

# MX400/450 QUADCOPTER USER MANUAL

## Highlights

- **Pure carbon-fiber frame, with foldable arms.**
- **High performance MindPX flight controller with 168MHz floating point processor, super fast and accurate.**
- **Separated power rails for flight controller and peripheral.**
- **Optimized for multiple radio system deployment.**
- **Modularized and flexible payload mounting configurations.**
- **DroneCode compliant sockets.**

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### **Important**

Do NOT fly MX400/450 near any people or animal as it may cause serious damage to human or animal body.

Keep MX400/450 away from any buildings, vehicles, private properties or public facilities.

Pilots need to keep themselves from MX400/450 at a safety distance of at least 15 meters during the flight.

## Physical

	MX400/450
WheelBase	400mm(450mm) diagonal
Weight	1027g (w/o battery)
Propellers	1045, 1147
Flight controller / Processor	MindPX V2.8 / STM32F427
IMU / Redundancy	10 DOF / Dual redundancy
Motor	2312/960KV brushless
ESC	20A BLHeli
GPS	Ublox M8N
Output power rating	2 BEC power rails: 1. 5V@1A 2. 5V@6A
Antenna mounting rack	2
Battery	5200mah / 4S
Flight time	About 20 minutes
Max. Payload weight	1.5Kg

## Quick Installation

MX400/450 quadcopter comes within a ARF(almost-ready-to-fly) package. Users only need few simple assembly before getting ready for fly. All steps you need to go through simply are:

1. Unfold arms
2. Landing legs
3. Antenna (optional)
4. GPS and battery
5. Propellers

### **Unfold arms**

MX400/450 is a foldable quadcopter designed for portability and flexibility. Fig. 1 shows the status of MX400 upon unboxing.

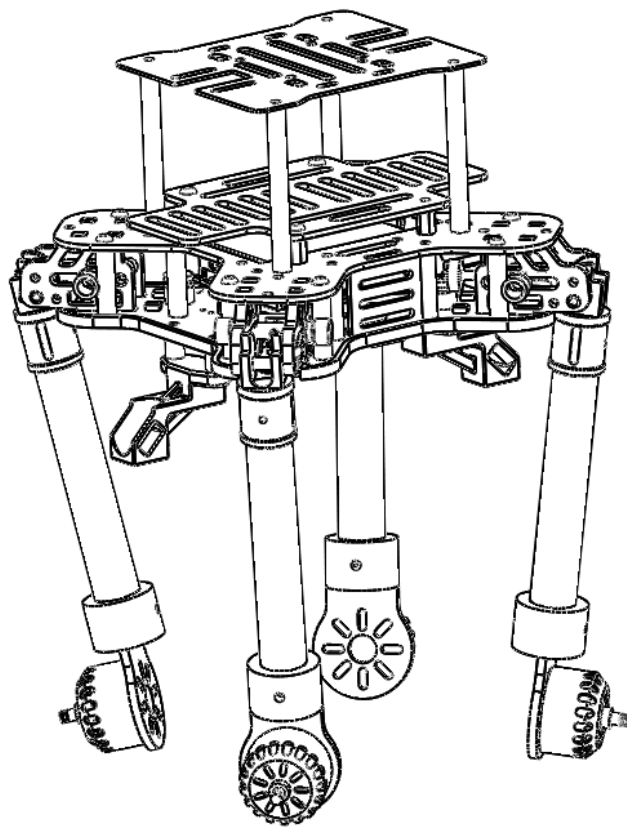


Fig. 1 Folded MX400 frame body upon unboxing

Users can easily unfold the quad as illustrated in Fig. 2. Rotate the arm following the direction in figure until you felt the feedback of arm in position and automatically locked. Do the same with other 3 arms left.

