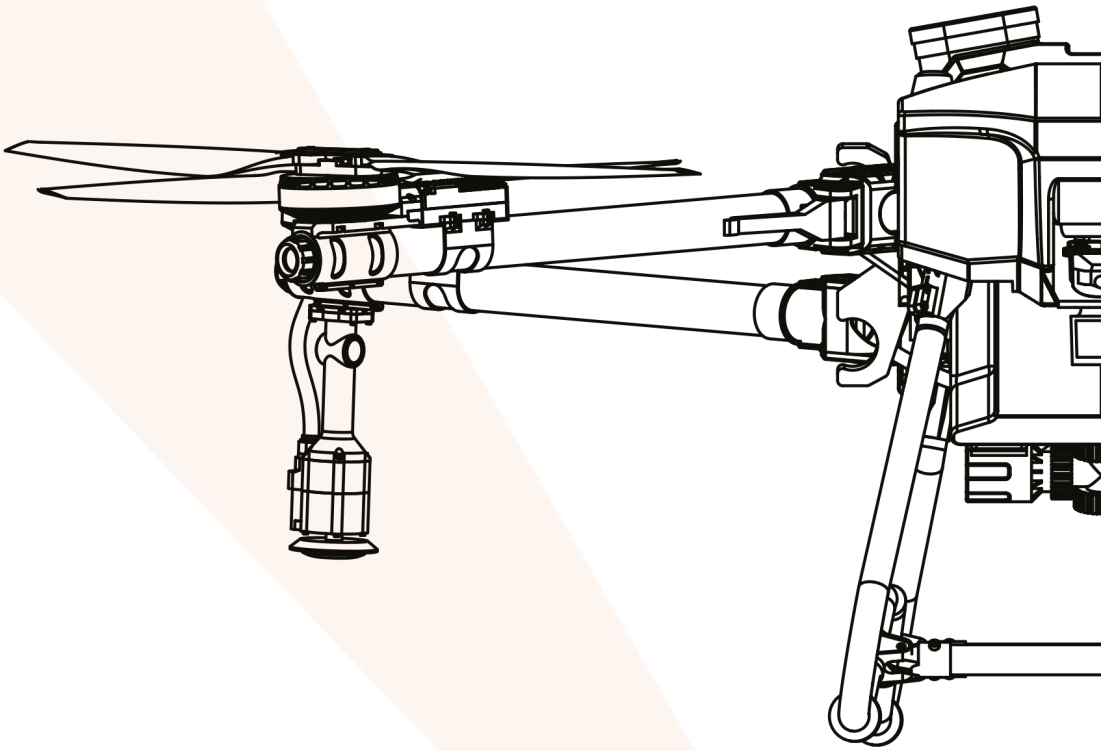
ABZ INNOVATION

WE BUILD DRONES.



L30 V2

OPERATOR MANUAL

Version 2.4

Overview

This manual is for the ABZ Innovation L30 V2 industrial, agricultural drone, equipped with a CDA (controlled droplet application) spraying system designed for the most efficient use.

The drone can be upgraded with a wide range of other payloads too, thanks to its universal design. The drone and its accessories may only be operated in accordance with the instructions in this manual.

Please read this notice and the manual provided for your ABZ Innovation L30 V2 drone before use. If you have any questions, please contact ABZ Innovation customer service before use. The contact details can be found at the end of this document. By using the drone, you declare that you have read this manual, that you understand and acknowledge the information contained herein, and that you consent to use the drone only under proper conditions, in full compliance with applicable laws and the instructions in this manual. Furthermore, you agree that you are now exclusively responsible for the drone and its operation, and for any direct or indirect legal consequences arising from its operation.

The ABZ Innovation L30 V2 drone is NOT a toy and is to be used only with care. Improper use of the drone poses a serious risk and can cause damage to the drone and its surroundings, severe personal injury, or death. The drone may only be used by qualified pilots. The ABZ Innovation L30 V2 is a technical, agricultural device.

Any modification to the drone, its components or software will immediately void the warranty.

To identify an L30 V2, locate the serial number label on the right side of the drone frame and check if the „Model” is L30 V2.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device contains the following FCC-certified modules: FCC ID: XPYANNAB4, FCC ID: 2AZBB-MK15RX, FCC ID: RID-LR101H, FCC ID: 2ABCB-RPI5

This device complies with Part 15 of the FCC Rules for Class A digital devices. NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Responsible Party:

Drone Nerds 5553 Anglers Ave, Suite #109, Ft. Lauderdale, FL 33312 Phone:(786) 708-7807, Email: sales@dronenerds.com

Drone main parts

1: Motors

2: Propellers

3: Front cover

4: Tank

5: Battery

6: Rear cover

7: Arms

8: Camera

9: LiDAR sensor

10: Landing gear

11: Pump

12: CDA sprayers

Packing list

The L30 V2 drone standard package contains:

- L30 V2 drone and tank
- ABZ Innovation MK15 remote controller with sticks and antennas
- 20 W fast charger and cable for remote controller
- US/EU plug converter for the fast charger
- USB-C / USB-A converter
- Carrying case for the remote controller

Specifications

Dimensions arms, propellers unfolded	2435 x 2541 x 752 [mm]
Dimensions arms unfolded, propellers folded	1520 x 1600 x 752 [mm]
Dimensions arms and propellers folded	979 x 683 x 752 [mm]
Spray tank capacity	30 L
Max. per hectare performance	21 ha/h
Flight planning and flight precision	RTK
Maximum flow rate	16L/min
Battery integration	Quick connector
Intrusion protection	Limited water and dust resistance
Drone frame	Folding frame
Range	3,5 km
Sensor	LiDAR
Total weight	32kg (without battery)
Max. Take-off weight	70kg
Max. operating speed	8 m/s
Max. level speed	10 m/s
Max. tolerable wind speed	10 m/s
Radio Control and Telemetry band	2.4 GHz
WLAN frequency band	2.4 GHz

Safety requirements

Use of plant protection products

- Pesticides are toxic, and their use poses high health and safety risks. Use them only as prescribed!
- Do not use strong acids, strong alkalis, high-temperature liquids, or pesticides that are prohibited.
- Do not endanger people, animals, or the health of the environment.
- Pesticides must not be allowed to contaminate rivers and drinking water sources.
- Avoid the use of powder-based pesticides, as they can shorten the life of the spraying system of the device.
- Mix the pesticide with clean water and filter it immediately before use to avoid clogging the filter. Clean the filters of the device before use if noticing deposits.
- The valves of the drone can be opened for cleaning. They have to be closed during operation.
- The membrane of the valve might become clogged with particles. For cleaning instructions, refer to CDA valve cleaning (page 103).
- If spraying in a windward direction, make sure that the spray does not drift onto you or anyone else on the site. Wear full protective gear to avoid direct contact with the pesticide.
- Clean the drone and remote controller after spraying.
- The effectiveness of application depends on the density of pesticides, the speed and distance of spraying, the flight speed and is affected by wind speed, wind direction, temperature and humidity. Take all these factors into account when spraying!
- Avoiding unnecessary spraying: accurate planning of the spraying work is necessary to determine the right amount of pesticide to use, so that the amount of excess spray can be minimized. It is recommended to apply the residual spray or water used to wash the drone's system to plants.

Child protection provisions

- This equipment is not suitable for use in places where children are likely to be present.
- The equipment must be kept out of the reach of children.
- The equipment contains a spray that is dangerous for children and must be kept out of the reach of children!
- In case of contact with the spray, wash off immediately with plenty of water. In case of ingestion of spray, seek medical advice immediately.
- The equipment operates rotating parts that are dangerous for children and must be kept out of the reach of children!

Environmental aspects

- It is forbidden to operate the drone or any of its components in an enclosed space.
- Fly only in places where there are no buildings or other obstacles.
- Do not fly over or near large crowds.
- Do not fly above 4.5 km (14 763 feet) above sea level.
- Fly only in moderate weather conditions, between temperatures of 5°C and 45°C (41°F and 113°F).
- Rain and foggy weather might affect the performance of the LiDAR, and consequently, the performance of altitude hold and obstacle sensing.
- During lightning, flight is prohibited.
- During adverse weather conditions, such as heavy rain, snow, and icing, flight is prohibited.
- Your flying and spraying activities must not violate any applicable laws or regulations. You must have all the necessary permits. Contact the appropriate government agency or authority before flying to ensure that you operate your drone in compliance with laws and regulations.

Operation

- The drone may only be switched on and operated in accordance with the "Flight Protocol" chapter, starting on page 95.
- Only use the drone in full compliance with the Checklists.
- Stay away from rotating propellers and motors, CDAs.
- Do not exceed the maximum combined accessories and batteries and payload weight in any case. Otherwise, the drone may be damaged and the flight might pose danger.
- Always keep track of the drone's flight, and be ready for manual control. Manually avoid obstacles at a safe distance. Never rely exclusively on the ABZ Control app. It is important to check or set the correct Failsafe and RTL altitude before each flight.
- Always keep the drone within visual line of sight (VLOS) and keep an eye on it.
- Don't get distracted by using your mobile phone or any other activities.
- Don't fly under the influence of alcohol, drugs or medicines. Fly only when you are mentally and physically capable of safely controlling the drone, including paying attention to its surroundings.
- If the drone or remote controller battery is low, land the drone in a safe place. The state of the drone battery should be monitored before the flight using the charging indicator LEDs on the battery. We recommend starting the flight with a minimum of 80% battery charge.
- During the flight, the pilot must monitor the battery voltage, which should always be above 51,4 V (Tattu Plus battery)/ 48,5 V (Zhian battery) even when flying with the Maximum Take-off Mass (MTOM). The ABZ Control battery indicator icon serves only as an indicator and shows an approximate value.

- Never fly closer than 100 m (328 ft) to a high-voltage power line or high-power radio emitters (e.g. Radar, TV/Radio station).
- Never fly closer than 30 m (100 feet) horizontal distance to buildings.
- After landing, switch off the motors, switch off the drone by disconnecting the battery, and then switch off the remote controller.
- In case of loss of remote controller signal, the drone can automatically switch to Failsafe RTL mode.

Maintenance and storage

- Do not use damaged, broken, or aged propellers.
- Clean the drone immediately after spraying.
- Regularly check the condition of the drone and make a flight log.
- To avoid damage to the drone's landing gear, remove or empty the spray tank, remove payloads, accessories, and the battery before transportation.
- Significant dust and stains on the optical window will affect the performance of the LiDAR sensor.
  - If it is necessary to clean the sensor, first use compressed or canned air. DO NOT wipe a dusty optical window, as it will only cause more damage.
  - If the optical window has visible stains after dusting, it is necessary to wipe it as well.
  - DO NOT wipe using a dry lens tissue, as it will scratch the surface of the optical window. Use the lens tissue provided (?) with isopropyl alcohol. Wipe slowly to remove the dirt instead of redistributing it on the surface of the optical window.
  - If the optical window is still dirty, a mild soap solution can be used to gently wash the window. Repeat Step 2 to remove any remaining soap residue.
- Never take pictures of the LiDAR while it is operating. The laser pulses emitted by the LiDAR may damage the mobile phone's camera sensor.
- Only store the drone with the spray system thoroughly emptied, cleaned, and flushed.
- Clean the drone, especially the propellers, after use.
- Recommended storage temperature: between 5°C and 40°C (41°F and 104°F) applicable for the drone, as well as the remote controller and the batteries.
- Never store the remote controller or the drone's batteries below 0°C (32°F), as it will cause excessive degradation to the battery cells.
- Store the drone, remote controller, and batteries below 60% relative humidity.
- The remote controller and the drone's batteries must be stored at about 60% charge.
- Batteries deplete after extended storage. The remote controller and the drone's batteries must be discharged and recharged every 3 months of storage.
- After long-term storage:
  - Every battery must be inspected and fully charged before use.
  - The drone's motors must be inspected for free rotation.

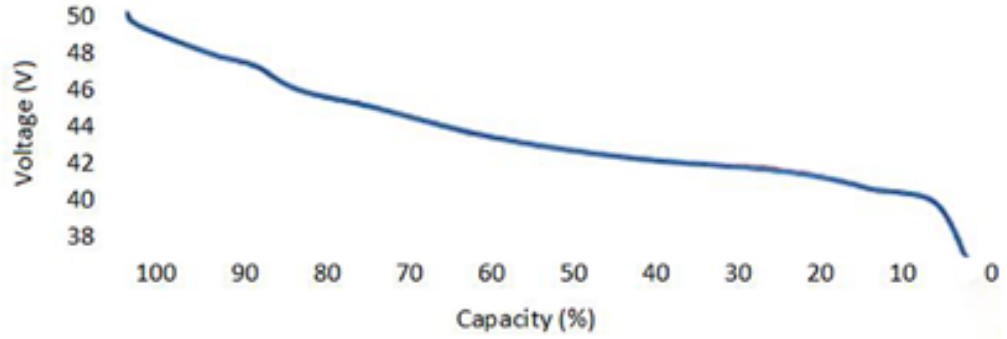
Personal precautions

- The temperature of the chemicals in the spray tank cannot exceed 45°C (113°F). During use, the working temperature range is between 5°C and 45°C (41°F and 113°F).
- Before starting the spraying work, always carry out an inspection of the condition of the drone (condition of seals, detection of possible leaks, quality of the spraying) with clean water. Make sure that everything is working properly before you start working with chemicals.
- Always prepare the chemicals according to the instructions for use provided by the manufacturer. Adhere to the appropriate mixing or dilution ratio prescribed by the manufacturer. Mixing and dilution at inappropriate ratios is prohibited as it may have adverse effects on humans and the environment, may be harmful to health, and may result in insufficient treatment of plants.
- Using protective equipment (safety goggles, rubber gloves, overalls, safety shoes, or boots), rinse the spray tank and the spraying system with plenty of water after each operation. Clean the drone after every work session. After cleaning the equipment, wash your hands, change your clothes, and store your work clothes and protective equipment in a locked place. After working with chemicals, always take a shower if possible.

Drone handling and use precautions

- Before commencing each flight, plan your drone's flight path with care and attention.
  Pay attention to the following:
  - working at a suitable time of day,
  - weather conditions,
  - environmental influences (such as sunlight),
  - drifting of the drone in case of wind,
  - wind speed,
  - flight altitude,
  - when planning, the correct line spacing,
  - turning points,
  - obstacles in the work area.
- When planning your flight, pay close attention to spray runoff caused by the wind. The degree of runoff depends on:
  - the amount of spray applied,
  - the flight altitude,
  - the airspeed,
  - the droplet size
    (determined by the combination of impeller speed and pump delivery volume),
  - the direction and speed of the wind.

- Always factor in the amount of runoff when planning your flight. An incorrectly chosen combination of airspeed and altitude will greatly reduce the quality of the work done. Therefore, follow the instructions provided by the chemical manufacturer and choose the correct flight speed, altitude and amount of spray to be applied.
- You can always count on some residue during operation, which is 1% of the spray tank capacity.
- Carefully store any remaining chemicals after the spraying is done.
- The equipment is powered by a replaceable battery. Make sure the batteries are in good condition and fully charged. Do not use faulty or damaged batteries. To learn about proper use and storage, please read the battery's instruction manual.
- The batteries can be charged using an external battery charger. To use this, please refer to the battery charger's instructions for use.
- The battery performance varies by temperature, so always pay attention to this phenomenon and follow the battery's instruction manual. Operate or charge the batteries only between 5°C and 45°C (41°F and 113°F) ambient temperatures, while the battery's temperature remains between 10°C and 60°C (50°F and 140°F).
- Battery discharge is not linear, depending on load, temperature, internal resistance, condition of cells. This figure shows the typical discharge curve for a drone battery in 90% state of health, at 40°C (104°F) at 7,5C load:



- The maximum masses of accessories/batteries/payloads combined, fitted to the drone must not exceed 38 kg (83,77 lbs), thereby the drone's overall mass must not exceed the Maximum Take-off Mass (MTOM), 70 kg (154,32 lbs).
- Maximum flight time with one battery is mostly dependent on the Take-off Mass, which is highly related to installed accessories and payloads. The difference in safe maximum flight time between an unequipped L30 V2 and a fully loaded L30 V2 at MTOM can be as high as 9 minutes.
- The drone's agility and balance are highly influenced by the payloads or accessories, especially if those are installed further away from the Optimal payload area. If a heavier device is installed offset from the drone's center of gravity, the pilot must fly with extreme caution to the altered controllability and potential of slower deceleration, acceleration, turning, elevation, and descent speeds.

Information about transport

The drone is designed for outdoor agricultural work. The drone can be delivered to the site in the trunk of a vehicle, in the loading area of a truck, or in a trailer. Proper anchorage is an important prerequisite for the safe transport of the drone, as it is done on uneven road surfaces and on various terrain. Securing the drone improperly can cause damage such as deformation and ultimately breakage of the propellers, damage to the spray tank, punctures, damage to the spraying system, etc.

Transporting the equipment requires extra care and attention. Improperly secured equipment and accessories necessary for its operation (drone, drone batteries, battery charger, generator, spray tank, spraying chemicals, etc...) can lead to damage, which may ultimately lead to total equipment failure. Therefore, please carefully secure the drone during transport and store its accessories in a suitable place.

In case of loss of signal and communication

The ABZ Innovation L30 V2 drone's software is equipped with safety features that ensure safe operation at all times. These include possible loss of signal and communication. This can occur when the drone signal is out of range, obstructed by a hill or building, or affected by interference from nearby equipment, electronic devices, or magnetic sources. In these cases, the drone will communicate clear instructions to the operator while the software initiates safety functions. The safety features can be set before take-off, telling the drone what to do if the drone loses signal.

These options can also be set with the following:

- Returning to the starting point (Return to Launch – RTL)
- Stopping at the point of signal loss
- Keeping the height
- Landing
- Climbing to the set altitude and return home
- continuing Auto mission

If the drone loses signal from the remote controller, or the communication between these are interrupted, on the remote controller's screen the following message will appear: „COMMUNICATION LOST" and it will read it out loud (if the volume is not muted).

The drone and the remote controller will try to recover the connection automatically. However, if possible, it is highly recommended for the pilot to move the remote controller closer to the drone, especially if any obstacles (e.g. building, tree, or a hill) are in between, and also if the communication between the remote controller and the drone is recovered, take back manual control of the drone (e.g. switching to Manual (Loiter) mode).

In the event of a crash, the drone typically disarms itself. However, if the rotors are still spinning, the pilot should attempt to activate the Motor emergency stop (by pressing the C and D buttons simultaneously), even if the 'Communication Lost' message is displayed.

Never approach an armed drone!

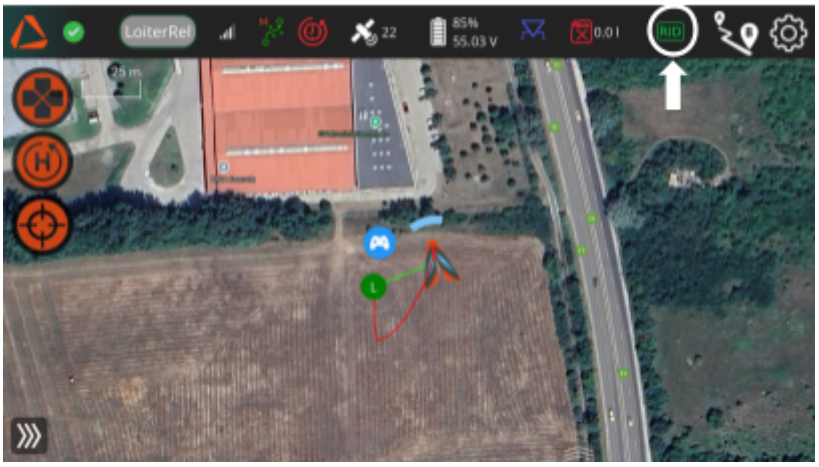
Mandatory Remote identification with Dronetag

For security reasons, remote identification of drones is mandatory in the United States and the European Union. All drones must be equipped with a Remote Identification device to locally transmit information about the operating drone.

The L30 V2 drone comes equipped with a Dronetag DRI Remote ID module and meets the requirements of the legislation requirements of the European Union[1] and the United States[2].

The Remote ID of your drone is its serial number, which is broadcast from the device during flight. The drone's system prevents takeoff if the Remote ID is not functioning.

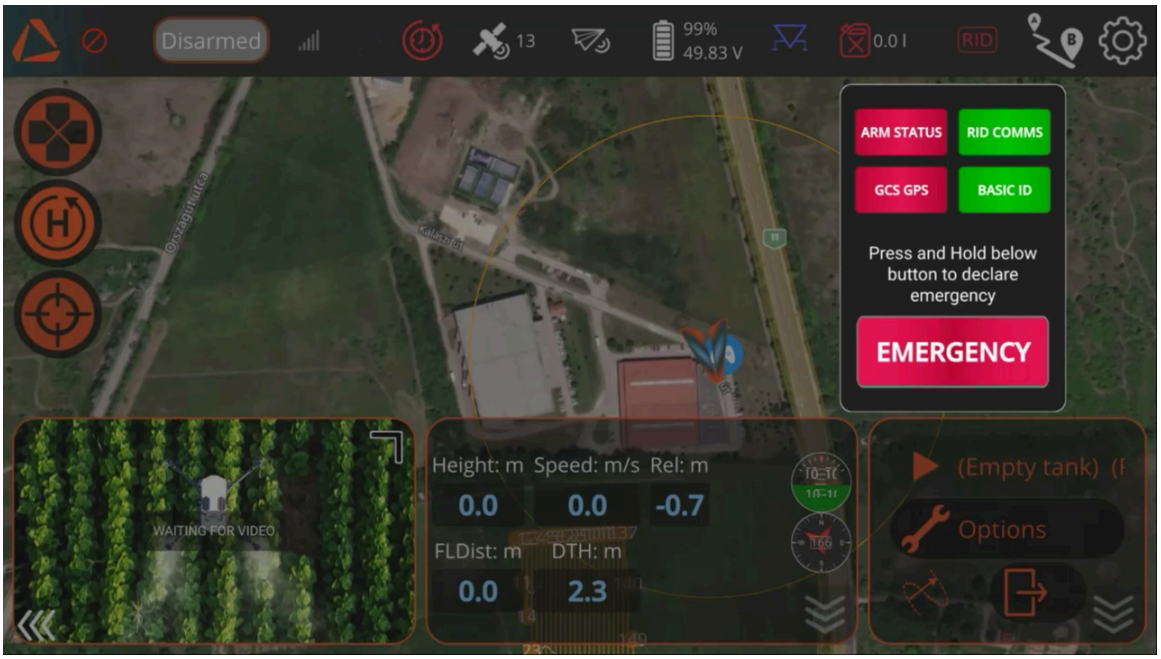
The **RID icon** shows the operational status of the Remote ID system. If the icon is green, the Remote ID is broadcast correctly.



If the RID icon is red, it indicates that the Remote ID broadcast is not functioning properly.

[1] Commission Implementing Regulation (EU) 2019/947 (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R0947)
[2] 14 CFR Part 89 – Minimum Performance Requirements for Standard Remote Identification of Unmanned Aircraft (https://www.ecfr.gov/current/title-14/chapter-I/subchapter-F/part-89)

By clicking on the icon, you can check the health of the systems providing the necessary data for the Remote ID module.



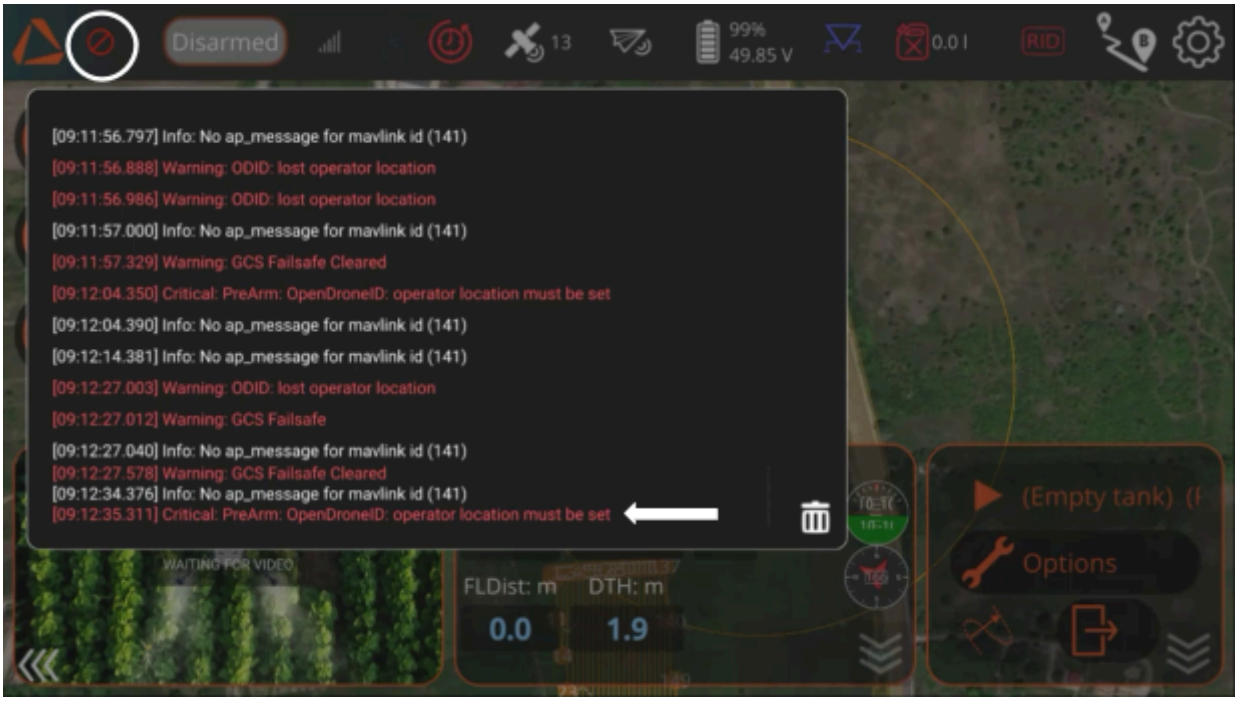
The **ARM STATUS** field provides feedback about the proper functioning of the location source hardware and software of the drone. In the case of a malfunction, this icon will turn red, and consequently, the Remote ID icon will also turn red, indicating a malfunction in the Remote ID system. The drone will also provide an error message stating that the Open Drone ID has encountered a problem (e.g., not receiving a location message).

The **GCP GPS** field provides feedback about the proper functioning of the Transmitter radio GPS (hardware and software). In the case of a malfunction, this icon will turn red, and consequently, the Remote ID icon will also turn red, indicating a malfunction in the Remote ID system. The drone will also provide an error message stating that the Open Drone ID has encountered a problem (e.g., not receiving a location message).

The **RID COMMS** field provides feedback on the proper connection between the Remote ID module and the drone.

The **BASIC ID** field should always be green, indicating that the drone's serial number has been set up as Remote ID and is broadcasting.

If the Remote ID system experiences an error due to insufficient GPS coverage on the drone or the remote controller, or a hardware malfunction, the drone prevents arming.



The drone continuously monitors the Remote ID functionality **from takeoff to shutdown** and provides a **notification of any malfunction or failure** in the top bar of the ABZ Control application. If the Remote ID system detects an error during flight, the RID icon will turn red, and the drone will provide an error message stating that the Open Drone ID has encountered a problem (e.g., not receiving a location message).

If the Remote ID system experiences an error during operation, the unmanned aircraft is no longer broadcasting the message elements of the standard Remote ID.
The pilot must [3] land the unmanned aircraft as soon as practicable.

[3] in accordance with 14 CFR Part 89 (Minimum Performance Requirements for Standard Remote Identification of Unmanned Aircraft:https://www.ecfr.gov/current/title-14/chapter-I/subchapter-F/part-89)

Declaring an Emergency

In the Remote ID interface, the pilot can click on the **Declare Emergency** button. To declare an emergency, you need to **press and hold the button for 3 seconds.** This function may be employed in situations such as loss of control, potential threats to persons or property, or in other emergency scenarios, at the pilot's discretion.

