un-stabilized position mode using the **Roll** and **Pitch** values from the textboxes

Set Global Position: Place the system in global position mode using the **Elevation** and **Azimuth** values from the textboxes

F.MODE Panel

The F.Mode panel holds useful actions for controlling specialized flight modes



The button functions are explained in the following list:

SY On: Enable Single Yaw mode

SY Off: Disable Single Yaw mode

Follow On: Enable Follow mode

Follow Off: Disable Follow mode

Fly Above On: Starts the fly above process

Fly Above Off: Stops the fly above process

For detailed information about the special flight modes please review the TRIP2/5 user manual.

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Object Detection Panel

The object detection panel allows the user to configure the TRIP-5 object detection.

The button functions are explained in the following list:

OD.EN: Enables the object detection feature in the TRIP-5

OD.DIS: Disables the object detection feature in the TRIP-5

Detector Type: The detector type can be selected using the Detector Type Combobox, the available detectors types are: • Human & Vehicle

• Fire & Smoke
• Human Overboard
• Marine Vessel

Clicking on the **Set** button on the right will set the selected detector type.

Confidence Threshold: Sets the minimum detection confidence threshold. The allowed values are between 20 – 90 in percentage

Fire Threshold: Sets the fire threshold of the detector, the allowed values are between 0 - 65535

MISC Panel

The MISC panel allows the user to control useful miscellaneous, non-specific TRIP2/5 functionalities.

The button functions are explained in the following list:

En Geo AVG: Enable TRIP2/5 Geo averaging on the OSD display data.

Dis Geo AVG: Disable TRIP2/5 Geo averaging on the OSD.

En Vivid: Enable the Vivid image postprocessing functionality.

Dis Vivid: Disable the Vivid image postprocessing functionality.

For detailed information about specific functions of this panel please review the TRIP2/5 user manual.

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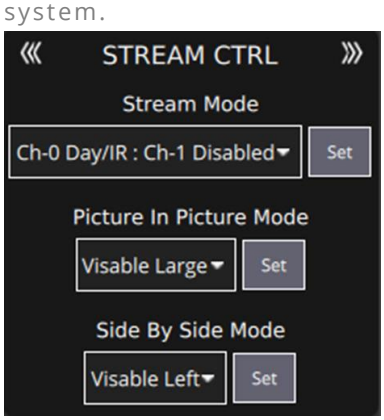
STREAM CTRL Panel

The Stream Ctrl panel allows the user to send stream control commands to the TRIP-5 system.



The button functions are explained in the following list:

Stream Modes: The stream modes combination can be selected using the Stream Modes combo box, the available stream modes combinations are:

Channel-0 Day/IR : Channel-1 Disabled
Channel-0 Day : Channel-1 IR
Channel-0 Day : Channel-1 Fusion
Channel-0 Day : Channel-1 PIP
Channel-0 Day : Channel-1 SBS
Channel-0 IR : Channel-1 Fusion
Channel-0 IR : Channel-1 PIP
Channel-0 IR : Channel-1 SBS
Channel-0 Fusion : Channel-1 Disabled
Channel-0 PIP : Channel-1 Disabled
Channel-0 SBS : Channel-1 Disabled

Clicking on the **Set** button on the right will set the selected stream modes combination.

PIP Mode: The PIP mode can be selected using the PIP Mode Combobox, the available PIP modes combinations are:

Visible Large
IR Large

Clicking on the **Set** button on the right will set the selected PIP mode.

SBS Mode: The SBS mode can be selected using the SBS Mode Combobox, the available SBS modes combinations are:

Visible Left
IR Left

Clicking on the **Set** button on the right will set the selected SBS mode.

For detailed information about the Stream Control commands, please review the TRIP-5 user manual.

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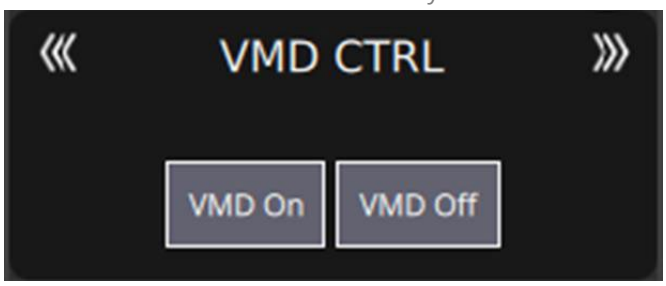
VMD CTRL Panel

The VMD CTRL panel allows the user to control the functionality of the Video Motion Detection feature of the TRIP system.



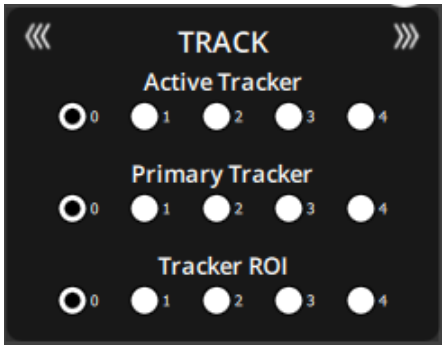
The button functions are explained in the following list:

VMD On: Enable the VMD algorithm on the TRIP system.

VMD Off: Disable the VMD algorithm on the TRIP system.

Track Control

The Multi Track control panel allows the user to control the functionality of the trackers when the multiple trackers feature is enabled



The radio button functions are explained in the following list:

First row of radio buttons defines which tracker is the current active tracker.

Second row of radio buttons defines which tracker is the current primary tracker

Third row of radio buttons define

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