When an emergency is declared, the drone will broadcast the emergency status. To clear the emergency, press and hold the same button (which now displays the text **'Clear Emergency') for 3 seconds.**

Remote Controller

The L30 V2 is compatible only with the controllers provided by ABZ Innovation with specialized ABZ Control software. All firmware/software combinations are compatible with the drone. The available remote controller unit:

- ABZ Innovation MK15

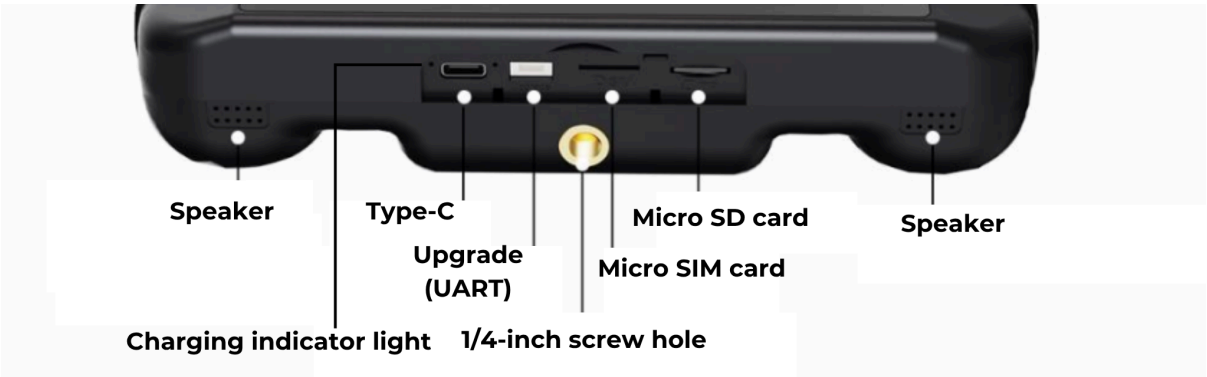
Other devices or applications are not compatible for controlling the drone and, therefore prohibited to use with the drone.

The MK15 remote controller is an Android operation system-based device, with an integrated system for communicating through radio signals with the drone. It runs the **ABZ Control** application to control the drone and let the pilot access all telemetry data and advanced flight planning.

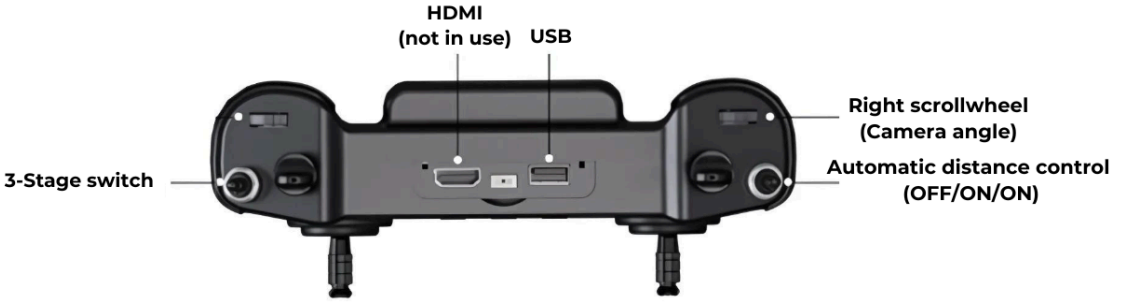
If the remote controller is turned off, you can check the battery charge of the remote controller by a short push of the power button. The blue LEDs indicate the charge level. The single LED in front of them gives feedback about the connection between the drone and the remote controller. When the LED is green, the drone and the remote controller are connected.

To switch on the remote controller, push the power button once briefly and then once more for a longer duration (until you hear the system's sound signal).

You can only charge the remote controller when it is powered OFF and only with the supplied fast Charger. The RC cannot be charged while working.



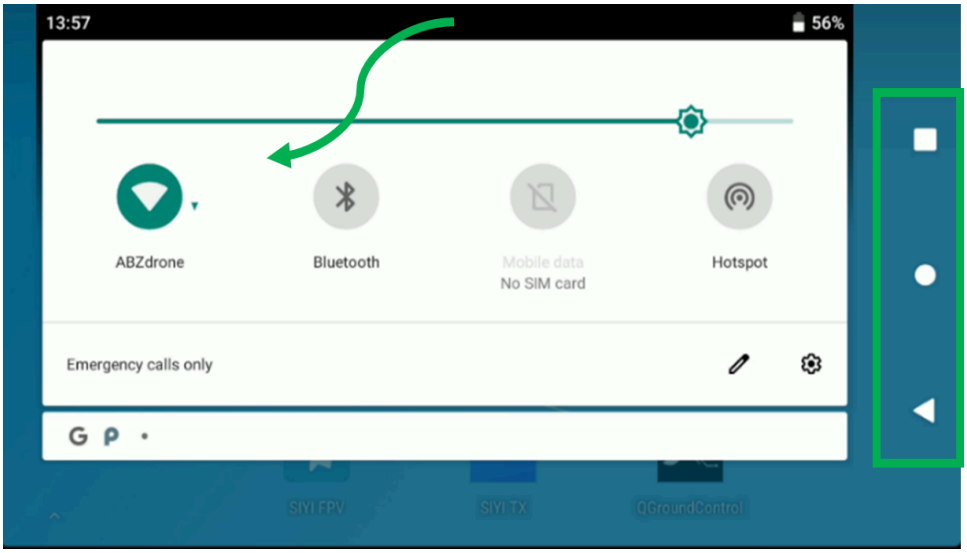
1. Connect the remote controller to the fast charger and plug it into the power supply.
2. The charging indicator lights are red when the ground unit is charging.
3. The charging indicator lights are green when charging is finished.



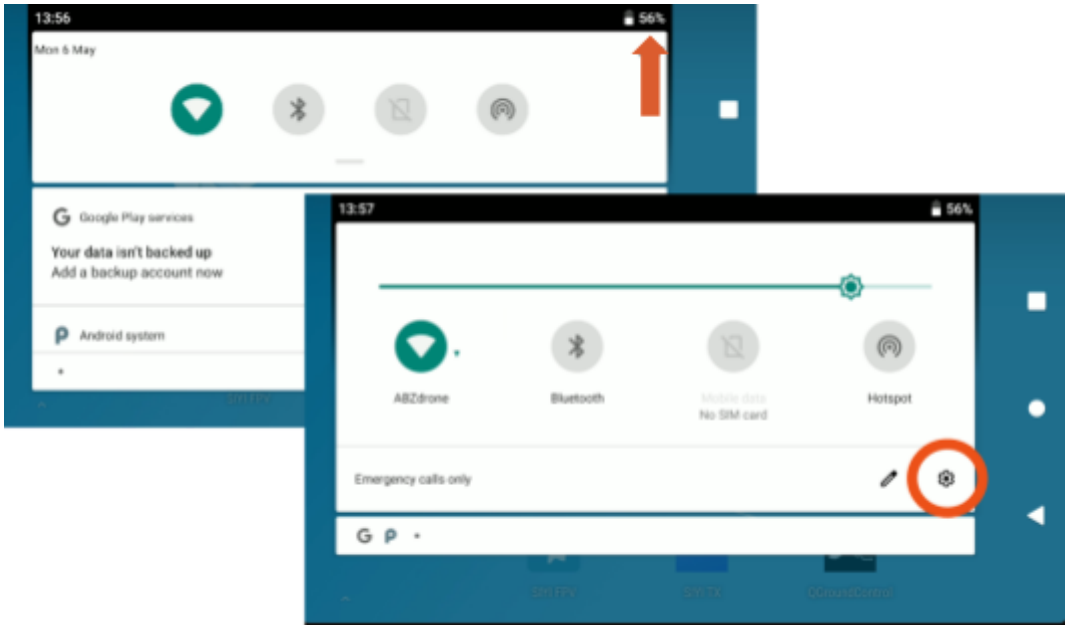
If you push the power button once short, the screen will turn off (power saving mode). If you push the button for 1 second, you can choose between the options of powering off the remote controller or taking a screenshot.

Remote Controller Settings

You can access the Android navigation bar by swiping down from the top of the screen or swiping from the right side of the screen.



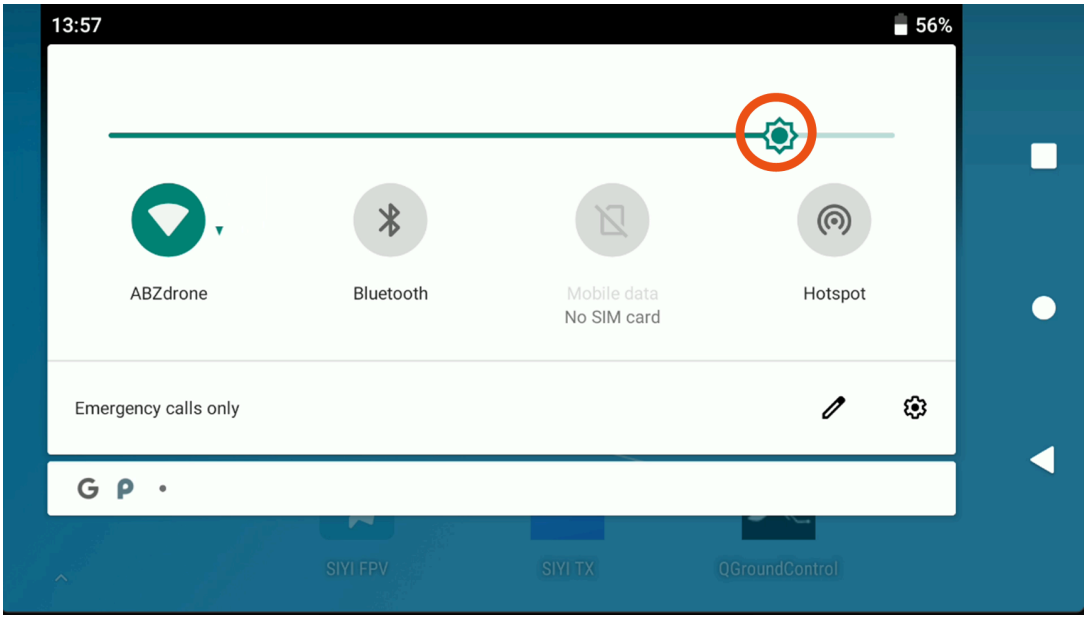
The rectangular icon allows you to switch between applications. The circular icon takes you to the main screen. The triangular icon lets you go back to the previous screen (note: this function is not supported in ABZ Control).



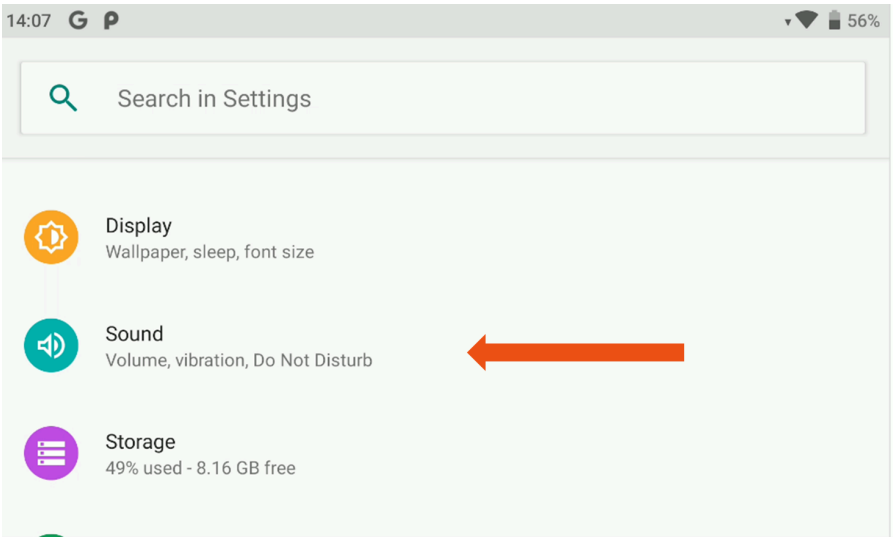
The remote controller battery status is displayed in the Android menu (by swiping down from the top of the screen).

Set the **display brightness** and **sound volume** always according to environmental conditions (light conditions and noise level)! Setting the display brightness and sound volume is always accessible (even when operating the ABZ Control software) from the basic Android menu, swiping down from the top of the touch screen once, where the general Android quick menu appears.

Swiping down from the top of the touch screen once more, the slider for the display brightness setting appears:



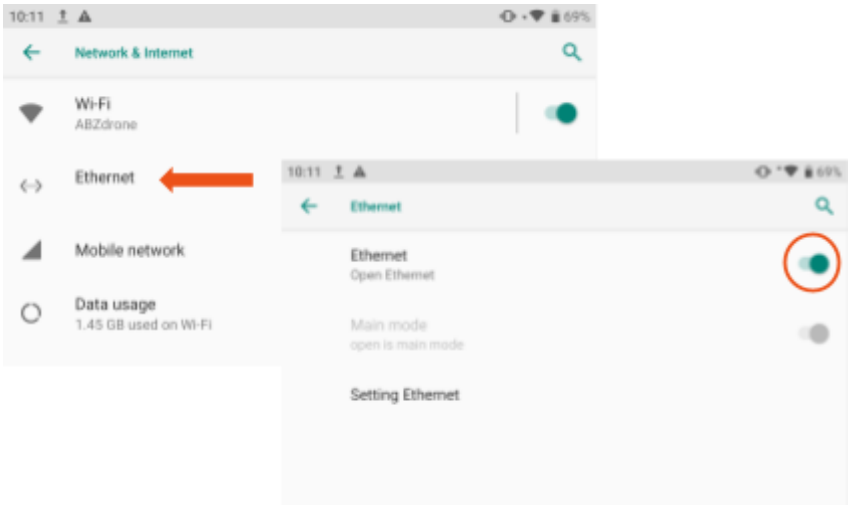
Click on **Settings** (gear icon) then scroll down to the Sound menu and tap on it to show the sliders for volume control functions.



Media volume controls the ABZ Control application's alerts and information volumes. We highly recommend keeping it set to maximum volume at all times.

Network settings

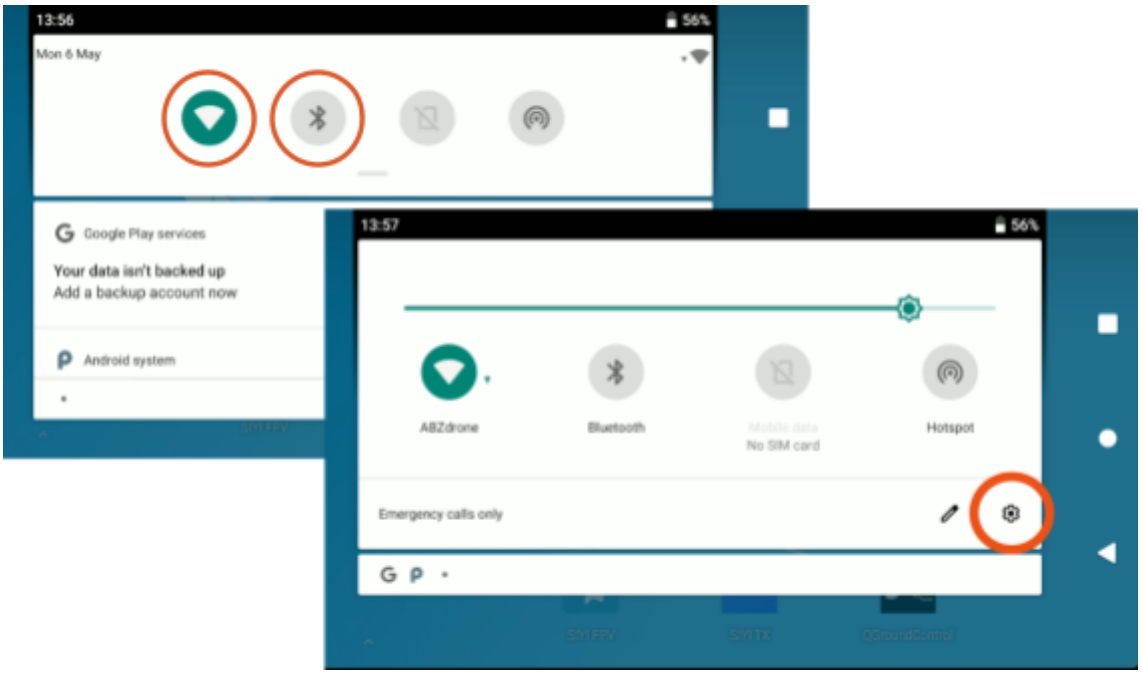
To ensure the proper functioning of the ABZ Control application, the Ethernet connection must always be turned on. This setting is available under *Android Settings > Network & Internet.*



Internet connection

The remote controller can access the internet via Wi-Fi or Bluetooth connection, e.g. shared from a router, mobile phone, tablet, or laptop.

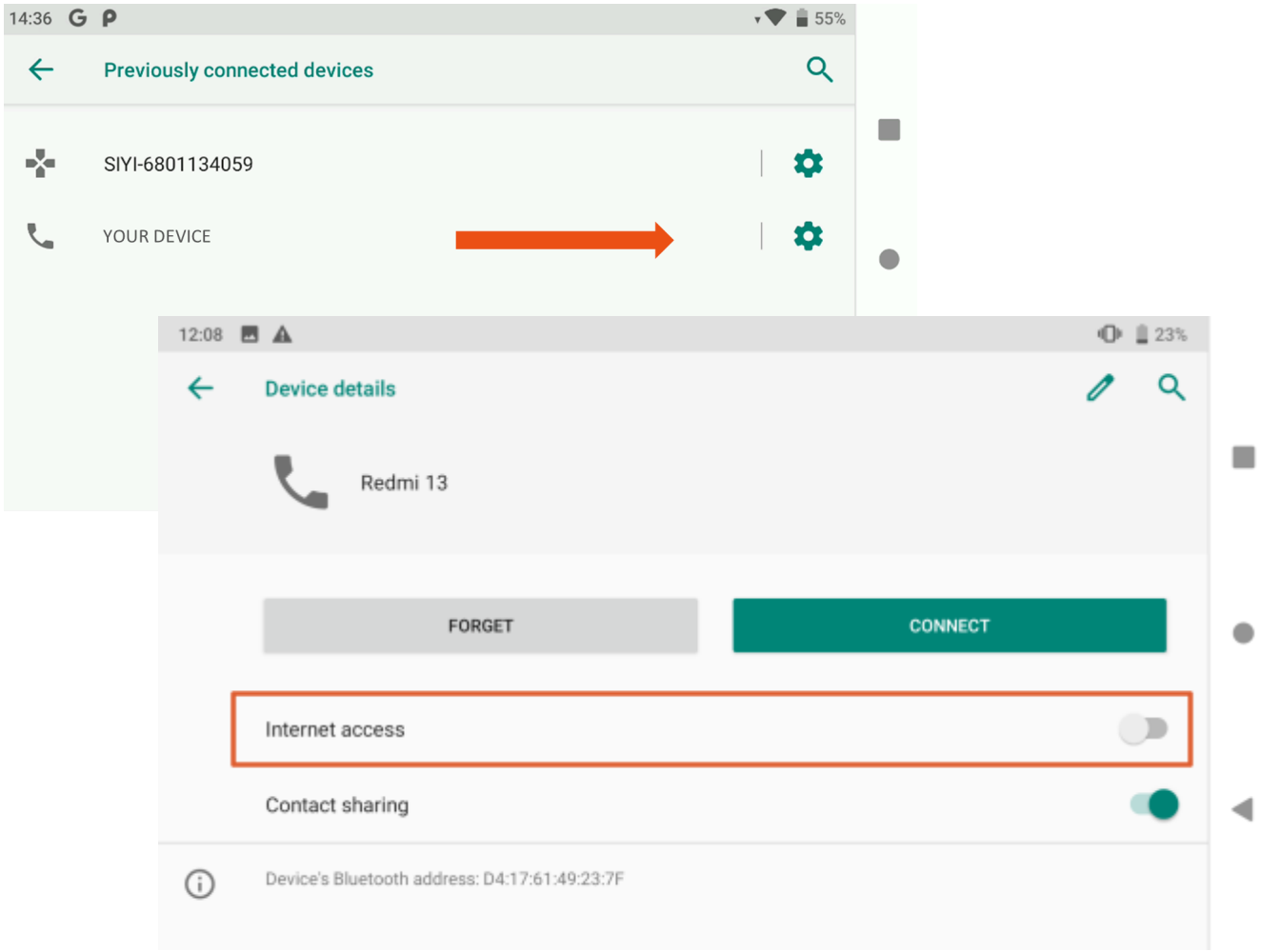
These options are available in the Android's Settings menu (by swiping down from top), by long pressing the Wi-Fi or Bluetooth icon, or by tapping the gear icon.



In the submenu the function can be switched on/off and the available devices can be connected. Wi-Fi only works on 2.4GHz networks. If the controller does not recognize the Wi-Fi from your mobile device, using Bluetooth connection for internet access is recommended.

To set up the Bluetooth connection for internet access:

1. Turn off Wi-Fi on the controller.
2. Turn on Bluetooth hotspot / internet sharing on your mobile device.
3. Turn on Bluetooth on the controller and pair the two devices.
4. If your device is connected to the controller, you need to set up the internet connection.
5. Tap on the gear icon next to the device name, then turn on the Internet access.



Controlling the drone

It is only permitted to operate the drone in full compliance with this entire operator's manual and specifically the checklists.

Manual flight commands - switching flight modes to choose manual flight control:

- **Manual (Loiter) flight mode: A button** – (GPS-based) the flight must be controlled manually with the sticks. If both sticks are fully released, the drone will stop and hover at the actual GPS coordinated position.
- **AltHold flight mode:** By default, this manual flight mode is disabled on the RC. To enable it, go to *Settings > ABZ Flight > Advanced*. Once enabled, AltHold mode can be activated with the *C* button.

  In this mode, flight, braking, and stopping must be controlled manually with the sticks. The drone does not maintain its position, and the pilot must counteract wind forces. The drone maintains altitude using only its barometric pressure sensor, so the pilot must pay attention to altitude changes caused by atmospheric and weather conditions.

Automatic flight commands - switching flight modes to start automated flights:

- **Auto flight mode:** slider on the screen – (GPS based) the drone will fly the mission uploaded to the drone (created by Mission Planner application or created by ABZ Control on the remote controller). Always start the drone manually and fly to a safe height before switching to Auto flight mode.
- **Return To Launch flight mode**: **B button** – (GPS based) the drone will fly the shortest way to the launch position (if not changed manually, it is the same as the take-off position) at the specified altitude (Settings/Safety/Return to Launch) and then land itself.

Every automated flight can be interrupted at any time, by the pilot's command to switch back to manual flight mode (**Manual (Loiter)** or **AltHold**).

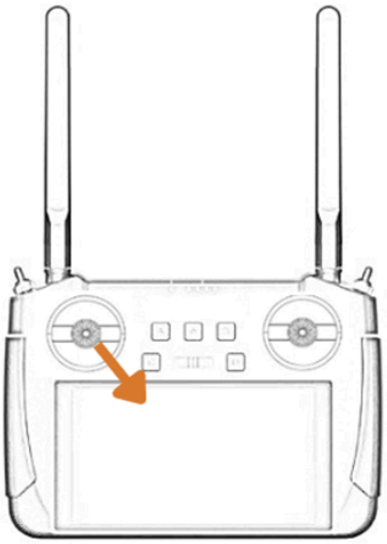
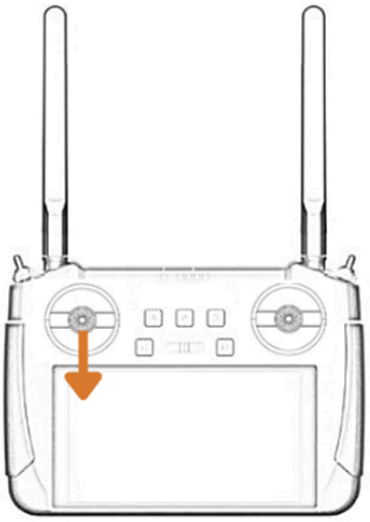
Emergency stop: In case of emergency, push the C button and D button simultaneously for at least 1 second. The motors will stop immediately, and the drone will crash into the ground.

The drone's pitch and roll angles, turning radius, climb, and descent speeds are limited by firmware in order to ensure safe flight. The pilot can safely fly the drone within all possible pilot inputs, no extra limitations are needed to implement manually.

- **Takeoff:** Switch to "Armed" mode by pushing the left control stick fully to the down-right position until "Armed" is shown on display, then release.
- After the motors are started and **have reached operating speed**, fly the drone manually using the left and right sticks in **Mode 2** (default), and take off to a safe height of at least 2 m.
- **Land:** Manually control the descent speed and slow it down before reaching ground.

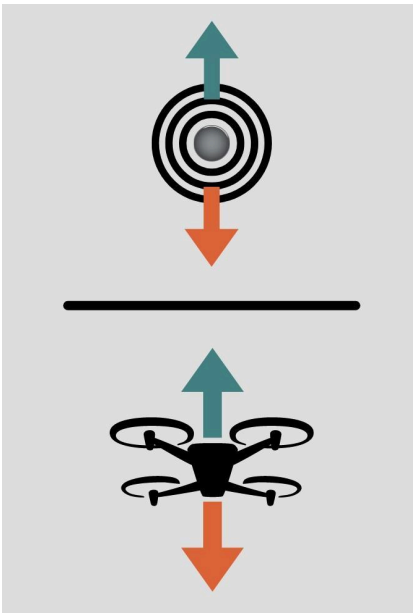
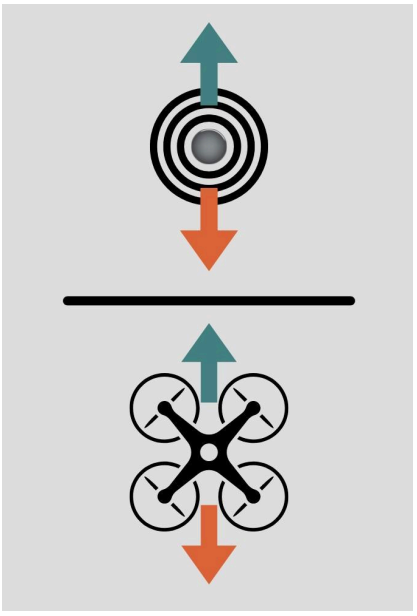
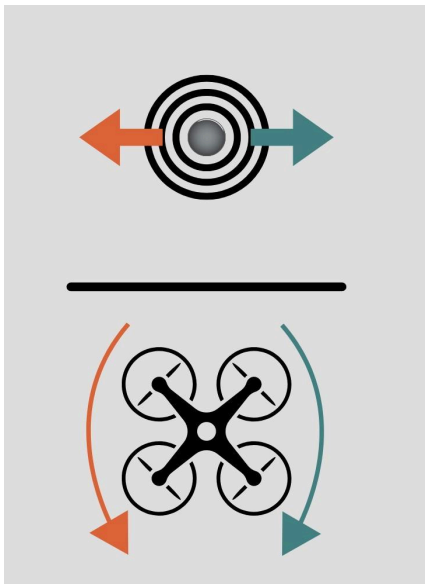
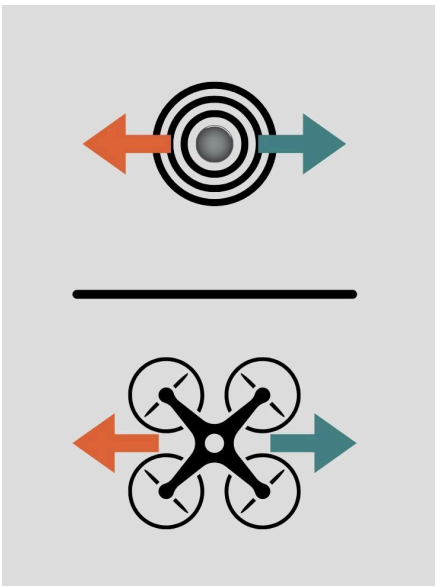
After landing, switch to **„Disarmed**" mode by pushing the left control stick fully to the down position until „Disarmed" is shown on the display and the motors are completely stopped, then release.

Make sure to release the stick after arm immediately, otherwise the system will detect your action as accidental and switch back to the mode previously selected.

Arm	Disarm
	

When you arm or disarm the drone, a large orange text appears on the screen, notifying you of the drone's status change. If audio is enabled, a voice notification will announce the same:

Default control (mode 2)

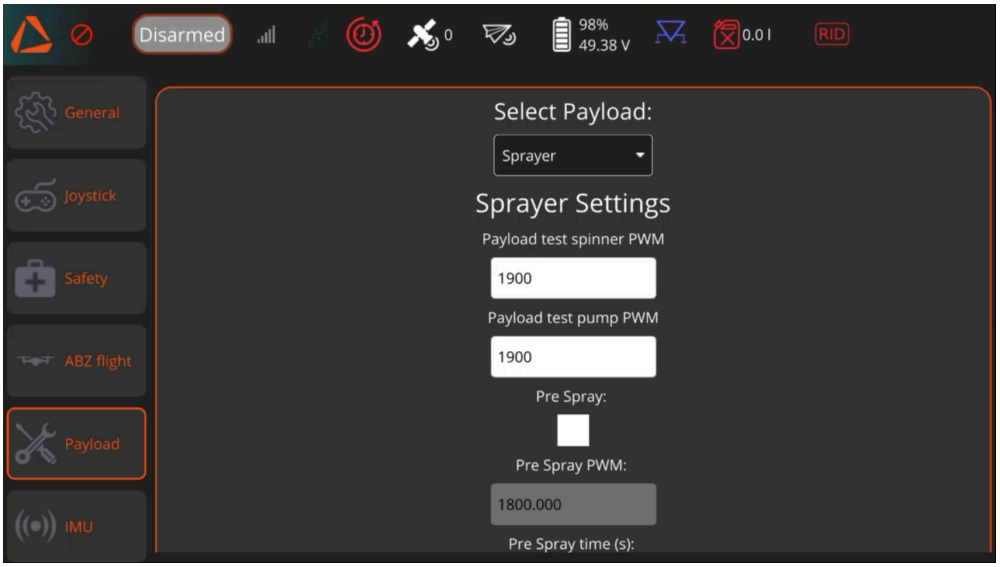
Left stick  **Up/down** **(Throttle)**	**Right stick**  **Forward/backward** **(Pitch)**
 **Rotation** **(Yaw)**	 **Left/right** **(Roll)**

Starting the pump/payload manually

If the drone is filled with liquid for the first time after the tank has been completely emptied, the pump can be started manually before take-off to facilitate dispensing from the empty tubes. This method can also be used to flush the spraying system.

In any case, this function is only used before pressing the Upload button of the automatic flight plan detailed below, if necessary! Cleaning and flushing the spray system is recommended with the Test Pump pwm at 1900 and the Test Spinner pwm at 1100 and 1900 (the lowest and highest CDA rotation).

You can make the necessary settings in the ABZ Control application under **Settings > Payload** by selecting Sprayer as Payload. You can activate the function by flipping the three-position switch on the right-hand side backward.



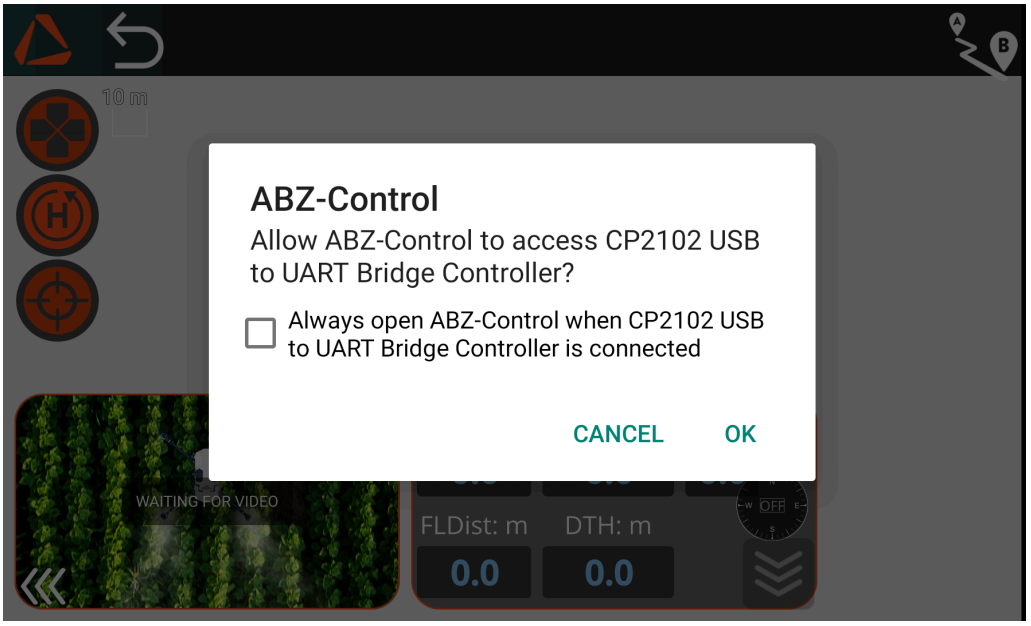
ABZ Control Software Overview

The L30 V2 is compatible only with the controllers provided by ABZ Innovation with specialized ABZ Control software. Other devices or applications are not compatible for controlling the drone and, therefore prohibited to use with the drone.

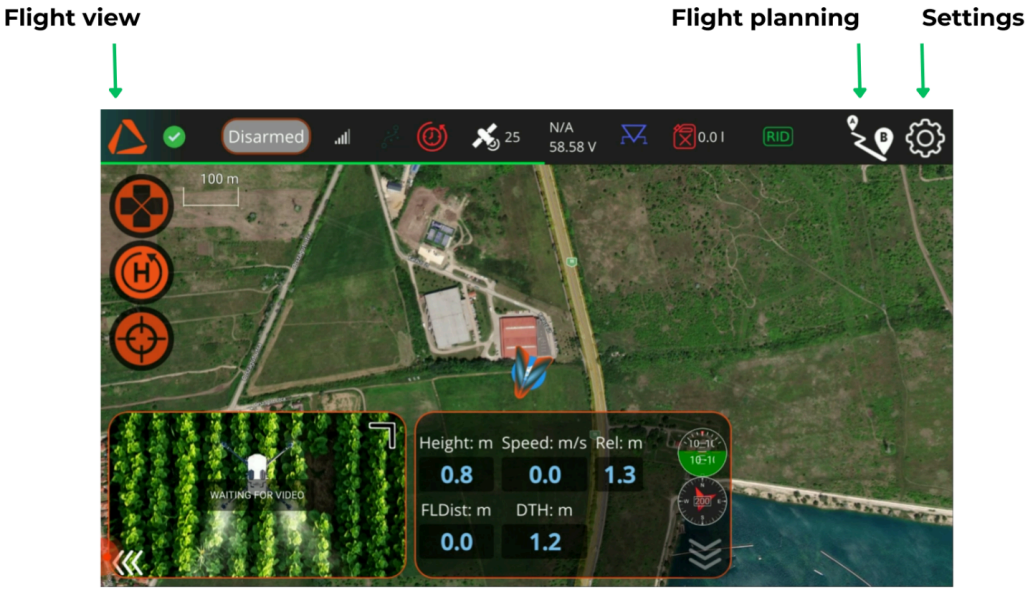
No software update is needed before and during operating the drone, future updates are only optional. Any future software updates will not affect the control and flight functions. Software update procedures are explained and guided in the documentation of the update package. All information and files are available at: abzinnovation.com/updates. Please check this website if you are looking for software or firmware update options.

Start the ABZ Control flight control and planning application by clicking on its icon on the home screen.

After starting the ABZ Control application, you will receive a pop-up window with the message: Allow ABZ Control to access USB to UART Controller. Click on OK.

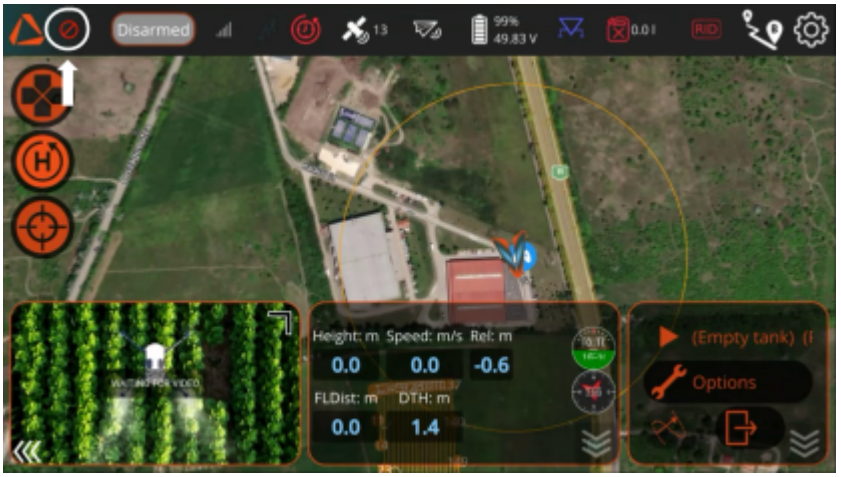


After launching the application, the following screen will be displayed. In the top menu bar, you will find icons representing the main views. In the left corner, the ABZ Innovation icon navigates to the Flight view.

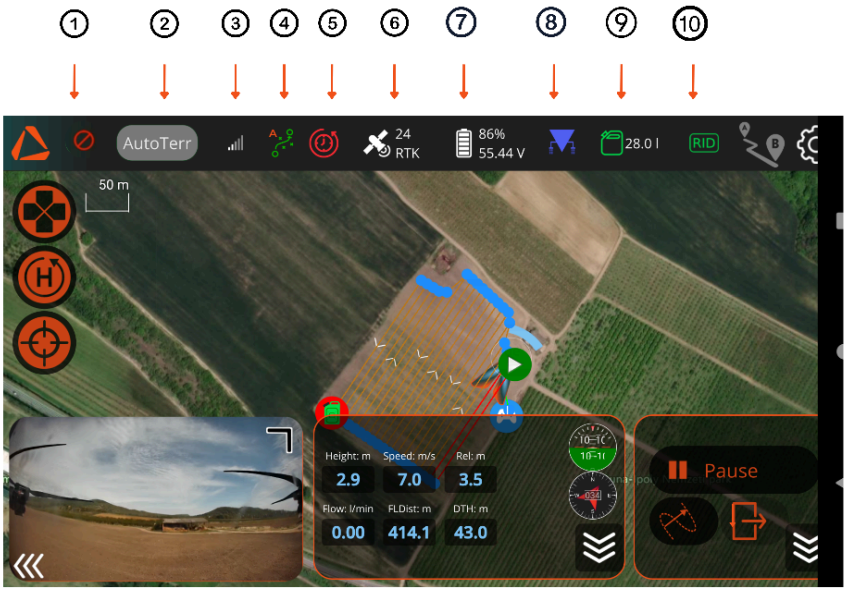


In the right corner of the top bar, you can access the Settings (gear icon) and the Flight Planning view (A to B icon).

After powering on and connecting the drone, you will see status icons at the top, including: Vehicle Messages, OBA Status, Connection Status, GNSS Status, Drone Battery Status, Payload Status, Tank Sensor Status, and Remote ID Status.



On the left side of the top bar, a red no-entry sign indicates that the drone is still preparing its systems for flight. If the icon changes to a green check mark, the drone is ready and can be armed. (Below the messages , you can check the pre-arm check messages and any potential error messages.)



1 Systems ready:

Not ready to fly | Ready to fly

2 Flight mode and altitude hold method

3 Sygnal strenth

4 Obstacle avoidancce (OBA) status

OBA inactive

OBA active (manual mode) | OBA active (automatic mode)

5 Vehicle messages

New messages available | No new messages available

6 GNSS status

Above: Number of satellites
Below: RTK connection feedback

7 Drone Battery status

Above: charge percentage
Below: Battery Voltage

8 Payload status

Sprayer OFF | Sprayer ON

Spreader OFF | Spreader ON

Trichograma OFF | Trichograma ON

9 Remote ID (RID) Status

RID healthy | RID unhealthy

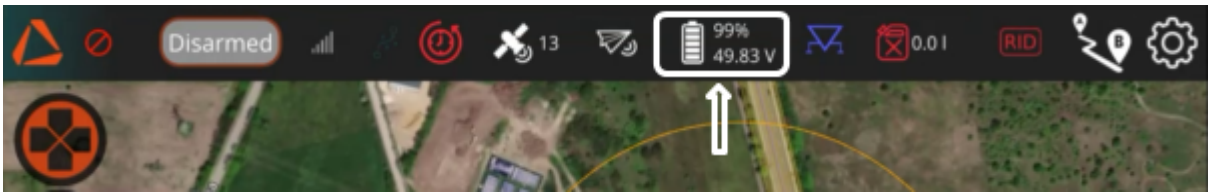
10 Tank status

The tank is empty | The tank is filled. The number indicates the remaining amount.

The RID icon shows the operational status of the Remote ID system. If the icon is green, the Remote ID is broadcast correctly. By clicking on the icon, you can check the health of the systems providing the necessary data for the Remote ID module. For further information regarding Remote Identification, see Mandatory Remote identification with Dronetag (page 12).

In the event of a Remote ID system error caused by insufficient GPS coverage on the drone or remote controller, or by a hardware malfunction, the drone prevents arming!

Next to the drone battery icon, you will see the charge percentage and battery voltage.
During the flight, you must continuously monitor the battery voltage, which should remain above 51.4 V for Tattu Plus batteries and 48.5 V for Zhian batteries, even when flying at the Maximum Take-Off Mass (MTOM).



The state of the drone battery should also be monitored before the flight using the charging indicator LEDs on the battery. We recommend starting the flight with a minimum of 80% battery charge.

In the Flight status bar, you can see information about the altitude hold method (Follow terrain with LiDAR or Relative) and the actual flight mode of the drone.

It can show the following statuses:

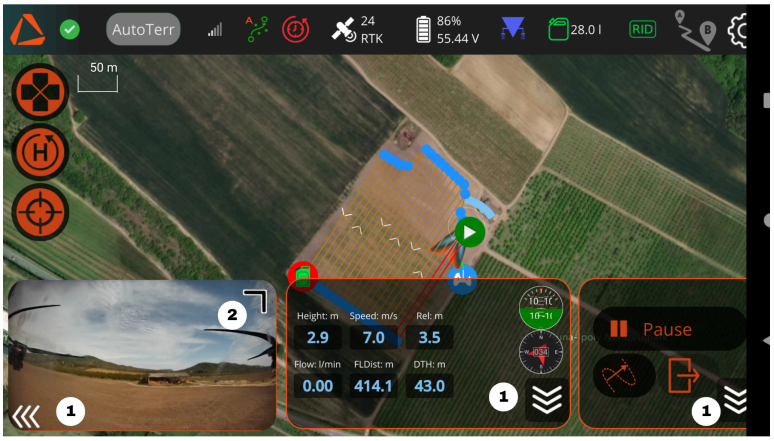
- Disarmed
- ManualTer – Manual (Manual (Loiter)) Follow terrain mode
- ManualTerRel: Manual (Manual (Loiter)) – Relative mode
- Auto mode – Forest mode
- AutoTerr: Auto mode – Follow terrain
- AutoRel: Auto mode – Relative mode
- RTL (Return to Launch mode)

Only fly the drone if the green check mark is visible, there are at least 7 satellite connections, and the Manual (Loiter) flight mode is selected.

On the left side, you will find three Flight function buttons:

- With the cross button, you can change the flight mode. You can choose between **Manual** and **Altitude Hold** (if enabled under Settings > ABZ Sense > Advanced).
- With the Home button , you can initiate **RTL** (Return to Launch) flight mode. The drone will then immediately return to the launch point—without asking for confirmation—based on the settings defined under **Settings > Safety > Return to Launch**.
- With the target button , you can choose what the map should be centered on: your **Mission**, your drone (**Vehicle**) or the **Remote Controller**.

In the Flight view, with a mission uploaded to the drone, you will see three windows at the bottom of the screen: the **Camera View**, the **Telemetry Window**, and the **Operation Window**. By clicking on the white arrows (1), you can hide the windows. The Camera Image has three possible views: hidden, default (minimal with full-screen map), or full-screen (with minimal map). You can toggle between these view options by clicking the black corner (2).



You can adjust the camera angle with the right scrollwheel on the remote controller.

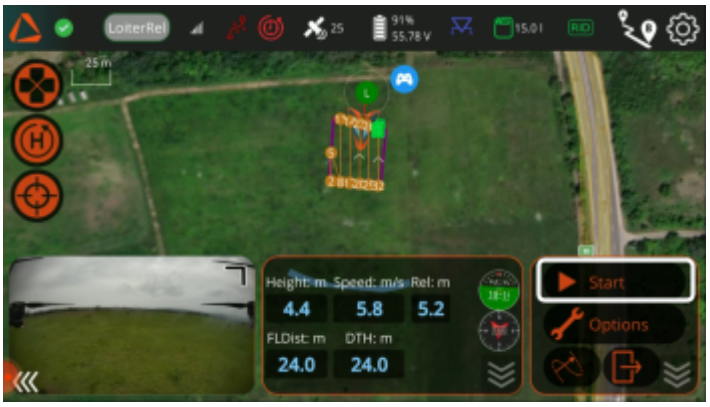
The **Telemetry Window** displays real-time telemetry data, including operational information and drone measurements.

In the telemetry window, you can monitor the following data during flight:

- **Height** → The current height from the ground measured by the LIDAR.
- **Rel** → The relative altitude from the takeoff point.
- **Speed** → The current speed of the drone.
- **FLDist (Flight Distance)** → The distance that the drone has flown from the takeoff point.
- **DTH (Distance from Home)** → The distance from the Home point(takeoff point).
- **Flow:** the actual spraying flow in l/min

If a mission was uploaded to the drone, the **Operation window** displays the upcoming steps for the pilot and provides access to essential functions throughout the automatic flight.

After you have entered the fluid level in the tank, armed the drone, and taken off manually, the Mission Start button becomes available.
(For further information about flying a Mission, see Starting the mission (see page 62).



If the drone is in Auto Mission mode, this button will change to Pause Mission. When you click on Pause, the drone switches to Manual (Loiter) Mode.

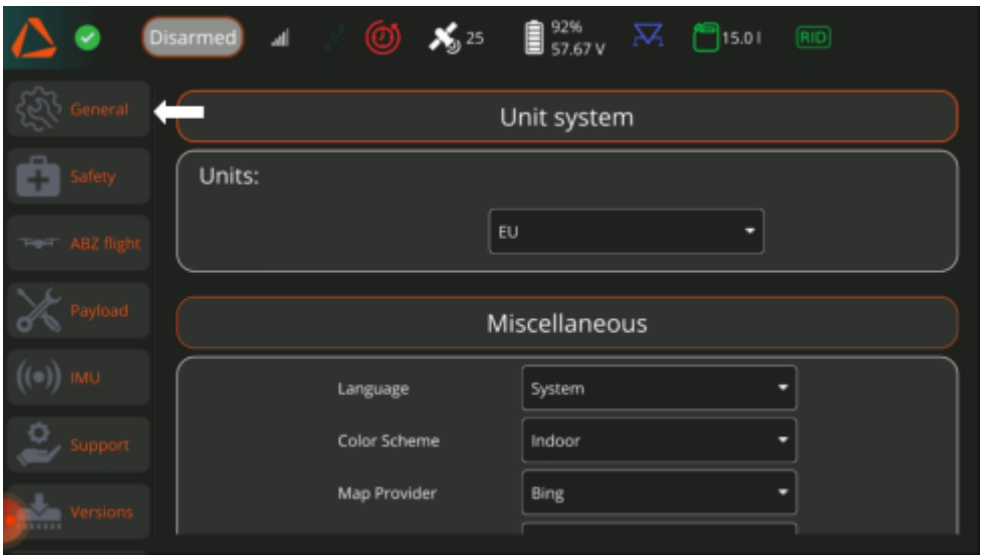
During flight, in the Operation window:

- Use the **Options button (1)** to change the Mission and Spraying settings after pausing the mission.
- Use the **OBA button (2)** to manually declare an obstacle. (For more information on obstacle avoidance, see page 48.)
- Use the **Exit mission button (3)** to clear the mission from the drone.

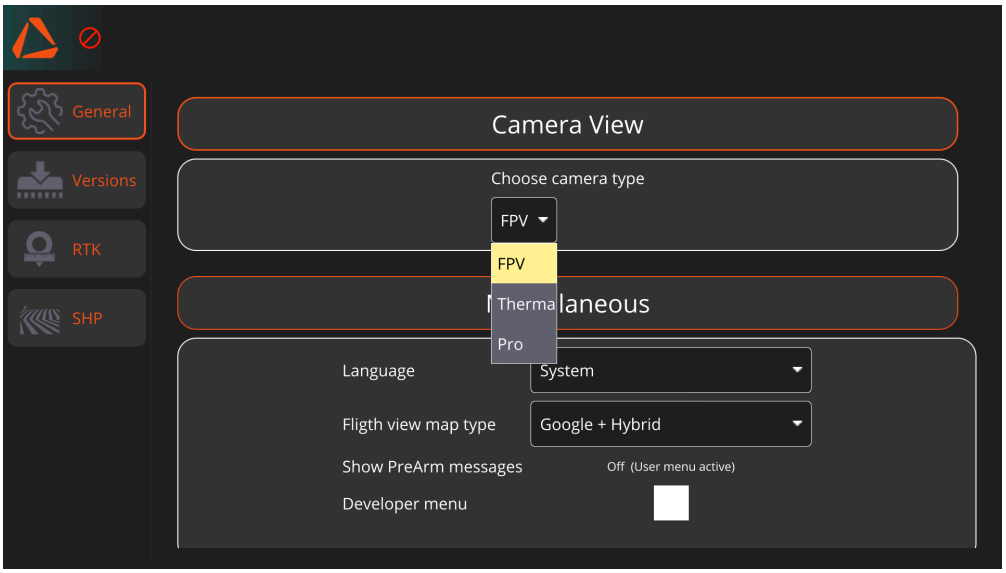
Settings

In the Settings menu, You can change the user interface settings (e.g., language or units of measurement), configure the Failsafe and Mission related behavior of your drone, change the Obstacle Avoidance system and default behavior of your drone, or set-up your payloads in the Settings menu. To access the Settings, tap the gear icon in the top-right corner of the screen.

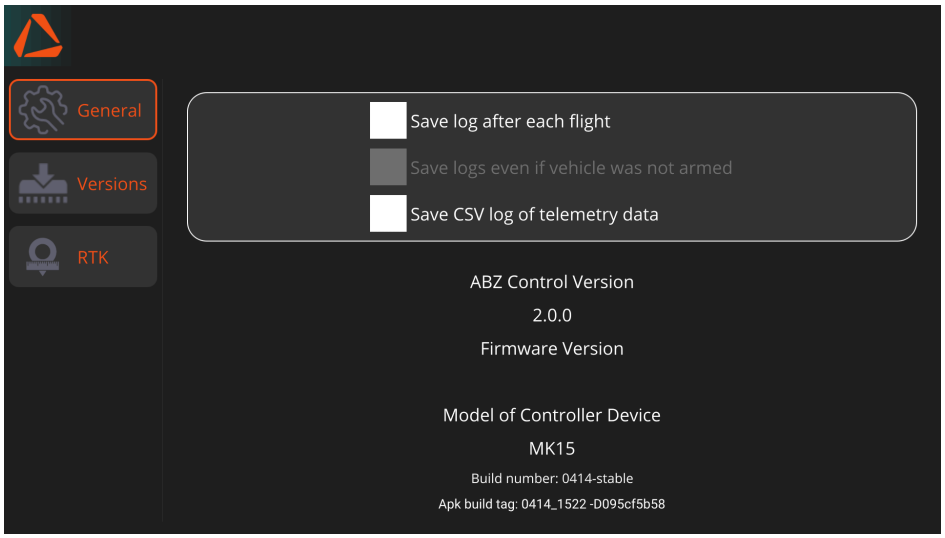
In the General menu, you can configure various settings, including the default units used for measurements in the ABZ Control interface and the provider of the online map displayed in the background of the Flight view.



Under the Camera View section, you can see the camera type used by ABZ Control. The default setting is FPV.



You can save the telemetry log files of your flights by checking in the Save log after each flight. The data will be saved to the folder under *ABZ Control > Telemetry* folder.



The current software version of your drone is displayed at the bottom of this page. If you contact our Support Center with an inquiry regarding your drone, you will be required to provide this information. The same details are also accessible via the *Settings > Versions* menu.

Safety – Setting up FailSafe

When using a UAS, unexpected events may occur that require intervention. The FailSafe settings are required by law, primarily to prevent personal injury and property damage. Under *Settings > Safety*, always check and configure the FailSafe settings before every new flight or mission.

- **Arm Lock Sensor Status:** You can decide whether the arm lock sensor's feedback regarding the arms' lock status should be included in the pre-arm check. If enabled, the drone will not allow arming if the sensor detects that an arm is not locked. (Error message: Arms are not secured, check them again!)

  If this function is enabled, the arms' lock status can be verified using the provided visual. A green circle around the propeller indicates that the arm is locked.

- **General failsafe triggers:** you can set what the machine should do in case of losing the remote controller's signal
- **Return to Launch:** set parameters for automatic return to home
  - Specify if current or specified altitude is desired.
  - Specify if the drone should wait and loiter above the takeoff position before landing.
  - Final land stage altitude should NOT be other than 0.
  - Specify the final land stage descend speed (limited by the drone's limitations).
  - Return speed: decide the speed at which the drone flies in Return-to-Launch mode.

- **Return to Mission:** Configure the parameters for resuming an interrupted mission. The drone will return to the interruption point using the shortest available route.

    - Specify whether the **current altitude** or a **specified altitude** should be used during the return. By default, the system uses the current altitude. If a specific altitude is defined, the drone will adjust to that altitude before proceeding to the interruption point.
      Note: The specified altitude is relative to the home point.

    - Specify the **returning speed** (limited by the drone's limitations)

- **GeoCage:** you can set virtual boundaries that the drone will not fly over.

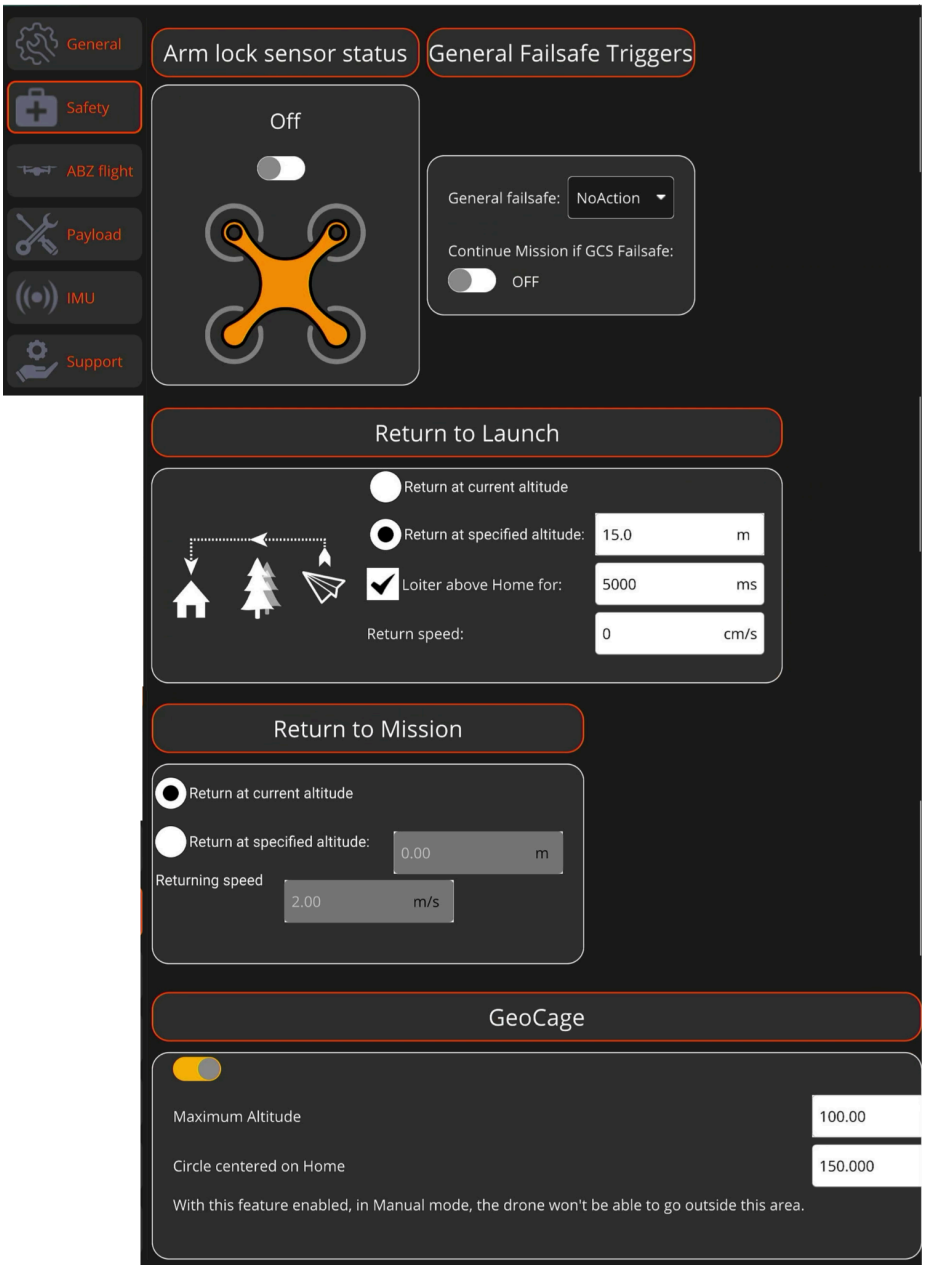
    - Circle Centered on Home means the drone will stop if it reaches the desired radius from the Home position.
    - Maximum Altitude means the drone will not fly over the desired altitude relative to the takeoff position.

- **Prearm checks:** Arming checks are meant to check all the functions and systems necessary for arming and flying the drone safely. All the prearm checks listed in this section are essential and mandatory for safe operation; do not change these settings.

You can also configure the drone's heading behavior and flight speed during Return-to-Launch mode. To adjust these settings, go to *Settings > ABZ Flight > Heading behavior during RTL*.

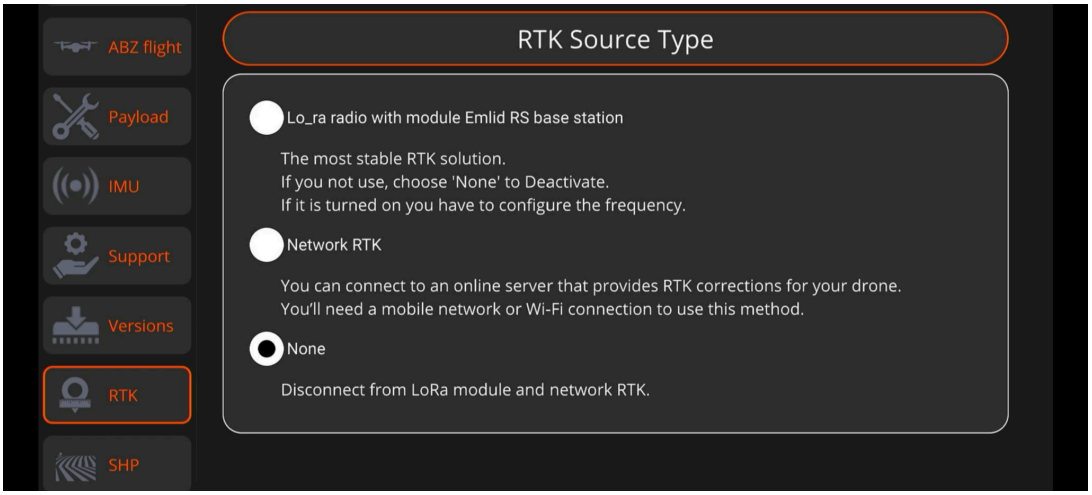
Action functions:

- **None:** the drone does not take any action itself. It remains in the actual flight mode.
- **Land:** the drone lands at the actual position and disarms itself after landing.
- **RTL:** the drone switches to RTL mode, and following the Return to Launch settings, it flies back to the takeoff position, then lands and disarms itself after landing.

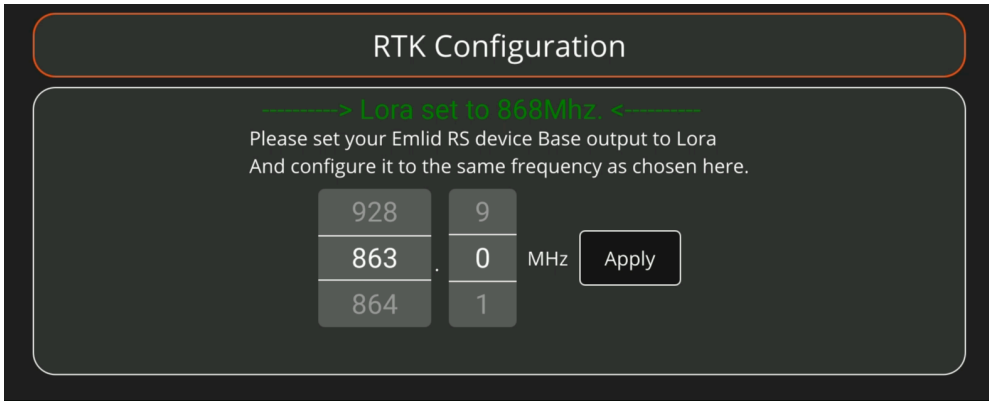


RTK configuration

In the **RTK menu**, you can connect to a server that provides RTK correction to your drone, or connect to your **Emlid base station** via **LoRa radio** or **NTRIP**.

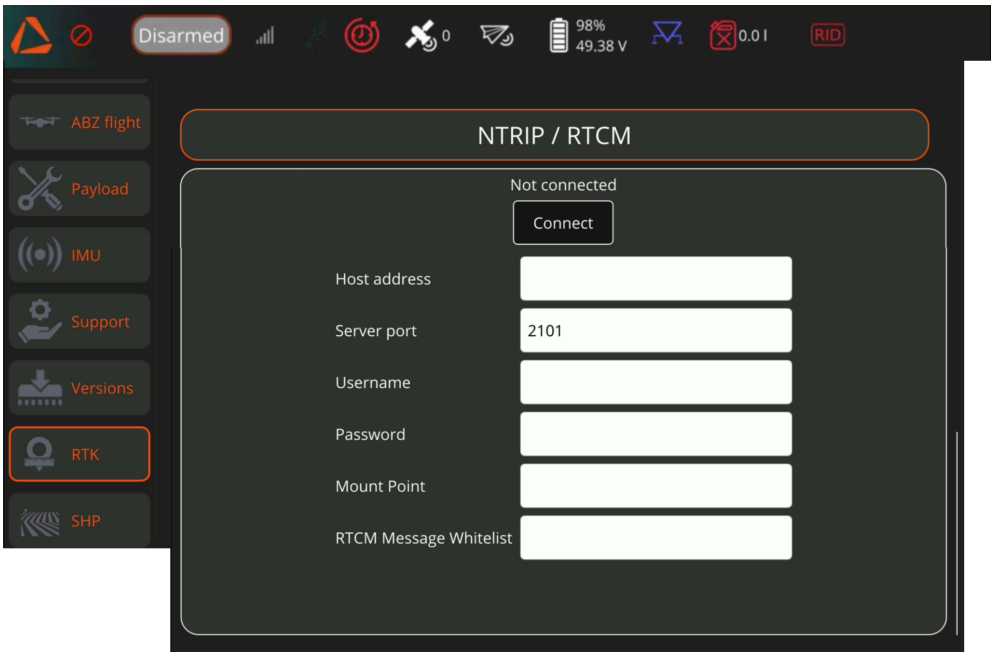


If using an **Emlid RS base station with LoRa**, make sure it is configured to **Output: LoRa**, and that the frequency matches the Base output value specified in the Emlid flow app. You can also connect to an **Emlid RS base station via NTRIP** using the **Network RTK** option. For the required credentials, refer to the **Emlid Flow app**.



Under **Network RTK**, you can connect to the nearest **Continuously Operating Reference Station (CORS)** via an **NTRIP Caster**. To use this option, you will need an internet connection using your mobile device as a hotspot.

To connect and receive corrections, enter the credentials provided by your NTRIP service provider. For best results, always select the station nearest to your operating location.



If you choose to fly with an RTK source, the system will only allow you to arm the drone if the correction data is accurate enough to ensure proper drone positioning.

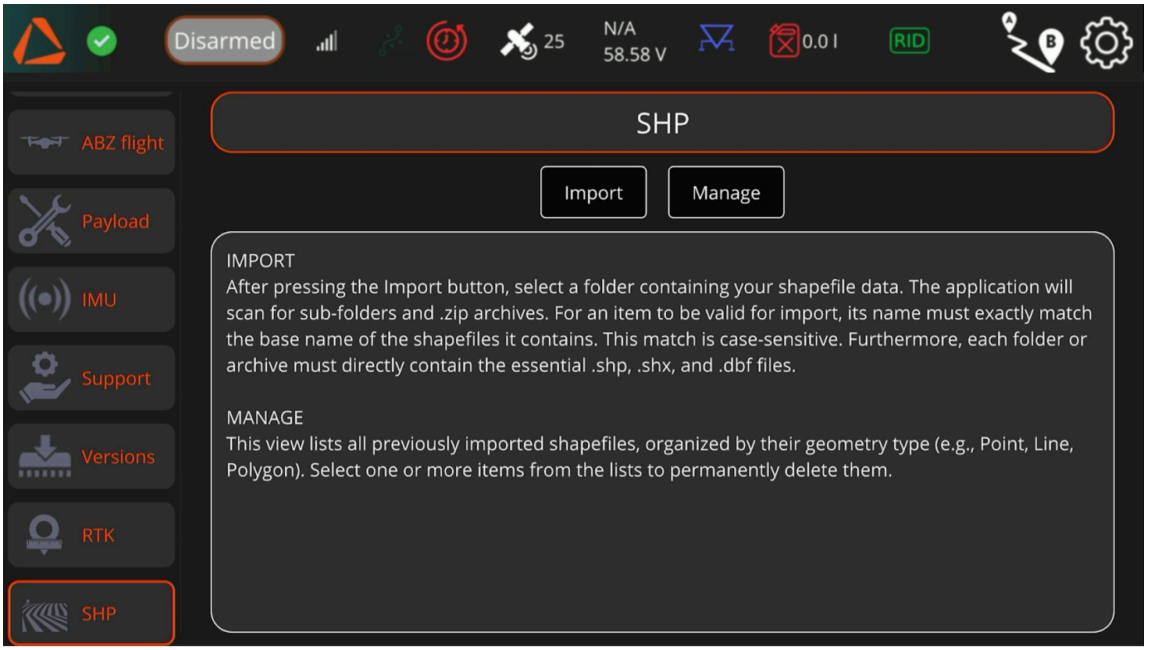
Settings: SHP

In the SHP menu, you can import Point, Polygon, or Polyline shapefiles to use as a boundary, mission route, or visual guide for mission planning.

To successfully import a shapefile, make sure that:

1. You select a folder that directly contains the shapefile folder or a `.zip` archive.
2. The shapefile folder includes all the required files: `.shp`, `.shx`, and `.dbf`.
3. The folder name matches the filenames.

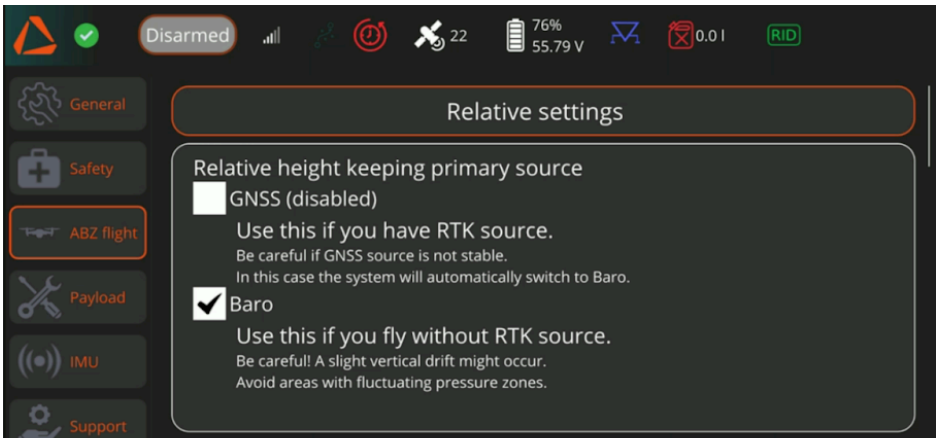
For further information, see page 68. [Shapefile Import].



Abz Flight

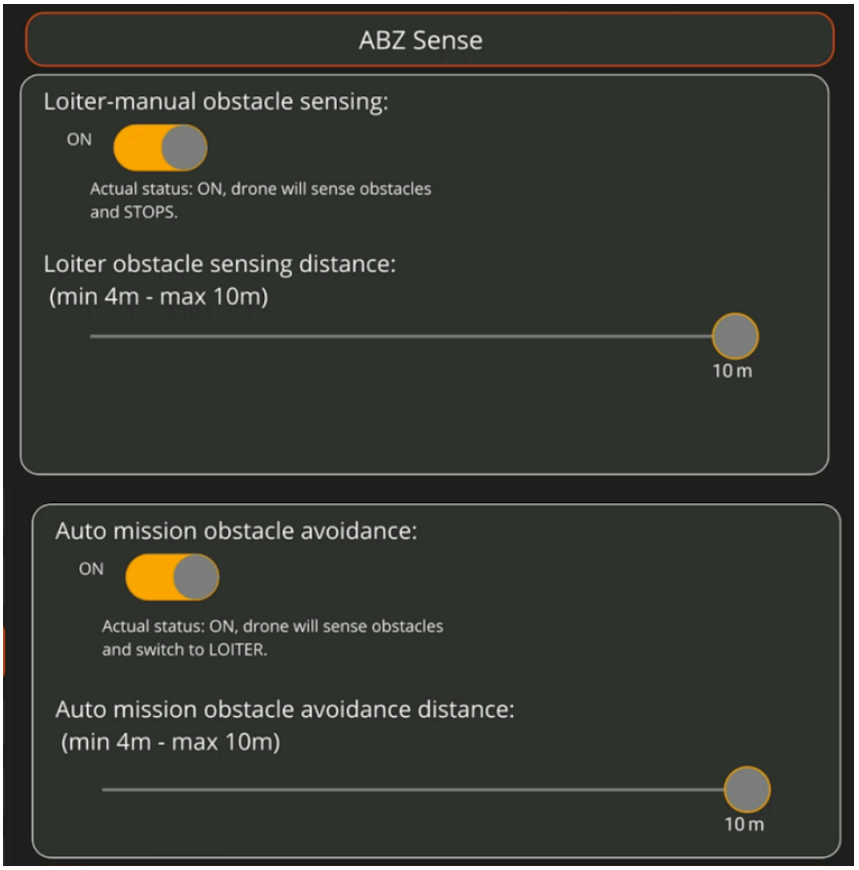
In the **ABZ Flight** menu, you can enable **Obstacle Avoidance** for both Automatic and Manual (Loiter) flight modes, set the primary height source for the Relative altitude hold method, and configure the drone's mission-related behavior.

In Relative Settings, you can specify the primary height source for the drone when flying without LiDAR measurements. **This setting can only be changed when the drone is grounded and disarmed.** Only use GNSS if flying with an RTK source (e.g., Emlid base station). To learn more about the different altitude control methods, see “Altitude control” (page 51).



Adjusting the Obstacle Avoidance Options

Under the **ABZ Sense** section, you can enable **Obstacle Avoidance** for both Manual (Loiter) and Auto Flight modes. You can also specify the obstacle sensing distance, which determines how far the drone should stay from obstacles. For more information about the ABZ Sense Obstacle Avoidance system, see page 52.



Additional Settings in ABZ Flight

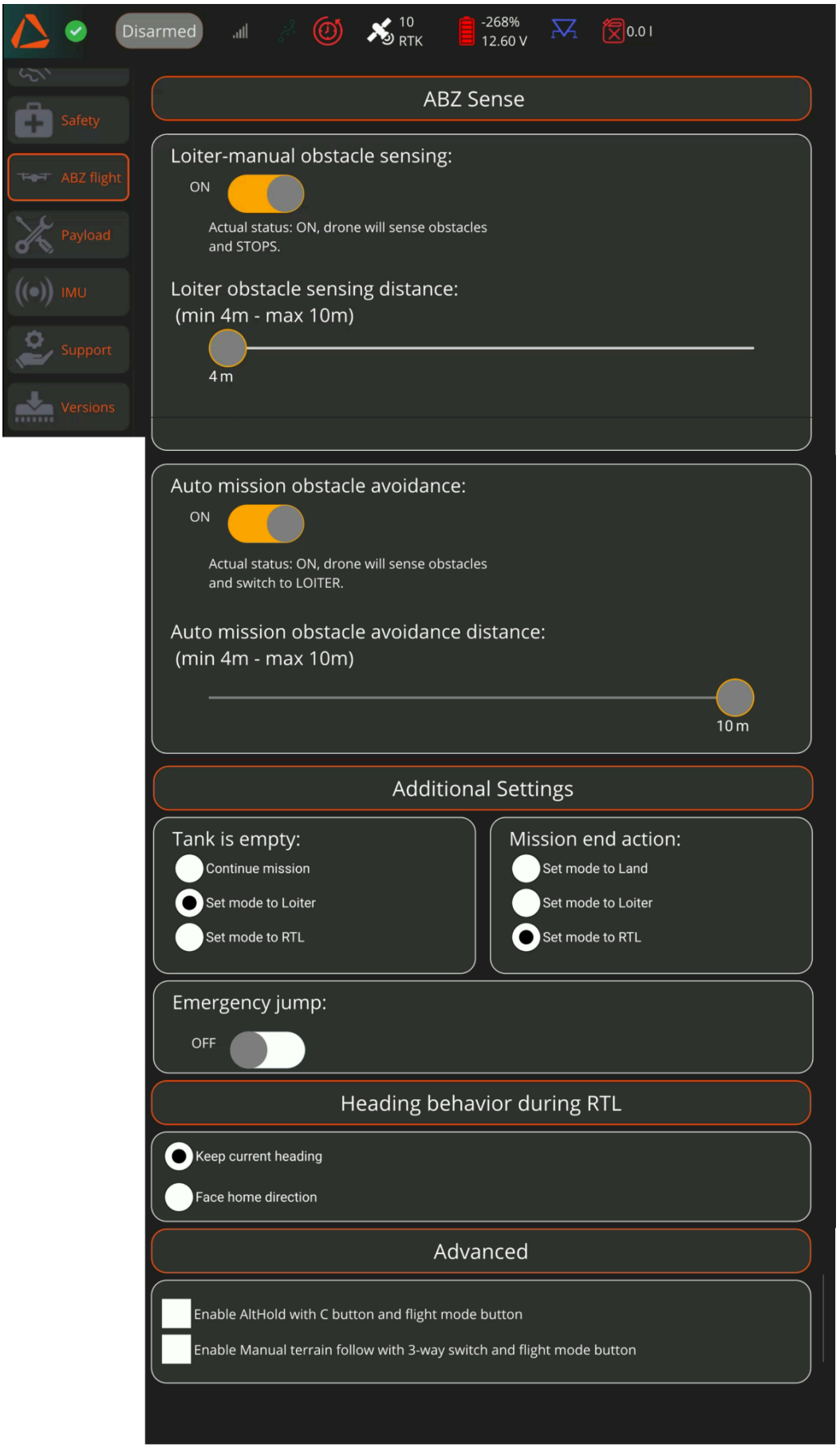
Under the **Additional Settings**, you can configure the drones automatic behaviour during Mission. You can decide what the drone should do when the Tank is empty and when it finished the Mission. You can also turn on the Emergency Jump function.

- **Emergency Jump:** If this function is turned on, the pilot can manually raise the drone during an automatic flight if he/she identifies an unregistered obstacle or if the drone unexpectedly begins to descend. By default, Emergency Jump is turned off.

  If the Emergency Jump is turned on, the drone will rise as long as the pilot pushes the left control stick up. The other settings (e.g., direction and speed) remain the same as defined in the mission settings. If the pilot releases the stick, the drone remains at the given altitude briefly before returning to the altitude specified for the mission.
- **Mission end action:** you can decide what the drone should do when the mission is completed. You can choose between setting the mode to Land, setting the mode to Manual (Loiter) or returning to launch (RTL).
- **Tank is empty:** you can decide what the drone should do when the tank runs empty during the mission. If the drone/payload has a physical sensor and you activate it under **Settings > Payload**, the action will be determined by the sensor's input. Otherwise, the action will take place at the emptying point calculated by the ABZ Control software.
- **Heading behavior during RTL:** You can choose the direction the drone should face when returning to its home point. The drone can either maintain its current heading or orient itself toward the home location.

Under the **Advanced** section, you can enable flight mode settings that are initially disabled on the Remote Controller:

- **AltHold Mode**: Allows you to assign Alt Hold to the **C button** and the **virtual Flight Mode function button** (in ABZ Control).
- **Manual Terrain Follow Mode**: Allows you to use the **altitude control method switch (3-stage switch)** in manual flight modes.



IMU - Compass calibration

Under the IMU option, the **Compass Calibration** can be carried out. **The calibration should only be performed if requested by the software or instructed by the Support Center.**

For further instructions, see Compass Calibration (see page 112).

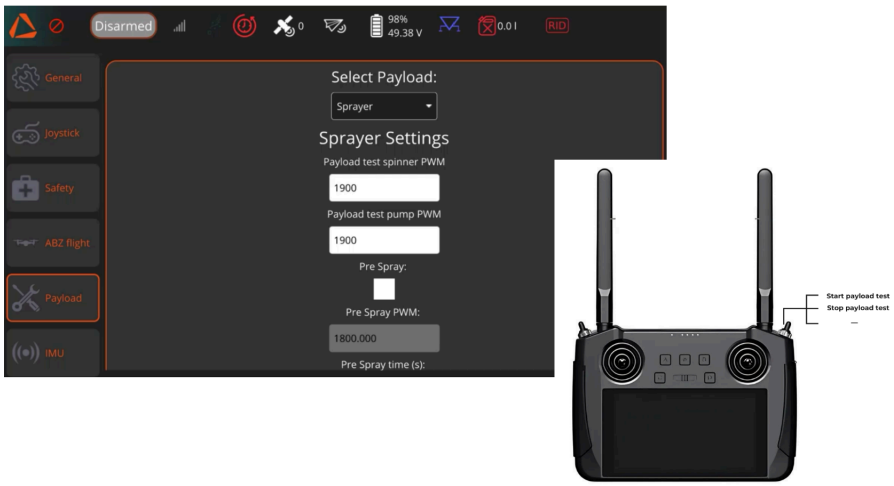
Software versions and Update

You can check the current drone firmware and ABZ Control software versions under **Settings > Versions.** If you contact our Support Center with an inquiry regarding your drone, you will be required to provide this information.

ABZ Innovation communicates all new software releases via email. Only perform updates when instructed to do so by ABZ Innovation.

Configuring Payloads

If you have purchased different types of ABZ Innovation payloads (e.g., spreader or Trichogramma) and your drone is equipped with the necessary connectors, you can switch between them in the **Settings > Payloads** menu. The Payload Test switch will activate the selected payload using the test values defined in this menu.



When planning an automatic mission for a specific payload, ensure the payload type is set correctly in the mission panel.

ABZ Sense

Obstacle Avoidance with ABZ sense

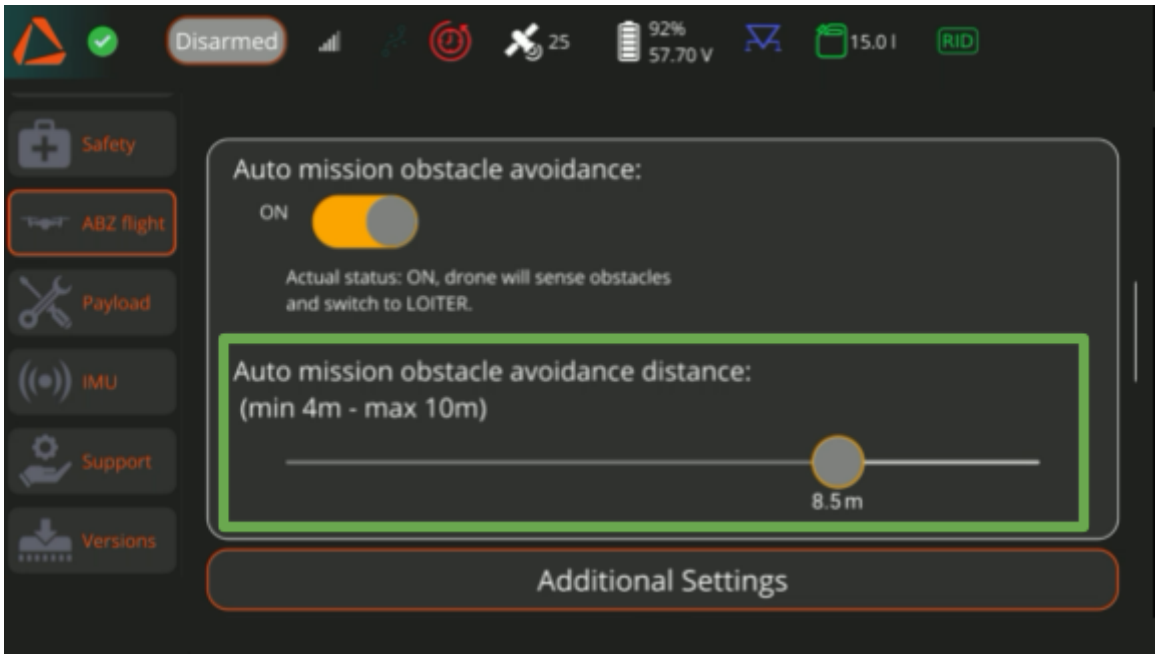
The ABZ Innovation L30 V2 drone uses the Multi beam LiDAR based ABZ Sense system to provide reliable obstacle avoidance, ensuring safe and efficient drone operations.

The Obstacle Avoidance (OBA) function is available in both manual (Loiter) and automatic flight modes. By default, it is enabled in manual mode and disabled in automatic mode. The obstacle avoidance is NOT FUNCTIONING when flying home with the „Return to Launch - RTL" function.

You can enable or disable Obstacle Avoidance via **Settings > ABZ Flight.**

When flying with obstacle avoidance enabled, the drone constantly analyzes its environment using its multi-beam LiDAR system. If an obstacle is detected, the drone stops at the distance defined as the obstacle avoidance distance.

This distance can be set between 4 m (13.1 ft) and 10 m (32.8 ft), and applies outside of the drone's braking distance (you do not need to consider the braking distance when defining it). The drone consistently preserves the set distance from obstacles, actively pulling back when necessary.



What to do if the drone stopped because of an obstacle?

1. If flying an automated mission with OBA enabled, the drone will switch to Manual (Loiter) mode after detecting an obstacle and stopping at the defined distance.
2. If the drone has stopped, manually navigate it parallel to the obstacle until you reach the end of it.
3. Define a return point on the mission's route by clicking on the map. Tap the X button to modify the position of the return point.
4. Tap the checkmark to continue with the mission.

After hitting the checkmark, in the pop-up window reconfirm the mission settings. The drone will fly to the designated return point and continue the mission from there. With the X you can delete the selected return point if you want to change it.

You can also manually declare an obstacle during a mission by hitting the OBA Button in the Operation window.

The OBA icon in the top bar of the Flight View provides continuous feedback on the current status of the system when the drone is armed:

If the OBA icon is red, the obstacle avoidance is disabled.

If the OBA is green, the obstacle avoidance is operating. A small “M” or “A” on the icon indicates whether the system is operating in manual or automatic flight mode.

If flying with obstacle avoidance enabled, you will see a blue arc moving at a fixed distance in front of the drone, indicating the scanning range. If the distance between the drone and the arc decreases, it means an obstacle has been detected.

Never rely exclusively on the obstacle avoidance system.

Always pay attention and observe the drone and its surroundings closely during flight.

Using obstacle avoidance, which is an additional safety feature, does not eliminate the need for pre-mapping obstacles, as spraying with pre-mapped obstacles is always more time-efficient and precise.

Altitude control

Based on the characteristics of the working area (terrain and plant coverage) and the requirements of the spraying mission, you can choose between three altitude control methods.

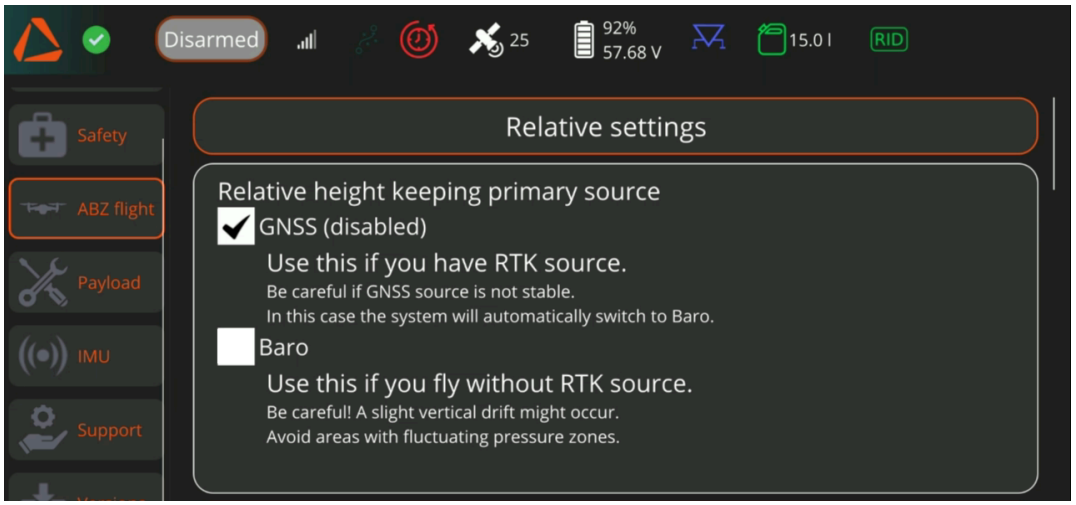
- LiDAR based follow terrain
- Relative
  - Barometer based
  - GPS based

In most cases, it is recommended to use the Follow Terrain altitude hold method, which relies on the ABZ Sense system. The multi-beam LiDAR continuously scans the environment and, based on a temporary real-time map generated from the point cloud, continuously and precisely adjusts the drone's altitude. This method is ideal for challenging terrains and plantations with significant height differences, such as vineyards and orchards.

By default, Relative Altitude Hold mode uses barometric measurements as the primary height source. The drone's altitude is maintained relative to the takeoff point. The pilot must be aware of altitude variations caused by atmospheric and weather changes. This mode is best suited for uniform plantations and flat terrains.

If you are flying with an **Emlid base station or Network RTK source using correction data,** the drone relies on GPS information as Primary Height source. This is the optimal setting in conditions where the LiDAR's normal operation is limited—such as when flying over water bodies, glass surfaces, or other reflective materials. You can enable this mode in **Settings > ABZ Flight** when the drone is grounded and disarmed.

You can change the default primary Height source used by the drone under Settings > ABZ Flight.



In manual flight mode, the drone operates in relative mode. You can toggle between **Follow Terrain** (LiDAR-based altitude control) and **Relative Mode** (barometer- or GNSS-based altitude control mode) using the central 3-stage switch. To enable this feature, go to **Settings > ABZ Flight > Advanced**, and activate **Manual terrain follow with 3-way switch and flight mode button**.

In automatic flight mode, you can predefine the altitude hold method for the mission in the Mission settings.

If Relative Altitude is selected, the drone relies on either barometer data or GNSS for altitude control, depending on the settings in ABZ Flight. Use GNSS only when flying with an RTK base station. If GNSS data becomes unreliable, the drone will switch back to barometric altitude hold.

Always define the mission altitude measured from the highest point of the plants you will be flying over.

In Return to Launch (RTL) flight mode, the drone will use the relative altitude hold method.

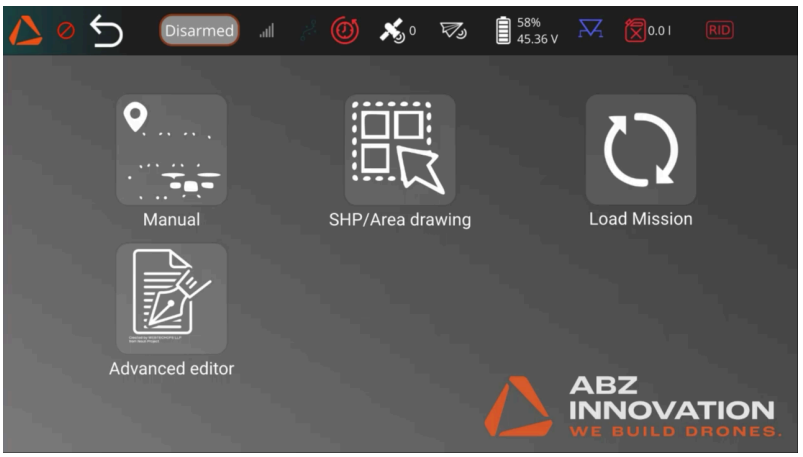
Flight planning

Each flight plan must include one Boundary (the working area where the drone will execute the automatic mission and perform spraying), and optionally one or more Obstacles (areas the drone will avoid during the mission). At least three points are required to define a boundary or an obstacle.

The Flight planning is accessed by selecting its icon at the top right.

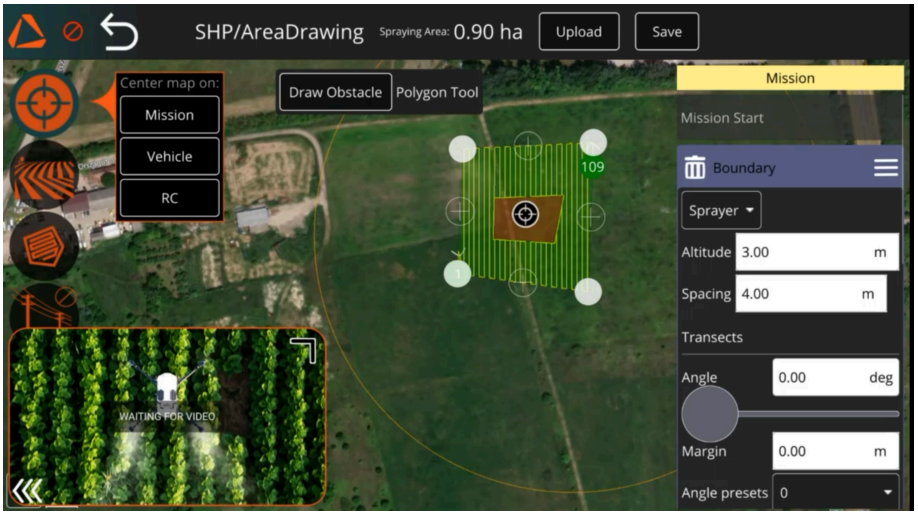
After clicking on the icon, you arrive at the Mission P**lanning Method Page**. Here you can choose between the following options:

- **Manual** (Marking the area with the drone/with the Remote controller)
- **SHP/Area drawing** to upload Area based SHP files (polygon or multipolygon) or draw the Mission Area onto Maps.
- **Load Mission** (Loading a previously saved mission).
- **Advanced planning** (waypoint based flight route planning).



For safety reasons, if your location or flight plan has changed, make sure to clear the previous mission from the drone by either clicking the **Exit button** in the Operation window under the Flight view, or by clicking the **Back button** on the Flight Planning page.

With the Center option, you can decide what should be in the central position on the map (the mission, the Drone, or the Remote Controller).



The Mission panel on the right shows the settings for automatic flight missions. To specify the spraying settings and start the automatic mission, follow the instructions from page 63.

Planning the field with the drone/ with the remote controller

You can use the drone's camera/the remote controller to mark the points of an area to specify a Boundary or Obstacle. To do so, on the Mission Planning Method Page choose the option **Manual.**

To define your working area for a new flight plan, Click on the Boundary icon.

A flight plan can only have one boundary. If you want to create a new one, the old one needs to be cleared.

2. After defining the Boundary, you can add points to it. To do so, the Boundary element needs to be active on the right side panel.

3. Click on **Add Point** in the left side menu. The points can be marked by the Remote Controller (RC Point) or the Drone (Drone Point).

If you want to plan with the drone, fly the drone to the desired points and let it hover. Then click on the **Drone Point** button on the left of the display to add the desired points. Points can also be manually moved on the display, based on the map, by tapping and dragging.

In this case, you should be aware of the inaccuracy of the map, which can be several meters off!

If you want to plan with the Remote Controller, take the controller to the desired point. Then click on the **RC Point** button on the left of the display to add the desired point.

If you have defined at least 3 corner points for the boundary, the Mission panel will open up on the right side for additional settings (see page 63).

4. To mark an Obstacle, first click on the Obstacle button.

5. Select the obstacle in the Mission panel and define its points by either the position of the Drone or the Remote Controller. You can define multiple obstacles; the points will be added to the obstacle currently selected in the Mission panel.

Using obstacle avoidance, which is an additional safety feature, does not eliminate the need for pre-mapping obstacles, as spraying with pre-mapped obstacles is always more time-efficient and precise. The drone will only avoid the obstacles marked in the flight plan in automatic flight mode!

Never rely exclusively on the obstacle avoidance system.

Always pay attention and observe the drone and its surroundings closely during flight. If possible, manually fly the drone as close as possible to the desired starting/continuation point!

Adjusting spraying settings

After defining a boundary, you can define the automatic spraying settings in The Mission panel on the right side of the screen. In this panel, you can adjust the following settings:

- Payload Type (For spraying missions, select "Sprayer")
- Flight altitude
- Line spacing: the distance between the drone's flight paths
- Angle of flight direction (also adjustable with the slider)
- Margin (distance kept from the edge of the designated area)
- Angle presets (to match the flight direction with the area's edges)
- Rotating the position of the first waypoint (it is recommended to set it the closest distance to the take-off point)
- Altitude hold method: In most cases, the Follow Terrain must be selected; this is the setting for the LiDAR system.*
- Droplet size (in microns)
- Optional: Change droplet size scale to ISO Category.

  You can explore the ranges for the different categories under *Settings > Payloads > Sprayer*.
- Coverage (quantity of liquid sprayed: l/ha)
- Flight speed (ground speed, between applicable extremes depending on spraying rate, also Adjustable with the slider: m/s)
- Statistics (calculated data according to the settings, at the bottom)

To upload the planned route to the drone, click the **Upload Required** or **Upload** button at the top-right corner of the screen.

If you save your plan, the file remains on the controller and you can open it from the **Load mission** menu. If you click on the **Back button**, your **plan will be cleared from the editor and from the drone.**

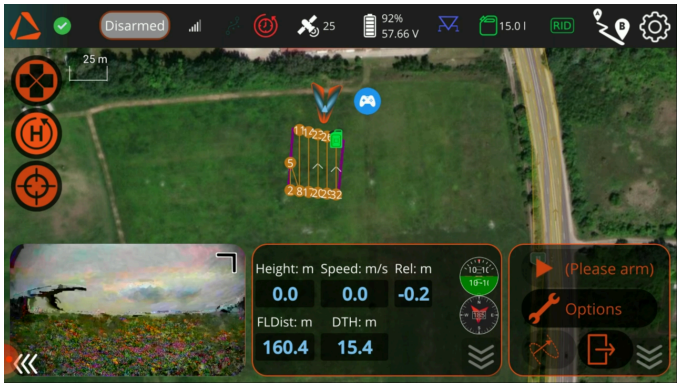
Starting the mission

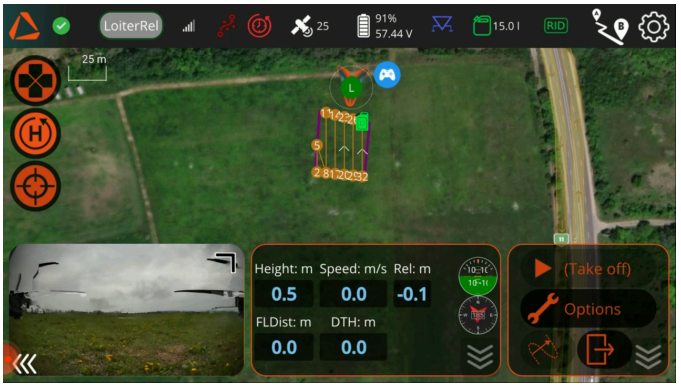
To start the mission, navigate to the **Flight View** by clicking on the **ABZ Innovation logo**. In the down-right corner of the screen, the **Mission window** displays the upcoming steps and provides access to essential functions throughout the mission.

- **With the Options button (1)**, you can change the Mission and Spraying settings after pausing the mission.
- **With the OBA button (2)**, you can manually declare an obstacle.
  (For more information on Obstacle Avoidance, see page 52.)
- **With the Exit button (3)**, you can clear the mission from the drone.

Before starting the mission, the software will prompt you to confirm the tank status by indicating that the tank is empty. You can enter the fluid level by clicking the **Options** button.

After being prompted to arm and take off, manually fly the drone to a safe altitude before starting the mission. You can start the mission by tapping the Start button in the Mission window.





The system will then prompt you to confirm the spraying settings. If all settings are correct, confirm by using the slider. The spraying will begin automatically.

Using shapefiles for mission planning

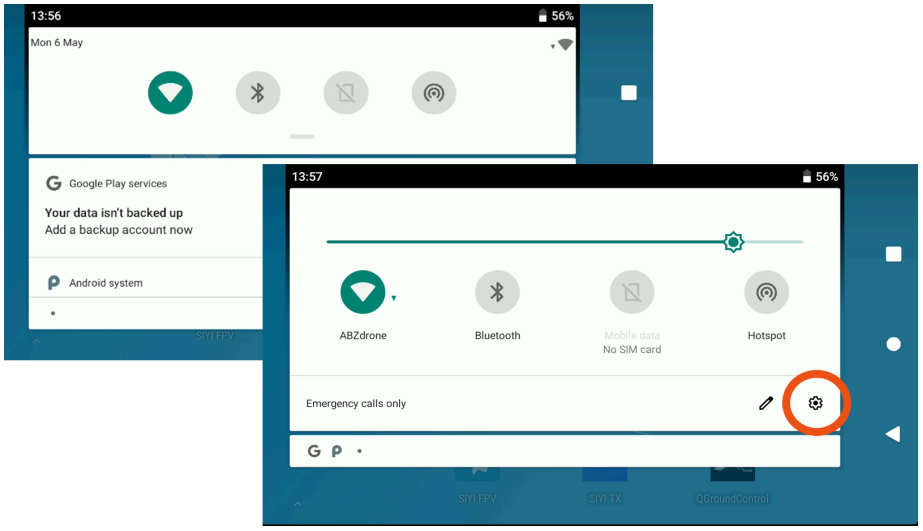
The ABZ Control supports polygon, polyline, and point-based shapefiles. You can use a shapefile in two distinct ways:

- To define an **area** (for further information regarding polygon based missions, see page 77) or **flight paths** (for further information regarding polyline based missions, see page 79)
- To serve as a **guide** for precisely positioning the points of a boundary or waypoints (for further information, see page 75.)

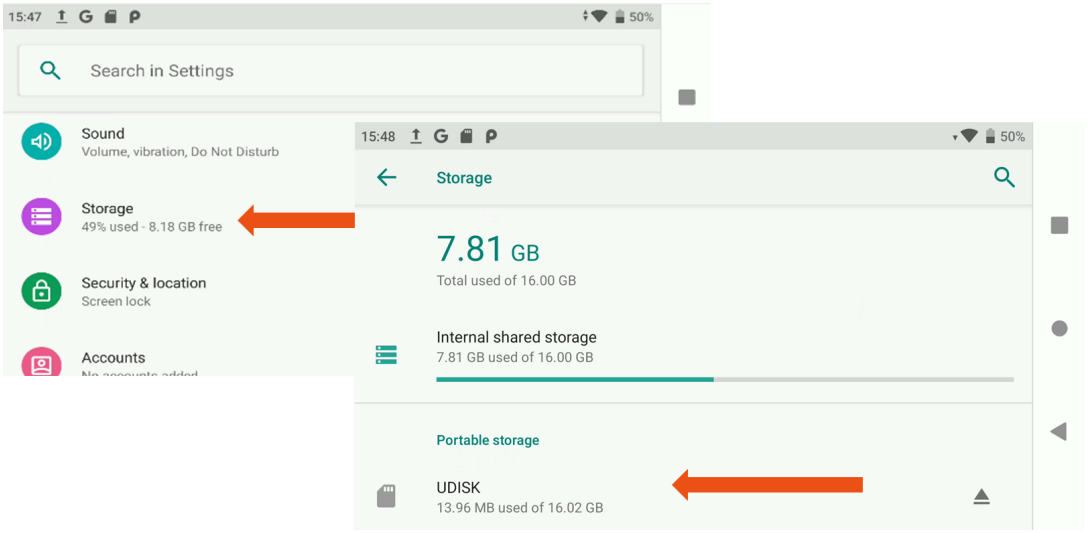
To import a shapefile into ABZ Control:

1. Make sure, **all** the needed shapefile parts are included in the .zip archive or shapefile folder (the files with extensions **.shp, .shx and .dbf** are present).
2. Ensure that the folder/archive has the **same filename** as the individual files.
3. Insert the SD card to the Remote Controller or copy the files to its internal storage with a cable:
    - If using an SD card, insert the card into the SD card slot. Only MicroSD cards with a maximum of 32 GB capacity are supported. You can decide to import the files directly from the SD card or copy them to the Remote Controller:

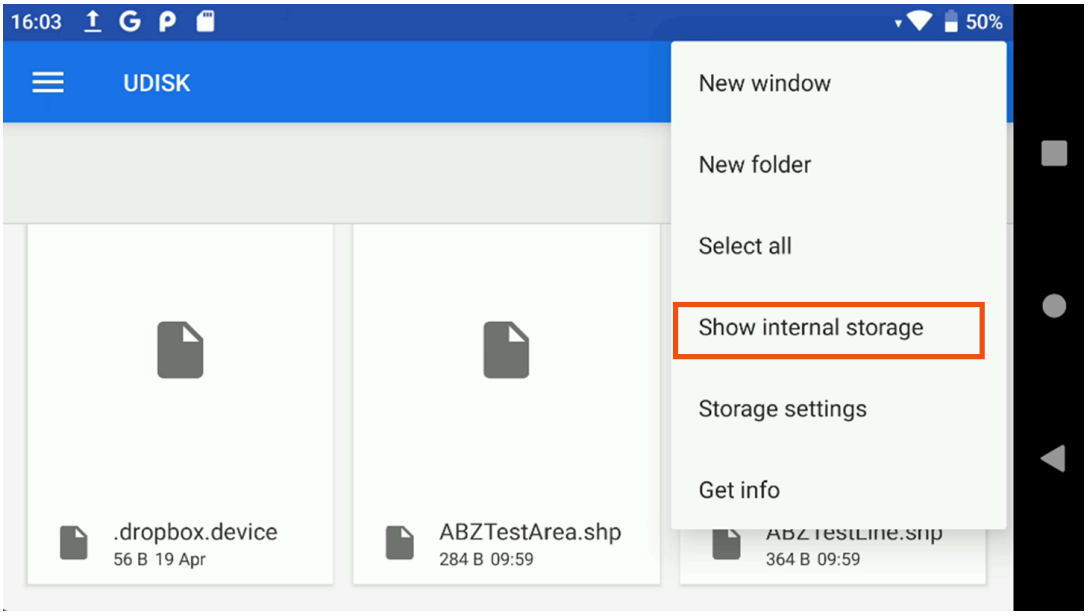
      To copy them, wipe down from the top of the screen to access the Android menu, where you must press the gear (**Settings**) icon.



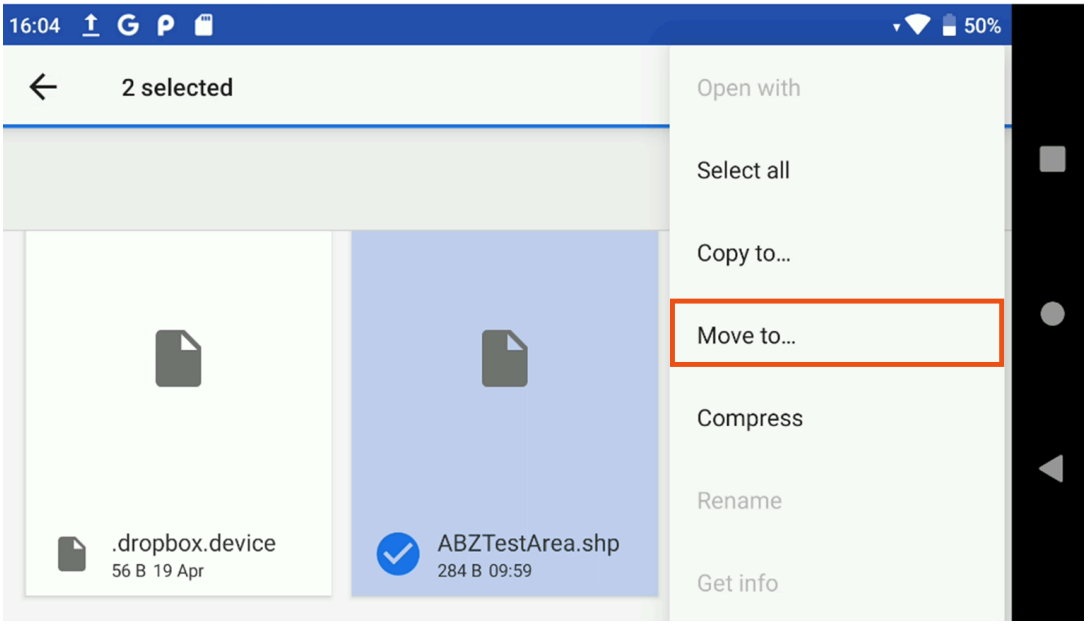
4. In this menu, scroll down to **Storage**, where you can select to open the SD Card.



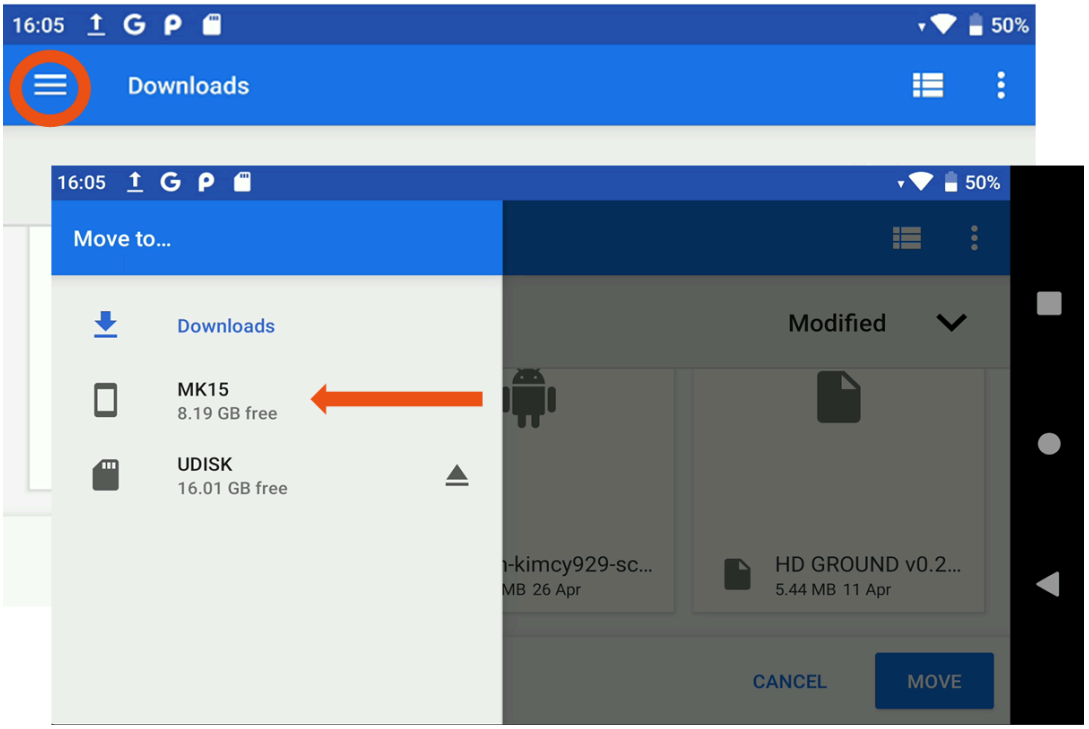
5. Tap the top right **Others** (3 vertical dots icon) menu, then **Show internal storage**.

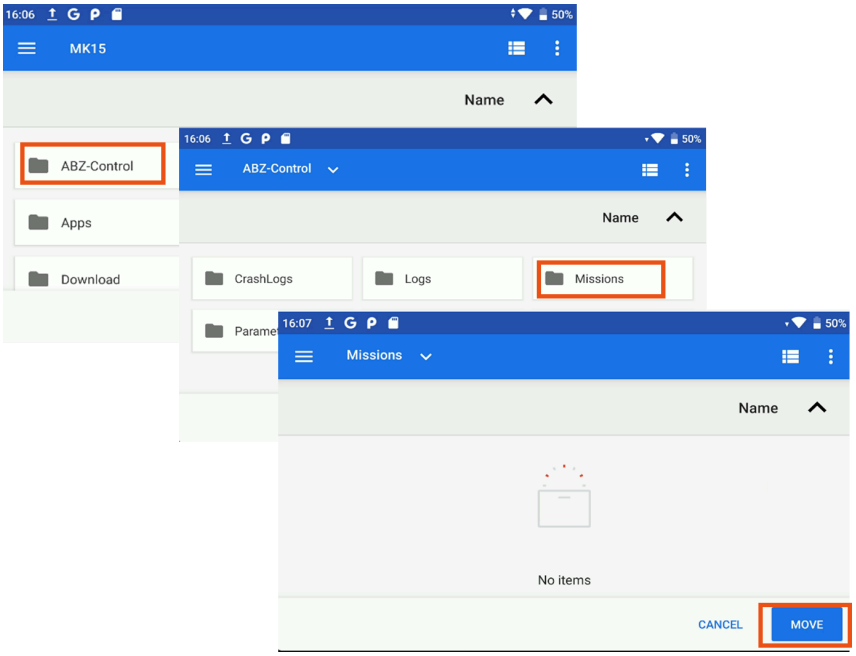


6. Select the required files on the SD card (tap and hold), then click on the Others (3 vertical dots icon) menu in the right corner of the screen, and select Move to...

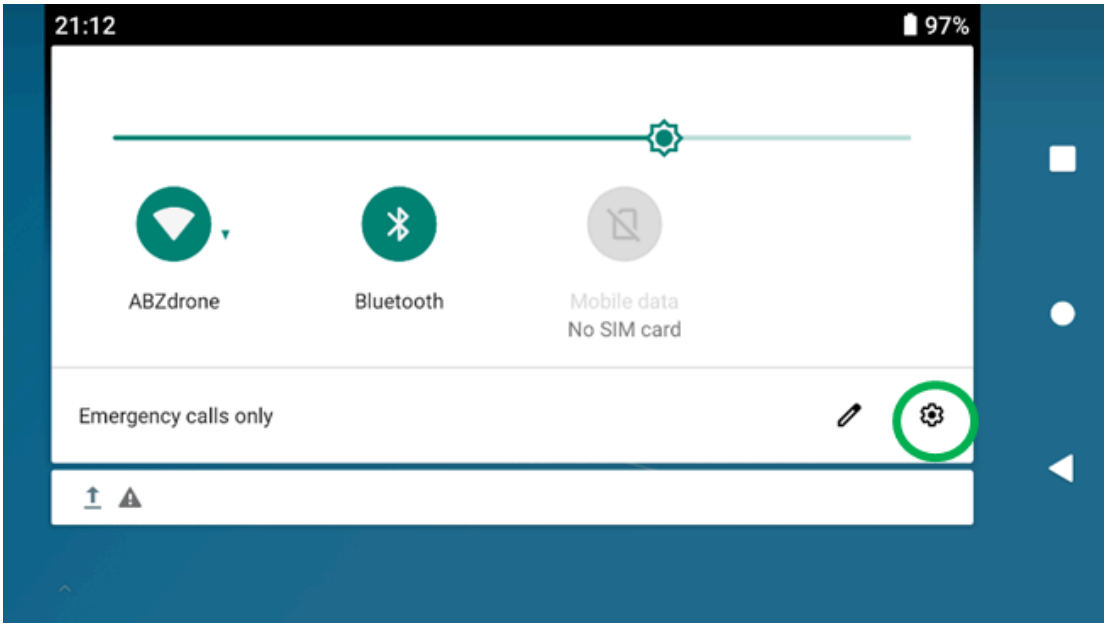


7. Click on the three lines on the left to open the navigation bar. Select MK15, then open the ABZ Control folder, then the Missions folder. Click the bottom right Move button to move the files to the controller.

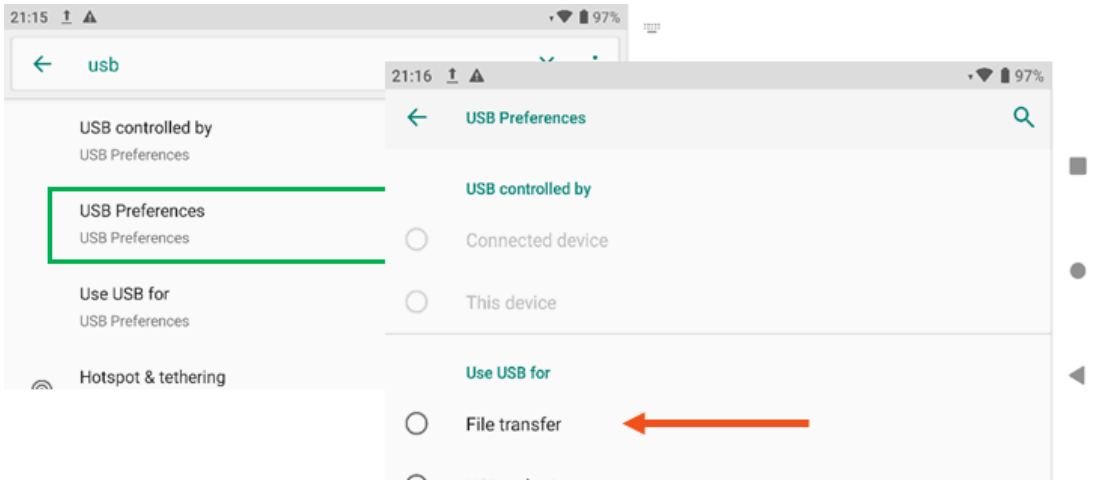




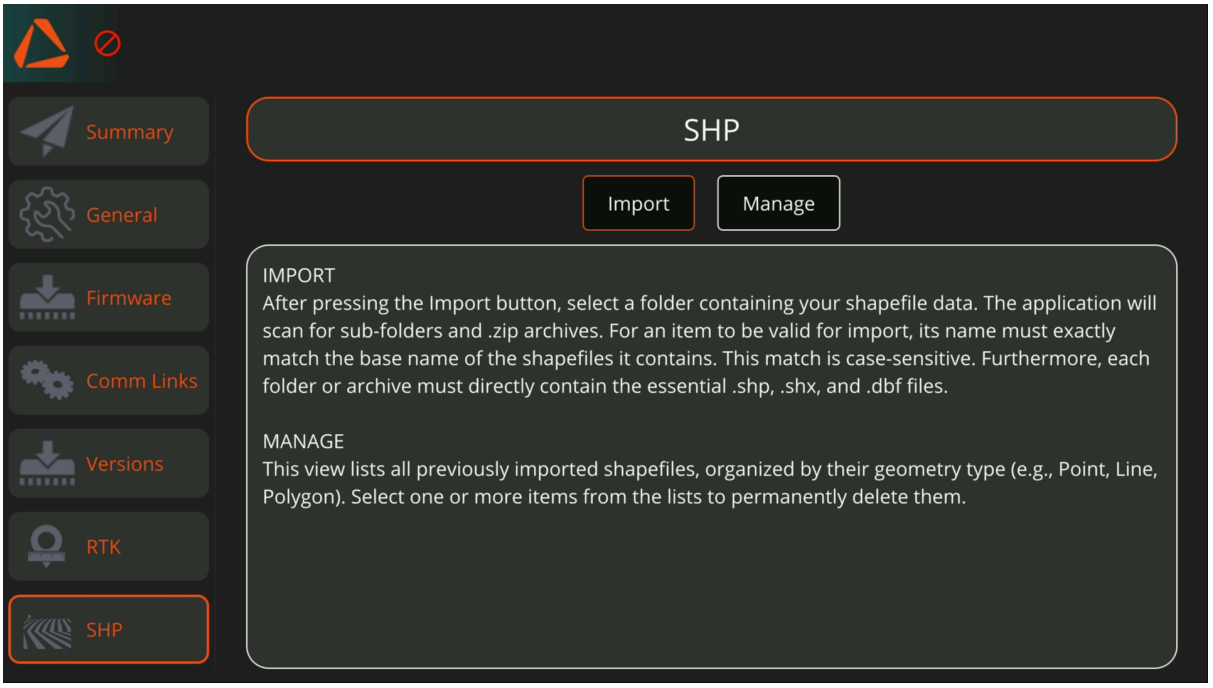
8. If you use a cable, connect the cable to the USB-C port of the remote controller and the computer. Open the Android Settings by swiping down from the top of the screen.



9. In the search bar, enter “USB”. Look for the option USB preferences. Click on File transfer.

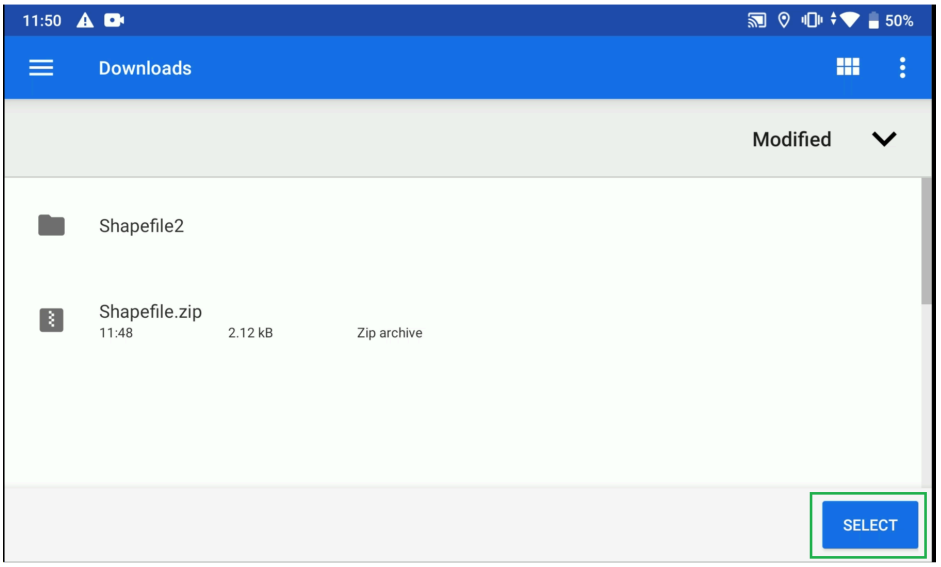


10. On your computer, the device MK15 appears. Copy the shapefile to the Controller.
11. You can disconnect the cable.
12. Launch the ABZ Control, and open the *Settings* > *SHP* Option.
13. Click **Import**.

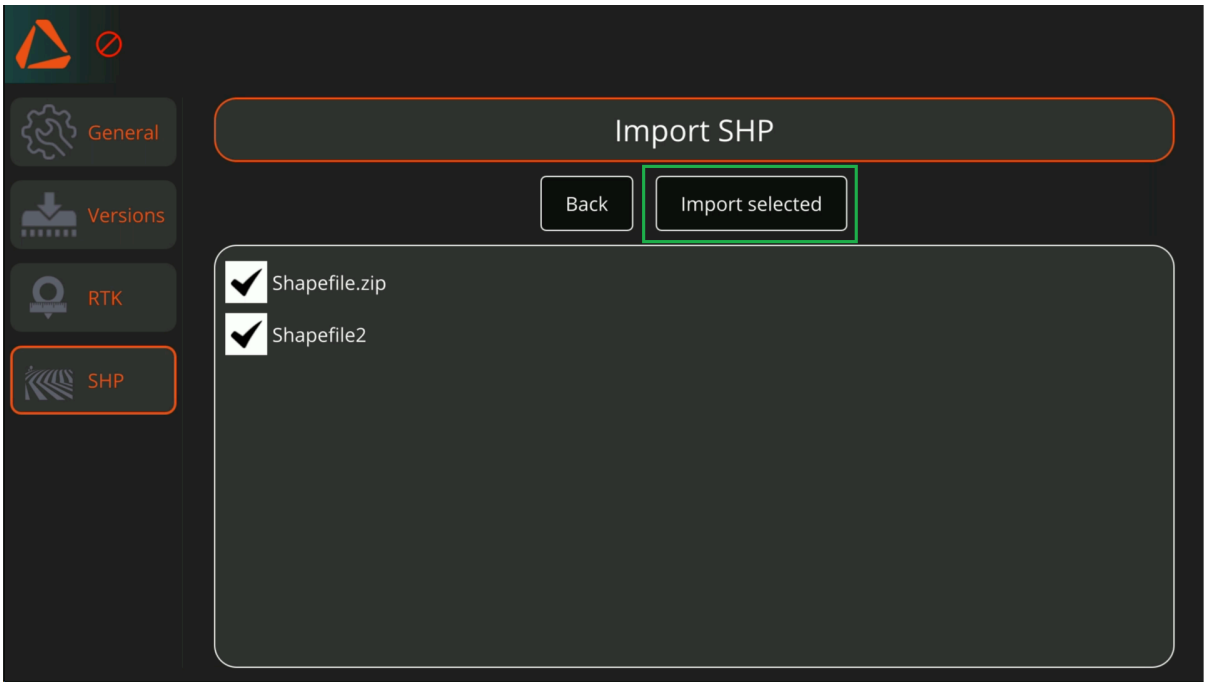


14. In the browser window, navigate to your shapefile folder/ZIP archive file. (Do not open it!)

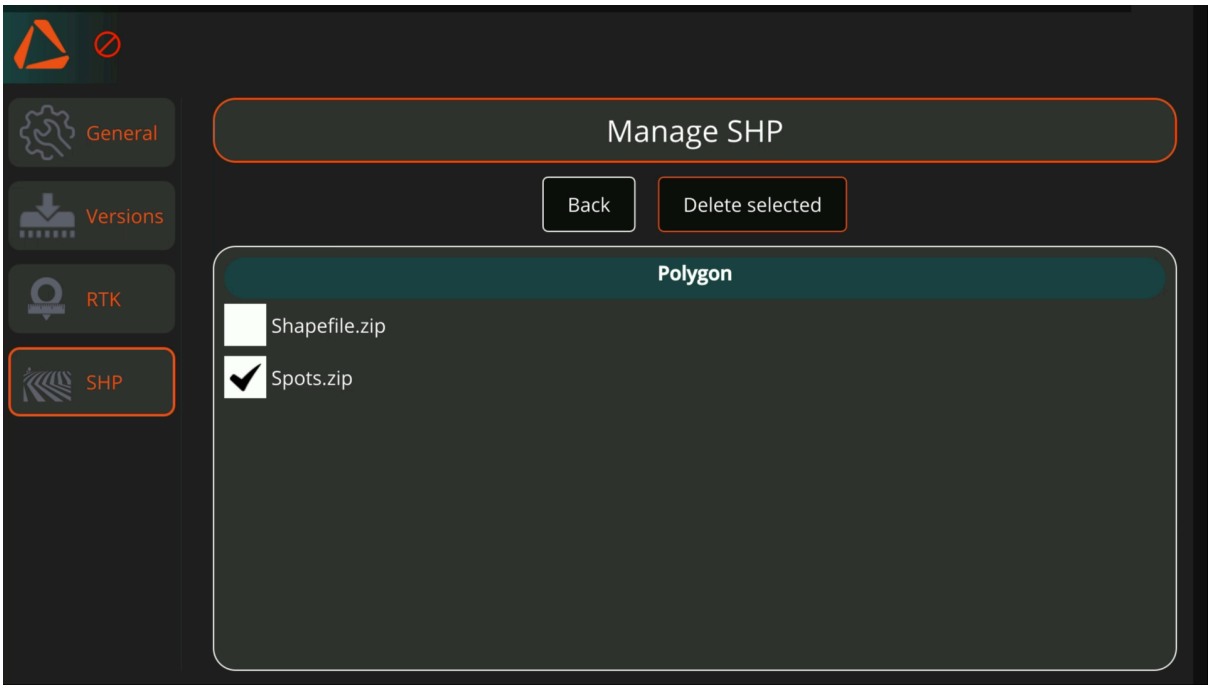
15. Click on **Select**.



16. Mark the needed shapefiles with a checkmark, and click on **Import selected**.



To Delete an imported shapefile, click on Manage. You will find the imported files grouped by their geometry. Select the files you wish to delete, and click on **Delete selected**.



You can open the imported shapefiles to add them as a work area (polygon-based mission), a work route (polyline-based mission), or a visual guide.

- Imported **area shapefiles** can be selected in the ABZ Control app by clicking on Flight planning then selecting the SHP/Area drawing option on the Mission Planning Method Page. For further information on the use of a shapefile as an area-based mission, see page 77.

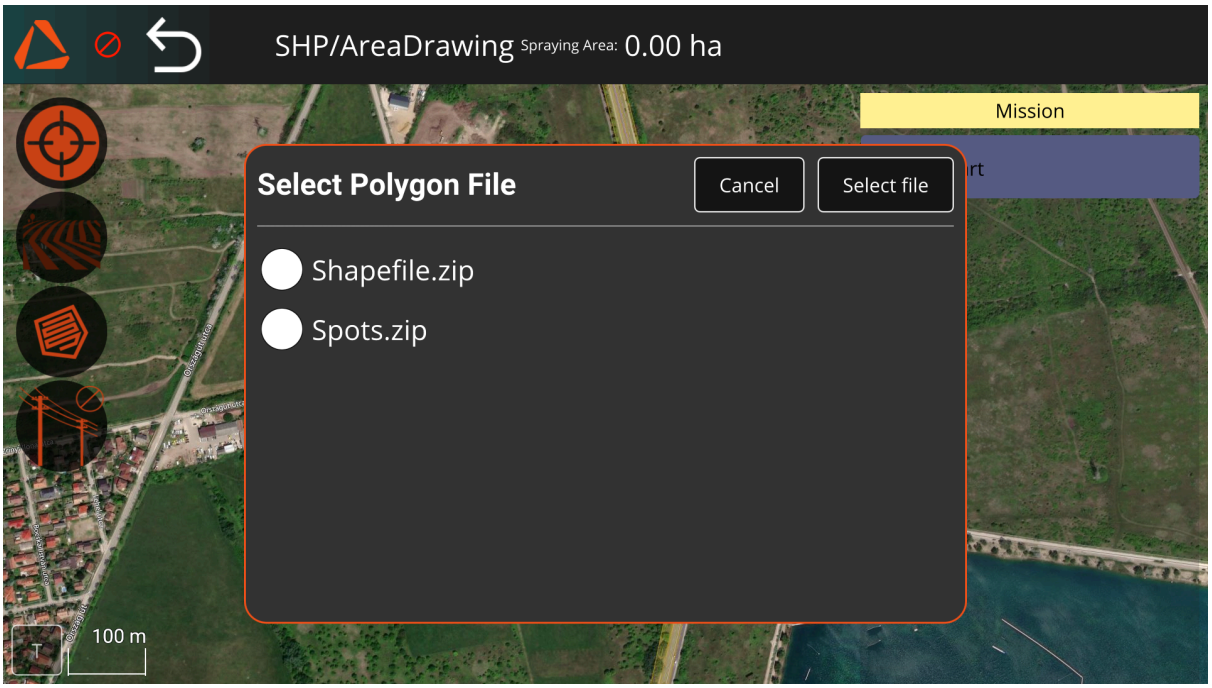
- Imported **polyline (lineshape) files** shapefiles can be selected in the ABZ Control app by clicking on Flight planning then selecting the Advanced planning option. For further information on the use of a shapefile as a polyline based mission, see page 79.
- For information on using shapefiles as visual guides, see page 79.

Using shapefiles as visual guides

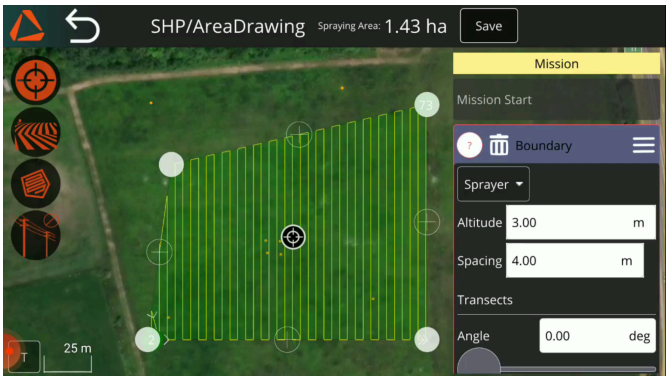
In ABZ Control, you can insert point, polyline, and polygon shapefiles as a layer to support precise planning. This function is available in the **SHP/Area Drawing** and **Advanced Planning** functions.

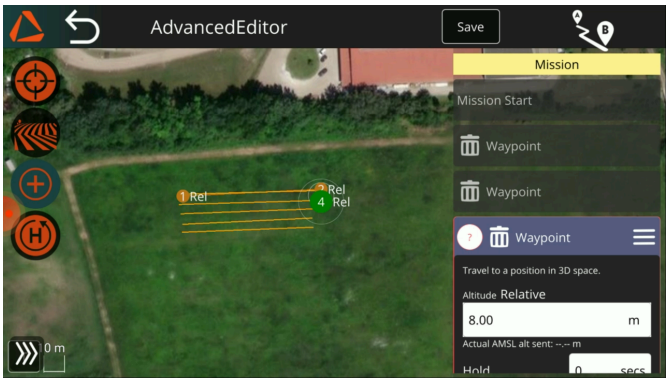
To open a shapefile as a visual guide, click on the shapefile icon  . You can choose whether you want to use a point-, polygon-, or polyline-based shapefile as a Visual Guide.

After selecting one of the options, you will see the corresponding files previously imported to the controller. Mark the needed file and click on select.

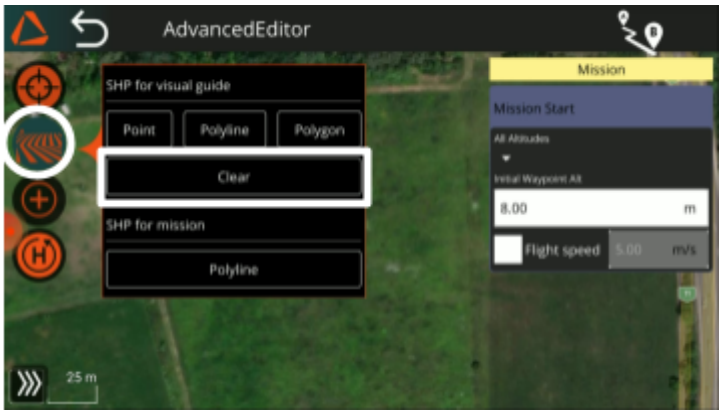


The shapefile will appear in the background, allowing you to use it for the precise placement of your boundary corner points (for more information about Area Drawing, see page 92) or waypoints (for more information about waypoint-based Advanced Planning, see page 83). It is possible to use multiple shapefiles of different types simultaneously.





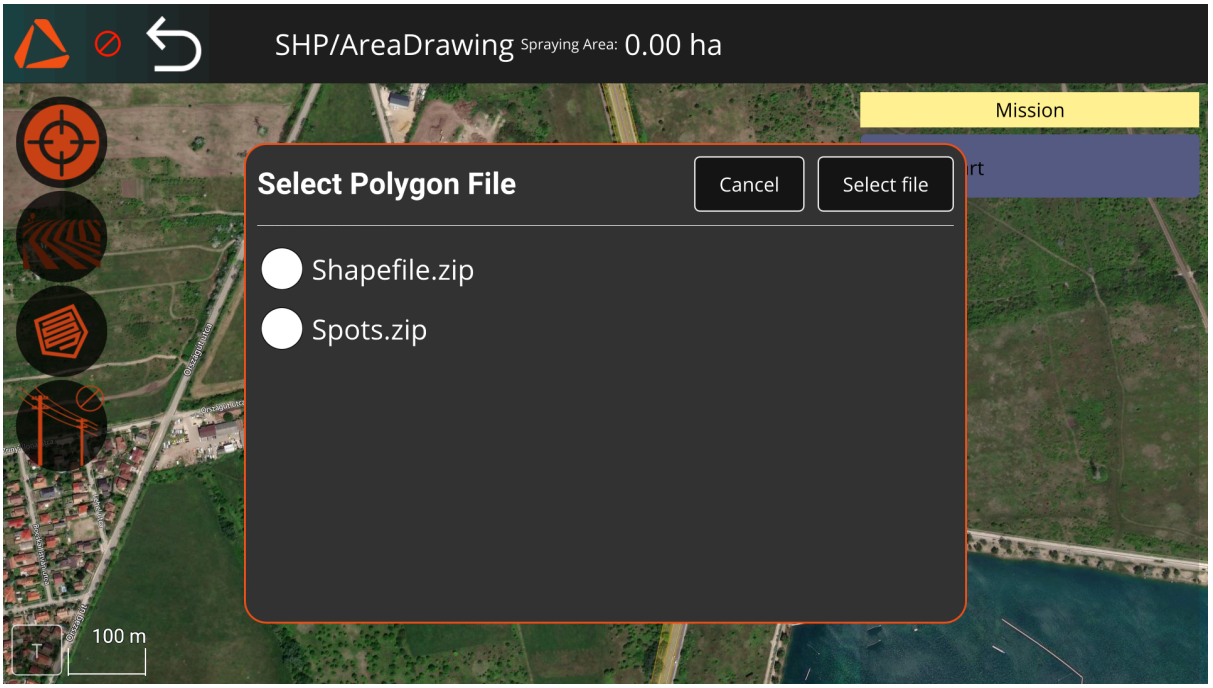
You can remove the visual guides from your planning page by clicking the Clear button.



Planning the field by loading an area shapefile

To use an area shapefile for planning, open the **Planning view** and, on the **Mission Planning Method page**, select the **SHP/Draw Area** option.

Click on the **Shapefile button**  . In the pop-up window, under the **SHP for Mission** option, click on the **Polygon(s)** button. In a popup window, you will see the corresponding files previously imported to the controller. Mark the needed file and click on select.

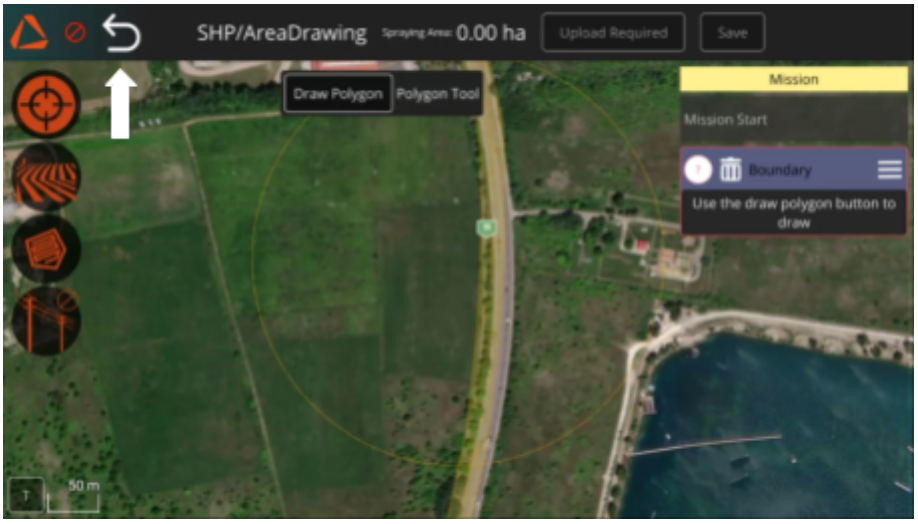


The polygon appears on the screen. If needed, you can adjust its edges by tapping and dragging the pins on the map.

To specify the spraying settings for Area shapefiles, follow the instructions on page 59.

When you have finished editing, you can save the mission by clicking the **Save** button on the right side of the top menu bar. To upload the planned route to the drone, click the **Upload Required** or **Upload** button at the top-right corner of the screen.

To start the mission, navigate to the **Flight view** by clicking on the **ABZ Innovation logo**. If you leave the planning page by clicking on the back button, your plan will be cleared from the editor and from the drone. If you have saved your plan, the file remains on the controller and you can open it from the **Load mission** menu.



To start a mission, in the **Flight view** tap on the **'Start Mission'** button after manually flying the drone to a safe altitude. The spraying will begin automatically. For more information on how to fly a mission, see page 65.

Planning the field by loading a Polyline (lineshape) file

The files must be imported to the ABZ Control (Settings > SHP). For further instructions, see Importing shape files on page 64.

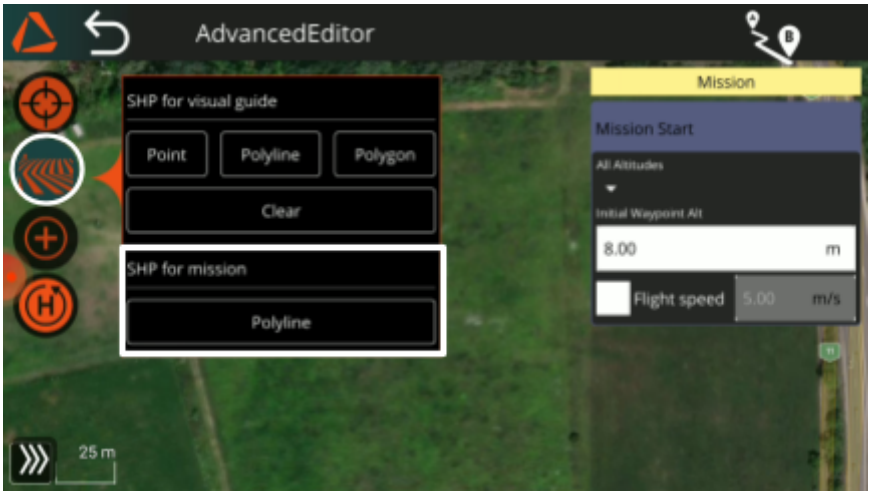
To Load a Polyline mission in ABZ Control, you need to open the **Advanced Planning** from the **Mission Planning Method Page**.

1. In the **Mission Start** section of the right-hand Mission Panel, define the **Flight Speed** and the **Altitude Hold Mode** for your mission. Make sure to check the box next to the **Flight Speed** value; otherwise, the speed will not be applied.

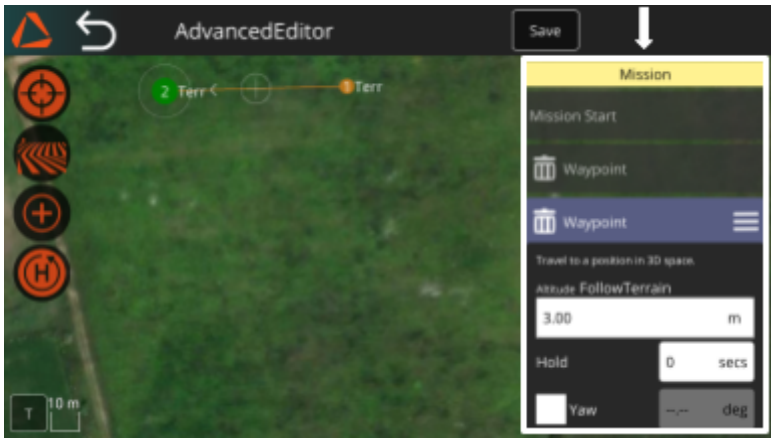
   For **Altitude Hold Mode**, you have three available options. (For further information regarding Altitude control methods, see page 55):

   - **Relative:** The drone's altitude will be relative to the takeoff point
   - **Follow Terrain:** The drone uses LiDAR to maintain altitude, measured as its distance from the ground.
   - **Mix Modes:** Allows applying the previous two modes individually for each waypoint.

2. On the right side, click on the **SHP** button and choose under the **SHP for mission**, then click on the **Polyline** button.



3. In the pop-up window choose the file you want to open and click on select.
4. The editor will display the routes and waypoints on the map.The waypoints of the mission will be also listed in the **mission panel** on the right side. Here you can adjust the parameters for each waypoint, and delete them by clicking on the bin icon. If you change the settings for any waypoint, the subsequent waypoints will inherit the new setting.



5. If you open the Set ABZ command window and check the box for **Append ABZ Command**, you can select and adjust the setting for the current payload of the drone.

6. You can turn the sprayer on or off at each waypoint. If the sprayer is activated, you can define different application values: the application rate in liters per hectare, the working width, and the droplet size, which can also be specified according to ISO standards.

7. In the **Statistics Window**, after entering the spraying parameters, you will see the calculated details of your mission:

    a. The route with spraying activated

    b. The entire route

    c. The area to be sprayed

    d. The amount of spraying liquid required

8. If you are ready with the editing, you can save the mission by clicking on the Save button in the right side of the top menu bar. With the upload required button you can upload the mission to the drone.
9. To start the mission, navigate to the Flight view by clicking on the ABZ Innovation logo. If you leave the planning page by clicking on the back button, your plan will be cleared from the editor and from the drone.

    If you have saved your plan, the file remains on the controller and you can open it from the **Load mission** menu.

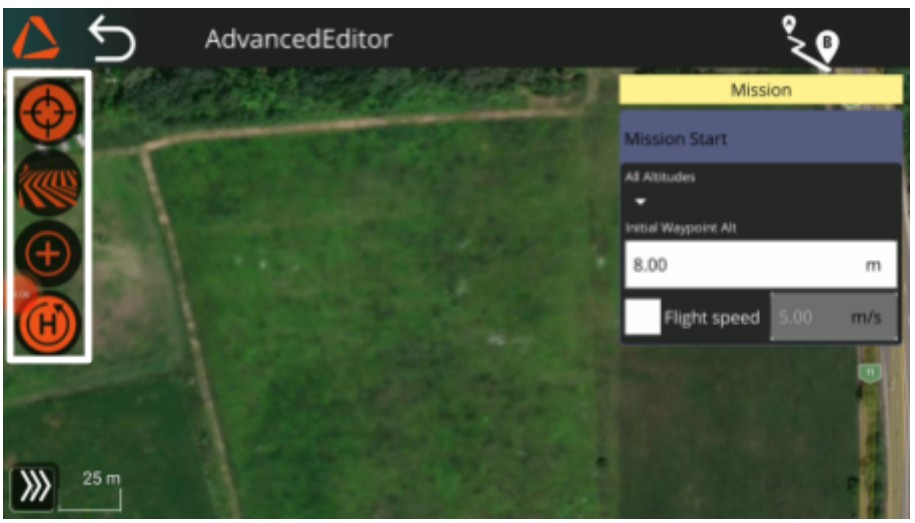
Advanced Planning:
Creating a mission by defining waypoints

Advanced Planning is a mission planning interface designed for creating more complex tasks, such as differential applications or spot treatments. Unlike Manual planning or Area drawing, where boundaries must be set, this feature gives you full control over the drone's flight routes.

Within a single waypoint mission, you can assign different deployment parameters to various waypoints, such as the drone's speed, altitude, and working width. These capabilities enable the drone to perform tasks with precision as needed.

To enter the **Advanced Planning**, navigate to the Mission Planning Method Page and select Advanced Planning.

On the left side of the planning page, you will find four buttons:



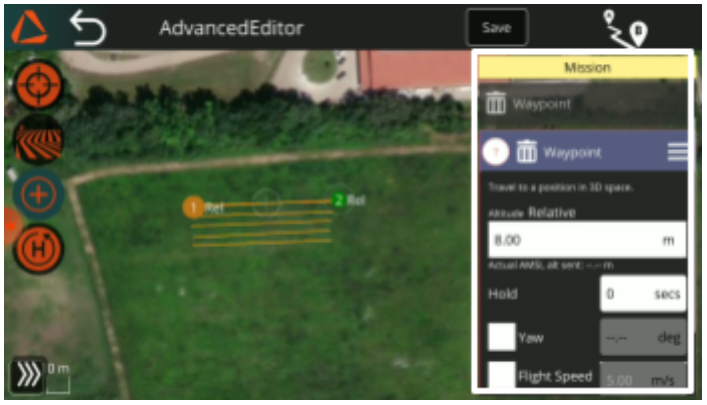
Center: places the mission, the drone's position, or the remote controller's position in the center of the screen with a single click.

SHP: you can add visual guides to the map to help you with the accurate placement of the waypoints. It offers several options: Point, Polyline (Line shapefile), or Polygon. For further information regarding Using shapefiles as visual guides, see page 68. You can also open a Polyline shape to configure it as a Waypoint mission (for instructions, see page 72).

Waypoint: You can set specific waypoints by tapping on the remote controller's screen to create the drone's route.

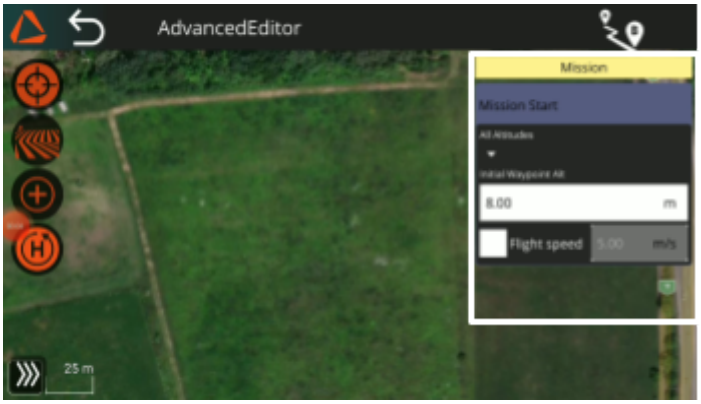
Return: activates the return-to-home function once the drone has completed the last waypoint. It is considered as part of the mission.

On the right side of the planning page, in the mission panel, you can set the Mission start parameters and the parameters of the waypoints. The parameters you define in the mission start section will be inherited by all the waypoints. If you change the setting for any waypoint, the subsequent waypoints will inherit the new setting.



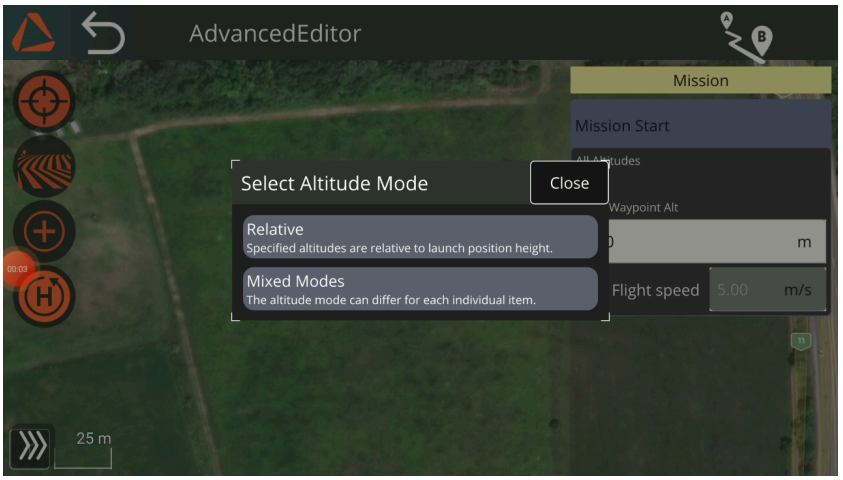
Waypoint mission planning process

In the **Mission Start** section of the right-hand **Mission Panel**, define the **Flight Speed** and the **Altitude Hold Mode** for your mission. Make sure to check the box next to the **Flight Speed** value; otherwise, the speed will not be applied.

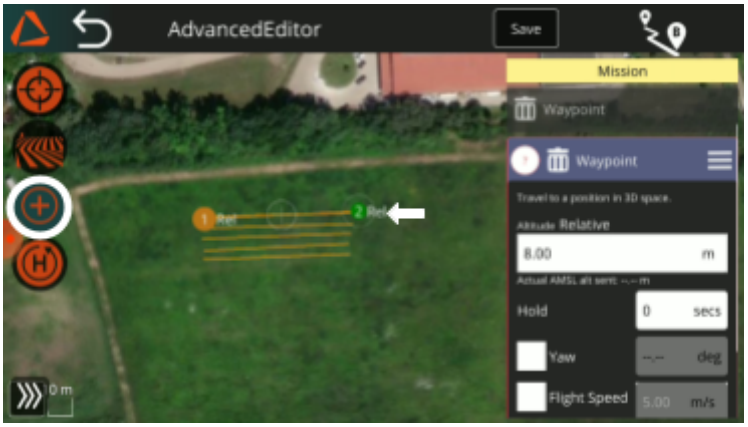


For **Altitude Hold Mode**, you have three available options. (For further information regarding altitude Control methods, see page 55):

- **Relative:** The drone's altitude will be relative to the takeoff point
- **Follow Terrain:** The drone uses LiDAR to maintain altitude, measured as its distance from the ground.
- **Mix Modes:** Allows applying the previous two modes individually for each waypoint.



1. Add the waypoints by tapping on the screen. You can grab and move the points to reposition them.



2. To avoid inaccuracies in planning caused by the inevitable limitations of online maps, use shapefiles to ensure the precise placement of the waypoints. For further instructions, see page 75.
3. You can delete a waypoint by clicking on the bin icon in the Mission Panel.

4. In the mission panel, you can adjust the flying parameters, including altitude and speed, individually for each waypoint. The subsequent waypoints will inherit the setting.
5. If you open the **Set ABZ** command window and check the box for **Append ABZ Command**, you can select and adjust the setting for the current payload of the drone.

6. You can turn the sprayer on or off at each waypoint. If the sprayer is activated, you can define different application values: the application rate in liters per hectare, the working width, and the droplet size, which can also be specified according to ISO standards.

7. Using the Return button (on the left side), you can instruct the drone to initiate Return to Launch (RTL) at the end of the mission. Otherwise, after reaching the last waypoint, the drone will follow the Mission End Action setting, which can be defined under **Settings > Safety**.

8. In the Statistics Window, after entering the spraying parameters, you will see the calculated details of your Mission:

   - A. Route with spraying activated
   - B. Entire flight route
   - C. Area to be sprayed
   - D. Required spraying liquid

9. When you have finished editing, you can save the mission by clicking the **Save** button on the right side of the top menu bar. To upload the planned route to the drone, click the **Upload Required** or **Upload** button at the top-right corner of the screen.
10. To start the mission, navigate to the Flight view by clicking on the ABZ Innovation logo. If you leave the planning page by clicking on the back button, your plan will be cleared from the editor and from the drone. If you have saved your plan, the file remains on the controller and you can open it from the Load mission menu.
11. To start a mission, in the **Flight view** tap on the **'Start Mission'** button after manually flying the drone to a safe altitude. The spraying will begin automatically.

Usage Examples

Vineyard spraying

In the advanced planning, you can create mission plans that align precisely over the vine rows for efficient and economical spraying.

1. Import the shape file of your vineyard generated by a monitoring drone or with the help of the Emlid RS base (see page 101) to the ABZ Control. (For further instructions see page 64).

2. In the **Mission Start** section of the right-hand Mission Panel, define the **Flight Speed** and the **Altitude Hold Mode** for your mission. Make sure to check the box next to the **Flight Speed** value; otherwise, the speed will not be applied.

3. For **Altitude Hold Mode**, you have three available options:

    - **Relative:** The drone's altitude will be relative to the takeoff point, based on barometric measurements.
    - **Follow Terrain:** The drone uses LiDAR to maintain altitude, measured as its distance from the ground.
    - **Mix Modes:** Allows applying the previous two modes individually for each waypoint.

4. Select the SHP icon on the left side of the screen, then choose either Point, Polyline (for line shapefiles), or Polygon (for area shapefiles), depending on the geometry of your shapefiles. Use the Clear button to remove the file from the planning page. The Points/Polyline/Polygone appears on the screen.

5. Use the Points/Polyline/Polygone of your SHP file as a guide to help you place the waypoints over the vine rows on your RC. It is possible to use more/different kinds of shapefiles simultaneously. You can grab and move the points to reposition them. For more information on Using shapefiles as visual guides, see page 72.

6. You can delete a waypoint by clicking on the bin icon in the Mission Panel.

7. In the mission panel, you can adjust the flying parameters, including altitude and speed, individually for each waypoint. The subsequent waypoints will inherit the setting.

8. Click on the waypoint where you would like to begin spraying. Open the **Set ABZ Command** window and check the box for **Append ABZ Command**. Turn on the sprayer. In this window, you must define the application values: the application rate (in liters per hectare), the working width, and the droplet size, which can also be specified according to ISO standards. The subsequent waypoints will inherit your settings.

9. You can turn the sprayer on or off at each waypoint. If the sprayer is activated, you can define different application values: the application rate in liters per hectare, the working width, and the droplet size, which can also be specified according to ISO standards.

10. When you have finished editing, you can save the mission by clicking the Save button on the right side of the top menu bar. To upload the planned route to the drone, click the Upload Required or Upload button at the top-right corner of the screen.

Spot spraying

In advanced planning, you can create mission plans for spot spraying missions.

1. Import the shape file of your field to the ABZ Control. (For further instructions see page 68).

2. In the **Mission Start** section of the right-hand Mission Panel, define the **Flight Speed** and the **Altitude Hold Mode** for your mission. Make sure to check the box next to the **Flight Speed** value; otherwise, the speed will not be applied.

   For **Altitude Hold Mode**, you have three available options:

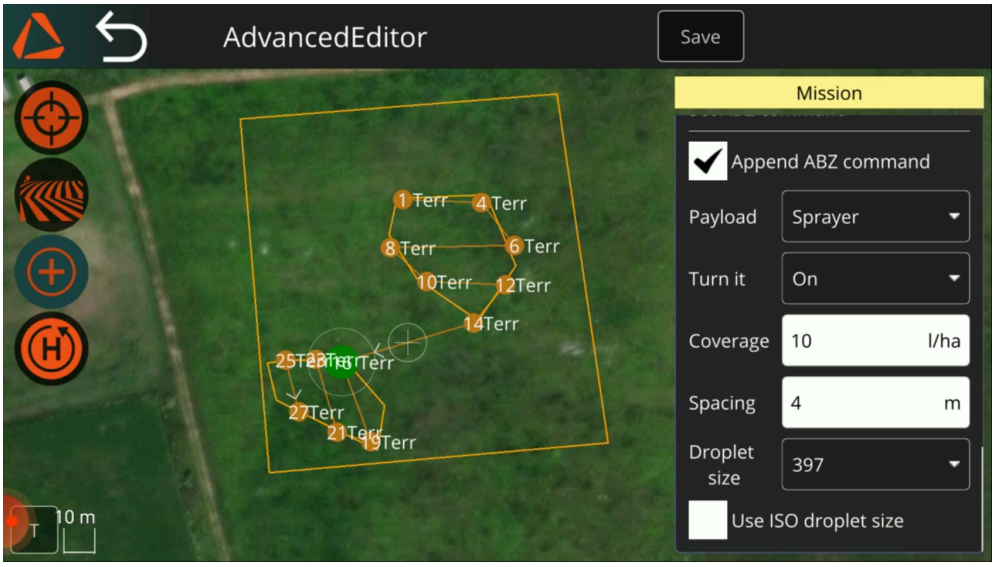
   - Relative: The drone's altitude will be relative to the takeoff point.
   - Follow Terrain: The drone uses LiDAR to maintain altitude, measured as its distance from the ground.
   - Mix Modes: Allows applying the previous two modes individually for each waypoint.

11. Select the SHP icon on the left side of the screen, then choose either Point, Polyline (for line shapefiles), or Polygon (for area shapefiles), depending on the geometry of your shapefiles. Use the Clear button to remove the file from the planning page. The Points/Polyline/Polygone appears on the screen.

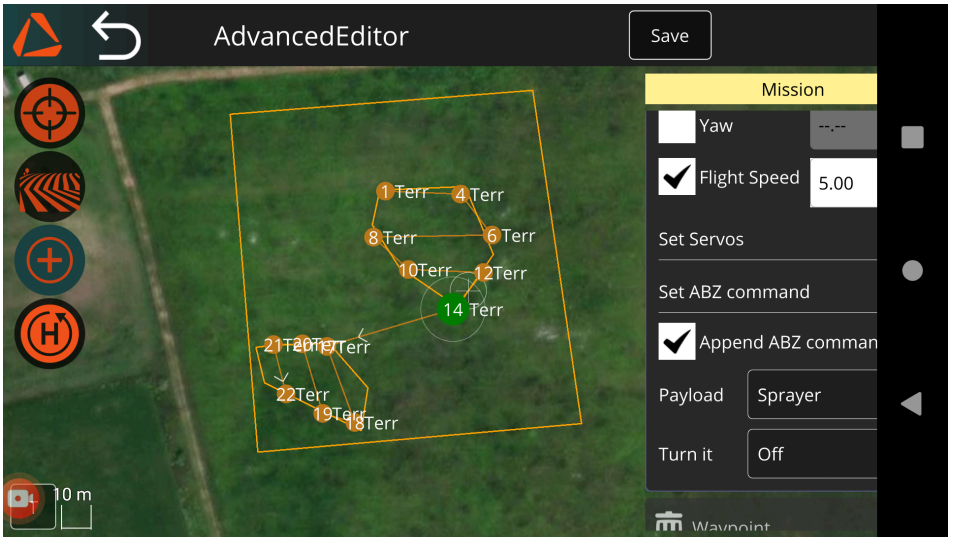
12. Use the Points/Polyline/Polygone of your SHP file as a guide to help you place the waypoints over the vine rows on your RC. It is possible to use more/different kinds of shapefiles simultaneously. You can grab and move the points to reposition them. (For further instructions, see page 75).

13. In the mission panel, you can adjust the flying parameters, including altitude and speed, individually for each waypoint. The subsequent waypoints will inherit the setting.

14. Click on the waypoint where the drone enters the first spot and begins the spraying. Open the **Set ABZ Command** window and check the box for **Append ABZ Command**. Turn on the sprayer. In this window, you must define the application values: the application rate (in liters per hectare), the working width, and the droplet size, which can also be specified according to ISO standards. The subsequent waypoints will inherit your settings.



15. Click on the last waypoint of the spot and turn off the sprayer.



16. Repeat the two steps above for the additional spots.

17. When you have finished editing, you can save the mission by clicking the Save button on the right side of the top menu bar. To upload the planned route to the drone, click the Upload Required or Upload button at the top-right corner of the screen.

Planning the field by drawing an area

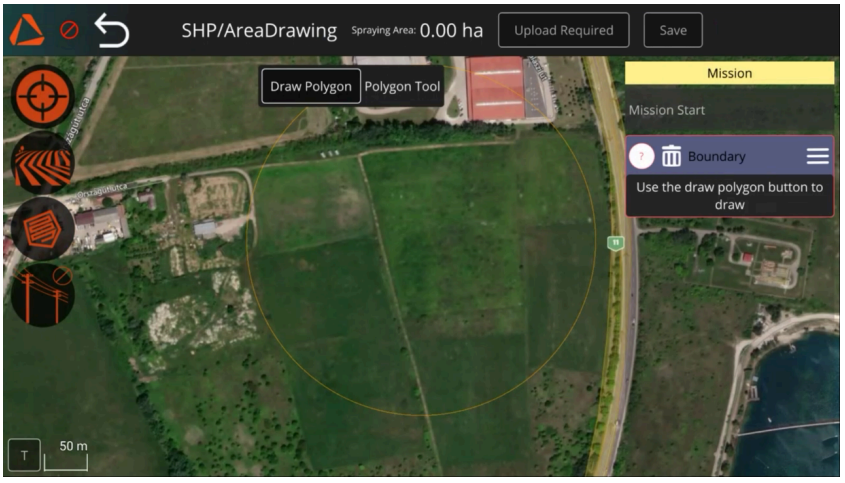
Under the SHP/Area drawing menu, you can manually add and move (by tapping and dragging) corner points on the display based on the map. In this case,

Be aware that the map may be inaccurate by several meters. To ensure precise placement of your boundary, we recommend using shapefiles as visual guides.

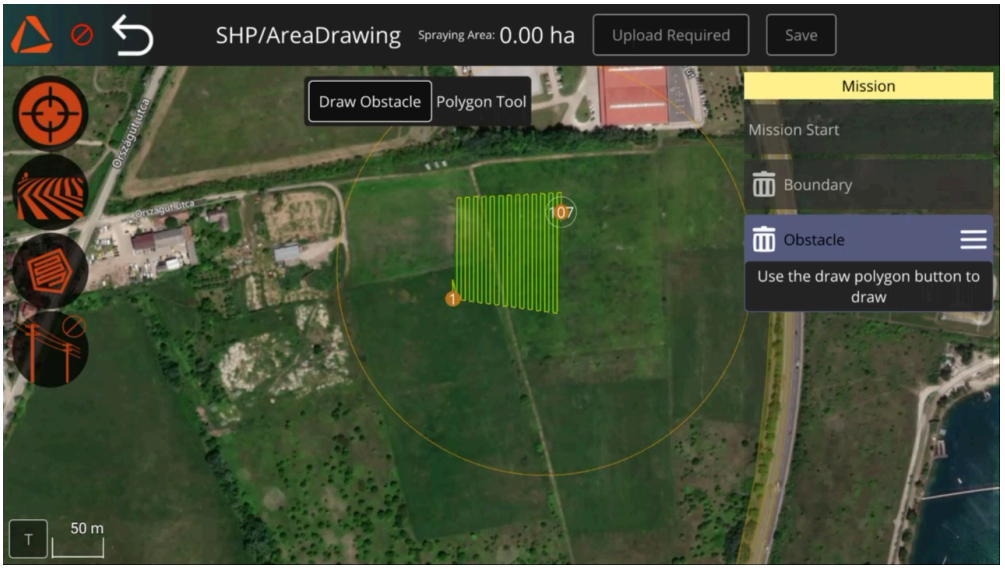
Important: Without shapefile-based visual guides, this solution should not be used for actual spraying. It is intended for testing and demonstration purposes only.

You can add visual guides to the map to assist with accurate boundary placement. To do so, click on the **Shapefile** icon.
For more information on using shapefiles as visual guides, see page 75.

To define a boundary by drawing an area, click the **Boundary** button, then select Draw Polygon. A polygon will be automatically generated, and you can adjust its corner points as needed.



You can add an obstacle the same way.



After you have adjusted the points, you can specify the spraying settings for the mission (see page 63).

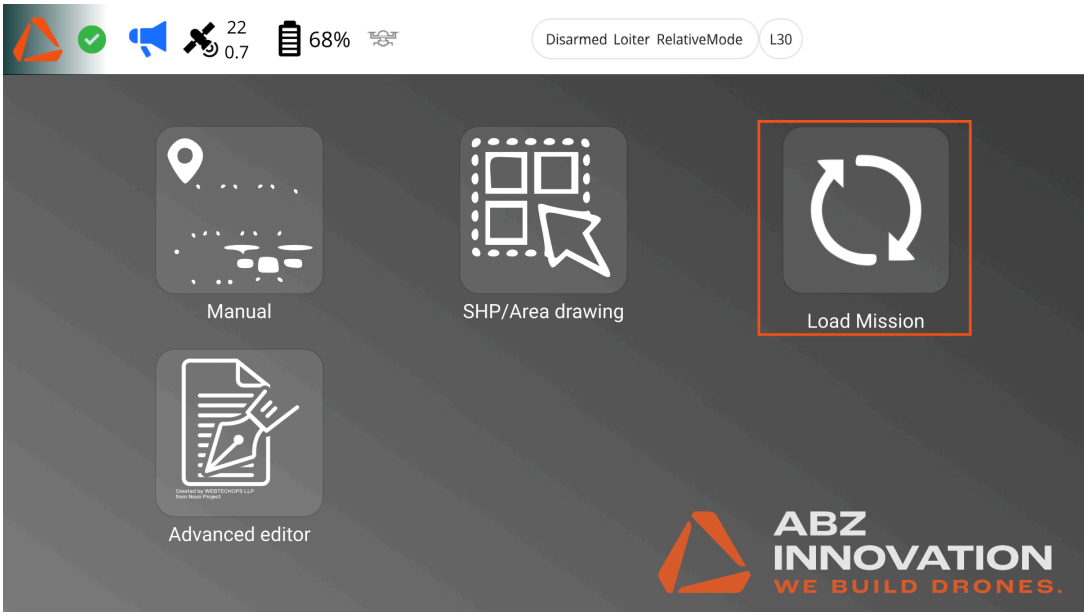
When you have finished editing, you can save the mission by clicking the **Save** button on the right side of the top menu bar. To upload the planned route to the drone, click the **Upload Required** or **Upload** button at the top-right corner of the screen.

To start the mission, navigate to the Flight view by clicking on the ABZ Innovation logo. If you leave the planning page by clicking on the back button, your plan will be cleared from the editor and from the drone. If you have saved your plan, the file remains on the controller and you can open it from the **Load mission** menu.

To start a mission, in the **Flight view** tap on the **'Start Mission'** button after manually flying the drone to a safe altitude. The spraying will begin automatically.

Loading a previously saved mission

If you have saved a mission plan using Manual, Drawing, or Advanced Planning, you can open it by clicking Load Mission on the Mission Planning Method page. These saved plans are stored on the remote controller and not on the drone.

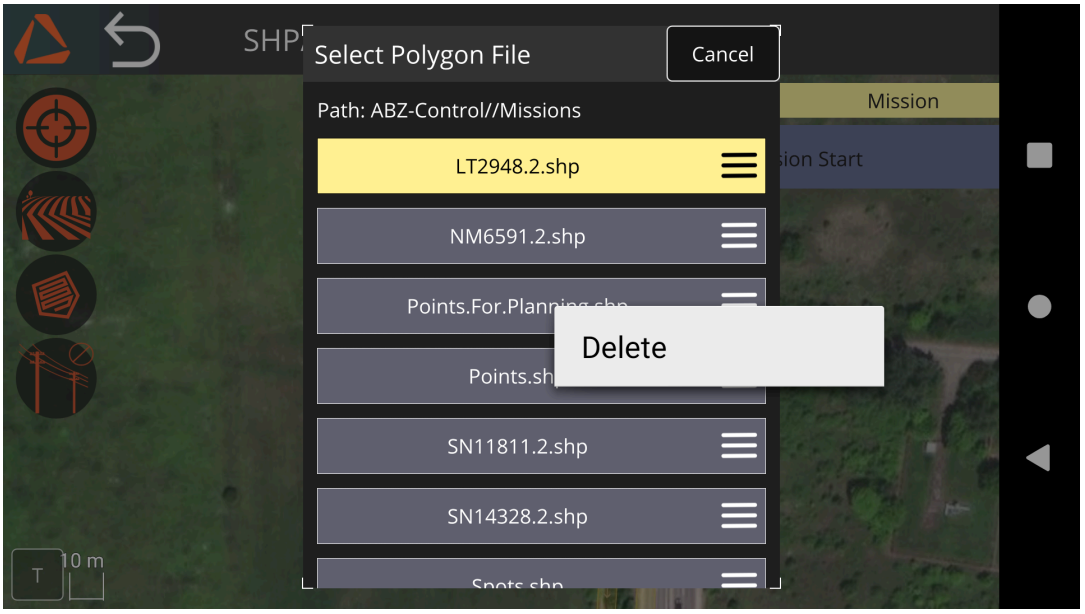


After selecting a mission, you can adjust the spraying settings in the Mission Panel, if needed (see page 38). When you have finished editing, you can save the mission by clicking the Save button on the right side of the top menu bar. To upload the planned route to the drone, click the Upload Required or Upload button at the top-right corner of the screen.

To start the mission, navigate to the Flight view by clicking on the ABZ Innovation logo. If you leave the planning page by clicking on the back button, your plan will be cleared from the editor and from the drone. If you have saved your plan, the file remains on the controller and you can open it from the Load mission menu.

To start a mission, in the **Flight view** tap on the **'Start Mission'** button after manually flying the drone to a safe altitude. The spraying will begin automatically.

You can delete a mission by clicking on the hamburger menu next to the name of the Mission and choosing delete:



Flight

If needed, check Failsafe settings and adjust them according to the actual flight task and surroundings.

Always fly in GPS assisted flight mode, if possible (e.g. Manual (Loiter)). In case of unexpected operation, switch to Manual (Loiter) mode (pushing the A button) and release the sticks to stop the drone.

Set the display brightness in accordance with the lighting conditions. Every data on the display should be readable even in direct sunlight. Turn off unnecessary nearby Wi-Fi and radio equipment to minimize interference.

If all the necessary conditions for the flight are ensured, you can then enter the flight view to start the flight, switching to "Armed" mode.

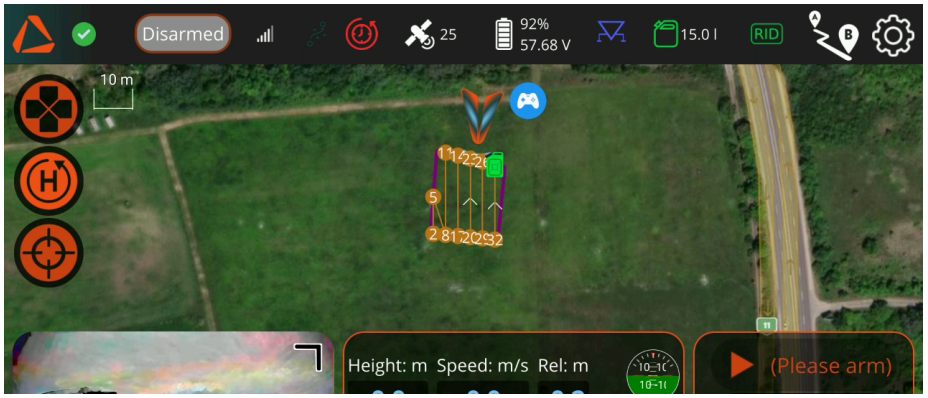
In this software version manual take-off is required and manual landing is recommended.

After arming the drone, wait about 4 seconds for the motors to reach full speed before take-off. After manual take-off, start the automatic flight by sliding the Start mission - Slide to confirm button. Every flight must be carried out fully in accordance with all Checklists (page 69-70).

If any values must be adjusted in **Flight view > Options**, even during the mission, these values can be applied. By default, the fields are greyed out. Check in the Editable box to turn on the editing option.

Setting an accurate value for the Tank capacity is mandatory after any change in the amount of liquid in the tank (refill or replacement of the tank) to ensure smart tank refill route calculation and for the correct execution of the Tank is empty action defined under Settings>Safety.

On the mission route, a green petrol tank icon will inform you about the calculated tank emptying point.



The automatic flight, and every other flight mode can be interrupted at any time by changing the flight mode, e.g. by pressing **Button A** (Manual (Loiter) mode - the drone will hover in position) or **Button B** (RTL – Return to launch) mode, the drone will fly back to the take-off position, so that settings can be modified, or the battery can be replaced.

After an interruption of automatic flight, the drone will offer you the Continue Mission option. By sliding the slider, the automatic route will continue from the point of interruption.

Irregular operational conditions

In case of any abnormal behavior of the drone during automatic flight, immediate switching to Manual (Loiter) (A button) or if enabled AltHold (C button) mode is required by the pilot to take full manual control and to ensure the safe flight and landing of the drone.

During intensive deceleration and sharp turns, the LiDAR measurement point geometry varies as the drone's horizontal angle changes widely. This can cause the drone to descend. Please operate the drone smoothly when flying at low altitudes and fly above 2m.

If any flight system errors occur during the flight, the controller shows a pop-up message with information about abnormalities. If any of these happen, the pilot must take back manual control, switch back to Manual (Loiter) flight mode, and safely land the drone.

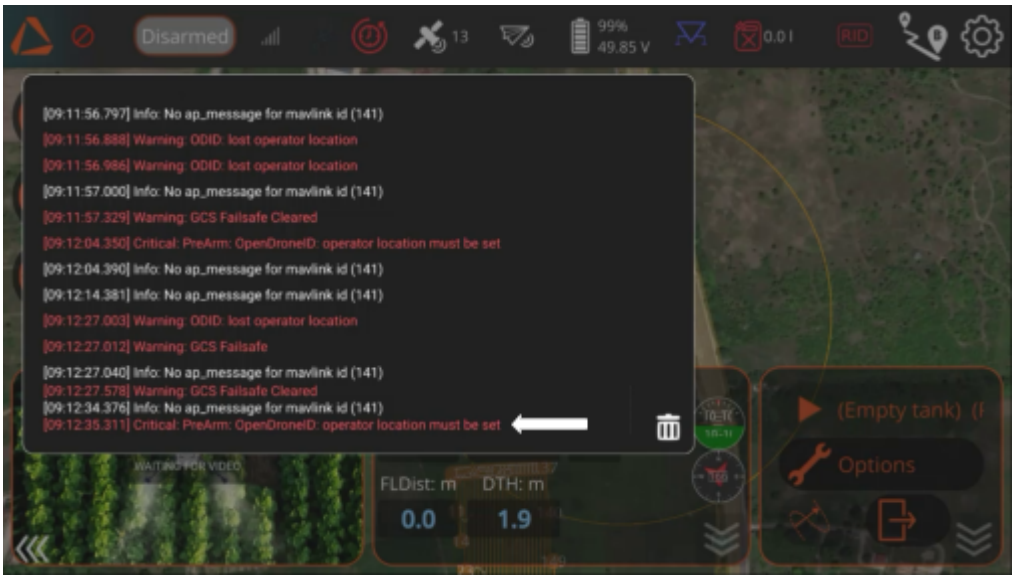
If the GPS system fails during flight, the „GPS glitch" pop-up message will be shown on the screen, the pilot must switch back to AltHold flight mode and safely land the drone.

In emergency situations, the pilot must operate the drone manually in the safest available manner, specifically taking care of personal and property security. The pilot must fly the drone away from potential risks, applying careful, slow stick inputs and flight speeds, find a safe area, and land the drone with a slow descent rate.

In case of a „Potential thrust loss" message, the pilot must land the drone as soon as possible, operating it with slow and smooth motion.

Error in Remote Identification System

The drone continuously monitors the Remote ID functionality from takeoff to shutdown and provides a notification of any malfunction or failure in the top bar of the ABZ Control application. If the Remote ID system detects an error during flight, the RID icon will turn red, and the drone will provide an error message stating that the Open Drone ID has encountered a problem (e.g., not receiving a location message).



If the Remote ID system experiences an error during operation, the unmanned aircraft is no longer broadcasting the message elements of the standard Remote ID. The pilot must, in accordance with 14 CFR Part 89 (Minimum Performance Requirements for Standard Remote Identification of Unmanned Aircraft)[4], land the unmanned aircraft as soon as practicable.

Declaring an Emergency

In the Remote ID interface, the pilot can click on the **Declare Emergency** button. To declare an emergency, you need to **press and hold the button for 3 seconds.** This function may be employed in situations such as loss of control, potential threats to persons or property, or in other emergency scenarios, at the pilot's discretion.

[4], in accordance with 14 CFR Part 89 (Minimum Performance Requirements for Standard Remote Identification of Unmanned Aircraft)https://www.ecfr.gov/current/title-14/chapter-I/subchapter-F/part-89

When an emergency is declared, the drone will broadcast the emergency status. To clear the emergency, press and hold the same button (which now displays the text **'Clear Emergency') for 3 seconds.**

Accessories

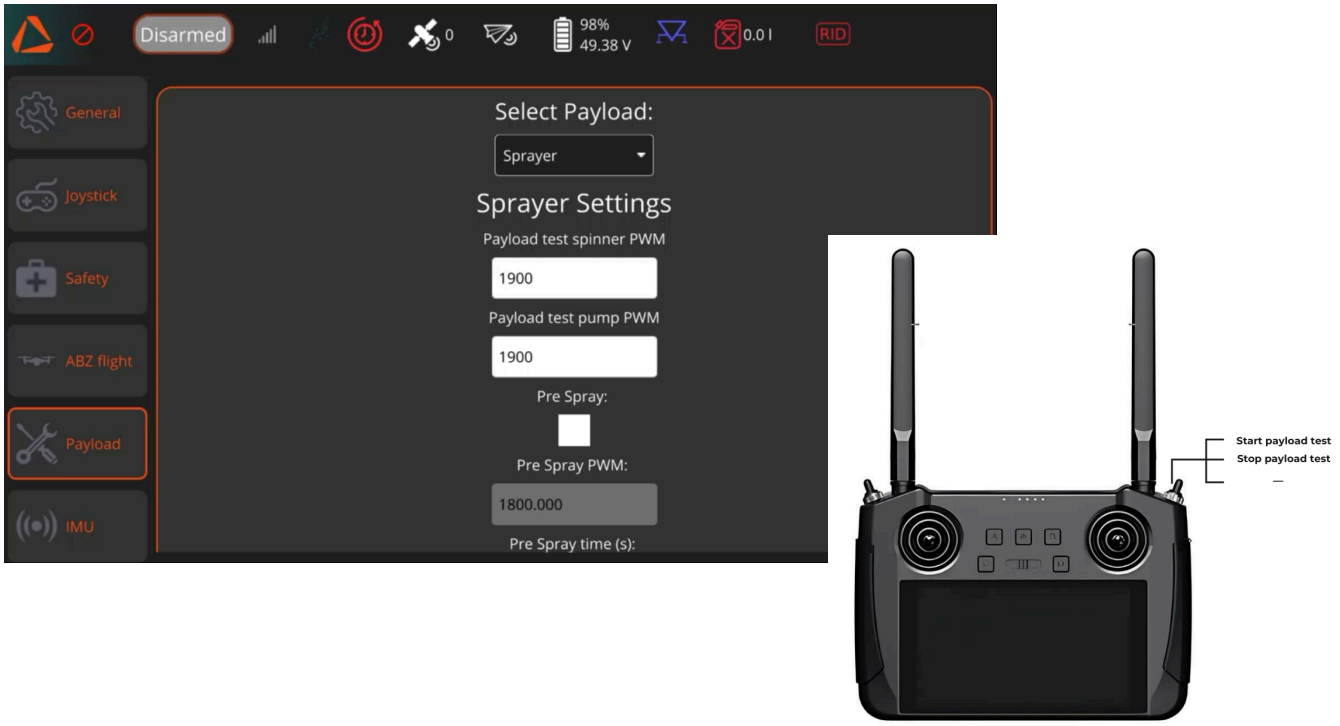
Payloads

ABZ Innovation does not limit the type of payloads to be used with the L30 V2. Any properly and safely mounted and operated payloads are allowed to attach to, and use with the drone.

The operator is solely liable for using only properly secured, correctly connected payloads and accessories, which are approved and compatible for drone use. It is the pilot's responsibility not to exceed the maximum combined accessories and batteries and payload weight, which is 88 lbs, thereby not to exceed the MTOM with the fully equipped drone, which is 154,32 lbs.

The payloads significantly affect the drone's center of mass, especially, when heavy payload is mounted. It is highly recommended to install the payloads as close as possible to the drone's center.

If you have purchased different types of ABZ Innovation payloads (e.g., spreader or Trichogramma) and your drone is equipped with the necessary connectors, you can switch between them in the **Settings > Payloads** menu. The Payload Test switch will activate the selected payload using the test values defined in this menu.



When planning an automatic mission for a specific payload, ensure the payload type is set correctly in the mission panel.

Emlid RTK

The L30 drone comes with the Emlid LoRa system, which can be connected with Emlid RS+ or RS2+ RS3+ base stations for RTK positioning at centimeter precision.

An RTK base station is a high-precision GNSS (Global Navigation Satellite System) device used to provide real-time kinematic (RTK) corrections for enhanced positional accuracy. It works by receiving satellite signals and transmitting correction data to the drone.

Setting up the RS2+ or RS3 base is documented at Emlid's support pages:

- Introduction | Reach RS3
- Introduction | Reach RS2/RS2+

When setting up the RS2+ or RS3 base, use exactly the 868.0MHz and 9.11kb/s values as Base output - LoRa settings.

When the system is set up and working correctly, on the drone's controller the GPS Status shows the following based on the accuracy:

- GPS Lock – RTK float
- GPS Lock – RTK fixed

Batteries and chargers

Battery:

Only use batteries purchased directly from ABZ Innovation distributors! This ensures safe operations, full compatibility, appropriate data connection to the drone. Using 3rd party batteries void the drone's warranty.

General informations about the battery:

- 51,8V nominal voltage
- min. 25000mAh capacity
- 25C discharge value
- 14 Cells
- Integrated Smart battery management system with automatic storage mode
- To charge the battery in storage mode, turn it on with one short press and then one long press of the power button.

Charger:

Only use the original ABZ Smart Charger 3000! This ensures safe charge, full compatibility, appropriate data connection to the batteries. Using 3rd party chargers void the batteries' warranty.

- Power output: max. 60A/3000W
- Power Input: 16A/110-230V
- Capable of multiple charges at the same time
- Slow, Normal, Fast charge speed options
- Storage mode option
- On the field use two chargers, simultaneously charging one battery each.

For continuous drone operation, use a set of four batteries. You can charge two batteries simultaneously while operating the drone with the remaining two (one active and one standby). To ensure long battery life, we highly recommend using balance charging. Also, let the batteries rest after charging before using them.

Flight Protocol

Before flight, tasks and inspections

- Drone battery status (The state of the drone battery should be monitored before the flight using the charging indicator LEDs on the battery. We recommend starting the flight with a minimum of 80% battery charge).
- Visual inspection of the propellers, paying special attention to possible mechanical damage and whether the propellers are properly fastened.
- General inspection: cables, connections, video connection, payload, etc. Payload condition, arms, base structure condition, and whether the bolts are properly tight.
- Determine the flight location.
- The task to be performed is properly analyzed.
- Permits applied for and obtained.
- Tools and accessories needed for the work are prepared.
- The pilot is fit and ready to work.
- Before take-off, tasks and inspections
- Weather conditions are suitable for the task:no lightning, appropriate temperature, visibility, rain, wind speed, etc.
- General visual inspection and condition assessment of the drone.
- Whether the drone is placed on level ground, away from metal surfaces.
- All batteries charged and checked: radio station, drone, video equipment, and accessories.
- The state of the drone battery should be monitored before the flight using the charging indicator LEDs on the battery. We recommend starting the flight with a minimum of 80% battery charge.
- The drone and all its accessories are in clean condition.
- The landing gear and any accessories are securely fastened.
- Unfold the drone’s arms and tighten the fasteners,
- Unfold the propellers symmetrically
- The propellers are clean, undamaged, properly fastened, and positioned.
- The remote controller is switched on and correctly set. The remote controller must ALWAYS be switched on before the drone battery is connected.
- Check the radio, telemetry, and video antennas.
- NEVER leave batteries connected for prolonged periods.
- Before arming the drone, leave enough free space, stand at least 10 m (35 ft) away from it.
- Perform compass calibration if necessary.

- Check the video signal on the display.
- Make sure the device has enough satellite connections, at least 7, or more indicated satellites are needed
- Check that the 'HDOP' value is below 1.1.
- Check that the devices installed are working properly.
- Make sure that liquid level is correct (for the spray tank)
- Make sure that the task you have chosen is the one you want to carry out, is planned, and properly analyzed.
- Whether the take-off zone is sufficiently cleared.
- Arm the drone and take off.

After take-off, tasks

- Stabilize and hold the drone at a height of at least 2m.
- Test the left and right rotation functions, forward/reverse movements, right, left tilting.
- Check that the drone is stable and that there are no abnormal vibrations.
- Check the voltage of the battery.
- Start the mission with the drone
- During mission, tasks
- Regularly check the voltage and charge level of your batteries.
- Check the flight altitude and the maximum allowed distance.
- If the drone or remote controller battery is low, land the drone in a safe place.
- During the flight, the pilot must monitor the battery voltage, which should always be above 51,4 V (Tattu Plus battery)/ 48,5 V (Zhian battery), even when flying with the Maximum Take-off Mass (MTOM).
- Battery voltage below 51,4 V (Tattu Plus battery)/ 48,5 V (Zhian battery):
    - When the battery voltage level drops under 51,4 V (Tattu Plus battery)/ 48,5 V (Zhian battery), start returning and landing the drone.
- Switch off the engines after landing (disarm function)
- End of mission.

After landing, tasks and inspections

- Switch off professional equipment if necessary.
- Switch off the drone by unplugging the battery from the connector.
- Switch off the remote controller.
- Clean the drone thoroughly (batteries, tools, camera, etc.).
- Disassemble, clean, check, and store all professional equipment properly.
- In the flight log, record the flight and any significant events. Accurate completion of this document is mandatory to monitor the operation and lifetime of the drone, and to facilitate properly scheduled servicing (every 300 flight hours).
- Record the nominal voltage remaining in the batteries used. After returning from the field, remove the batteries from the storage box and store them in a cool and well-ventilated place.
- DO NOT STORE batteries overcharged or fully discharged for extended periods of time.

Checklists

Before first take-off

- General structural, mechanical inspection
- Inspection of propellers one by one, even if there is only minor damage, takeoff is prohibited.
- Tightness of the drone arms' fasteners
- Propellers in an unfolded state
- Switch on the remote controller, and launch the ABZ Control app.
- When ABZ Control is waiting for the connection, turn on the drone by turning on the battery with a short and then a long push.
- If you are operating the drone in a country where the remote identification of drones is mandatory, verify in an appropriate application that the Dronetag DRI is correctly broadcasting your Remote ID (see on page 12).

Before every take-off

- Drone battery charge level. The state of the drone battery should be monitored before the flight using the charging indicator LEDs on the battery. We recommend starting the flight with a minimum of 80% battery charge.
- Remote controller battery charge level
- When ABZ Control is waiting for the connection, turn on the drone by connecting the battery
- (the plug must be fully plugged in).
- Check the connection between the remote controller and the drone.
- Verifying Telemetry live data (e.g. LiDAR, power consumption) (in case of failure, ABZ Control must be restarted).
- Whether the drone is in Manual (Loiter) mode (if not, press button A to switch).
- You are at a safe distance (at least 10 m / 35 ft) from the drone.
- Switch to "Armed" mode by pushing the left control stick to the down-right position, until
- „Armed" is shown on the display, then releases the stick.
- After arming the drone, wait about 4 seconds for the motors to reach full speed before take-off.
- Take off to a safe height (at least 3 m/9,85 ft).

After take-off

- Compass adjustment by a single 360° rotation around the vertical axis of the drone
- Check the stability and motion of the drone.
- Check the battery status and voltage frequently during flight.
- If the drone or remote controller battery is low, land the drone in a safe place.
- During the flight, the pilot must monitor the battery voltage, which should always be above 51,4 V (Tattu Plus battery)/ 48,5 V (Zhian battery), even when flying with the Maximum Take-off Mass (MTOM). When the battery voltage level drops under 51,4 V (Tattu Plus battery)/ 48,5 V (Zhian battery), start returning and landing the drone.
- Land the drone carefully and at a safe descent speed.

After landing

- Switch to „Disarmed” mode by pushing the left control stick to the down position, until
- „Disarmed” is shown on the display and the motors are completely stopped.
- At the end of the flight, first switch off the drone and then the remote controller.

Troubleshooting

If any malfunction is experienced, contact an ABZ Innovation service center for further instructions. No repair attempts are allowed by the pilot or operator.

abzinnovation.com/authorized_services/

Replacement parts

Only original replacement parts are qualified, directly from ABZ Innovation.

There are no life-limited parts of the drone, however propellers and motors must be inspected frequently and in case of abnormalities, replacement is needed.

Other than replacing the propellers and the battery, every repair or replacement should be carried out only at an official ABZ Innovation distributor's service center by a trained and qualified technician. Never repair any parts of the drone while it is powered on.

List of spare parts and part numbers:

- Battery:
- Propeller CW:
- Propeller CCW:

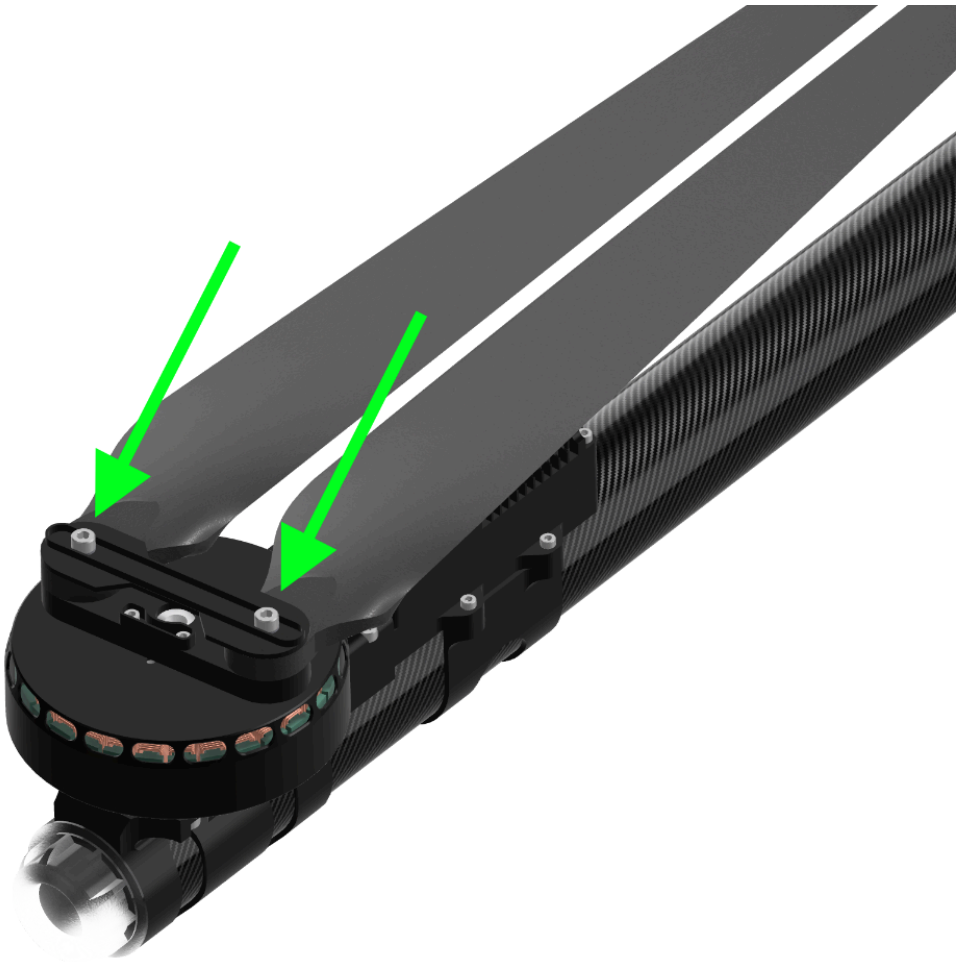
Replacing the propellers

Tools for replacement:

- HEX 45key
- Threadlocking fluid (e.g. Loctite 243)
- Original ABZ Innovation L30 V2 propellers

Carefully check the motor and propeller rotational direction. On the motors it is indicated with arrows, on the propellers „CW” or „CCW” are indicated.

Unscrew the two 5mm HEX screws, disassemble the fixing cap of the propellers, remove the propeller’s upper washers, remove the propellers and install new propellers, reinstall the upper washer and fixing cap. Clean the 5mm HEX screws from threadlocking residues and apply new threadlocking material (according to the manufacturer’s instruction). Tighten the screws until the propellers have zero axial and radial play, but still easy to fold and unfold them.



Obtain disposal information directly from local ABZ Innovation Distributors or Resellers. Always follow local regulations regarding disposal and recycling. If a part has ended life cycle or faulty/broken, it must be ensured not to be allowed to use again, which can be carried out by an ABZ Innovation Distributor or Reseller

CDA valve cleaning

The membrane of the valve might become clogged with particles. The membrane is located inside the pipe.

To clean the membrane:

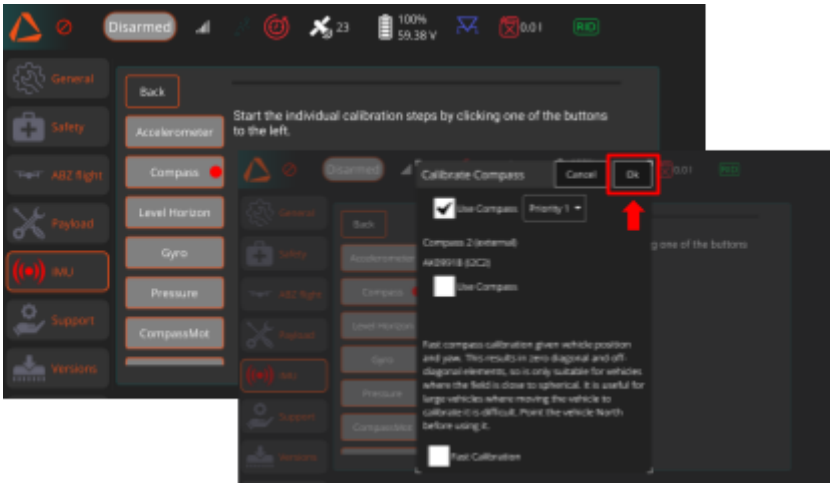
1. Open the valve using the gear wheel.

2. Remove it using pliers and wipe it thoroughly.

3. Reinsert it with the rimmed side facing inwards and aligned with the rim of the inner tube.

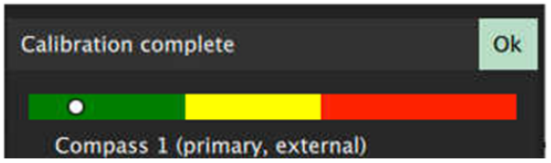
Compass calibration

Compass calibration can be performed under **Settings > IMU > Compass.**



The calibration should only be performed if requested by the software or instructed by the Support Center. Do NOT use Fast calibration!

- The drone must be turned on, in „Disarmed” state.
- Remove any metal (e.g. keys, coins) and electronic object from your pockets.
- The calibration sequence is initiated by pressing the "OK" button.
- Hold and Rotate the drone by hand 360° around all axes, and in both rotational directions
- Until the status bar is complete (usually a 1-2 minute operation).
- The result of the calibration is shown by the calibration quality feedback:



  - Green: good quality calibration -> Only green means successful calibration!
  - Yellow: medium quality calibration, consider recalibrating
  - Red: not acceptable; please recalibrate

After the calibration is complete, do NOT press the Restart button on the interface. Instead, click OK. Wait for the green progress bar to finish loading, then restart the drone by powering it off and on using the battery button (short press followed by a long press).

Table of contents

If you have any questions, please contact us: support@abzinnovation.com

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