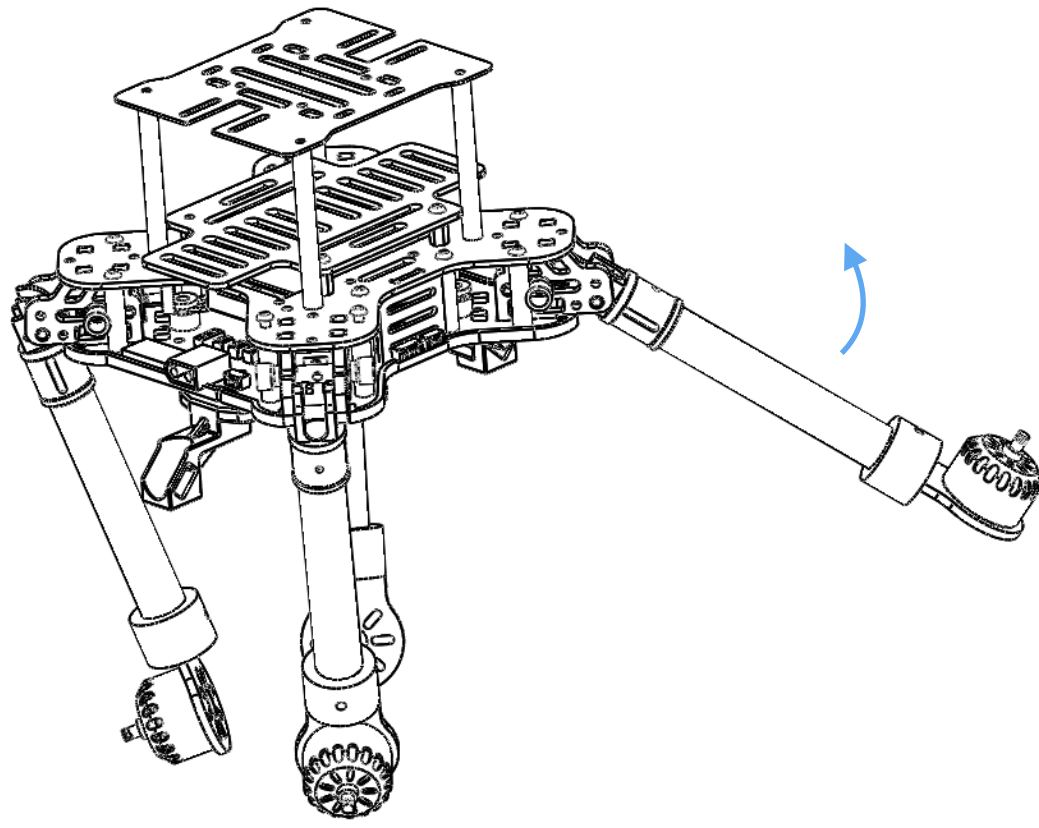


Fig. 2 Unfold arms

On folding, pull the latch back and rotate arm down, as illustrated in Fig. 3.

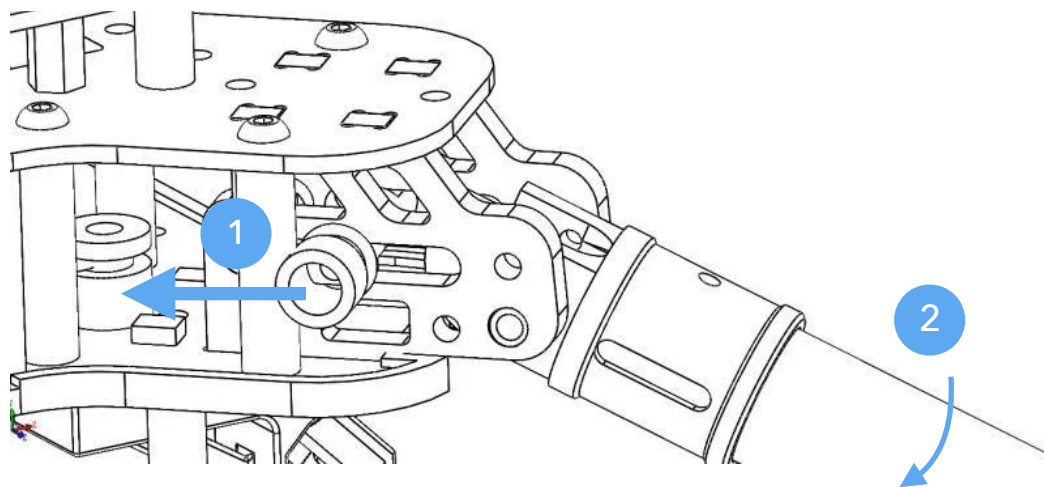


Fig. 3 Fold arms back

## **Landing legs**

Landing legs support the quadcopter standing during landing and taking off. Legs are detached initially from the frame body. Insert the leg into the receptacle in the bottom panel, and install the "T" bar as in Fig. 4. Tightening the screws to lock the position.

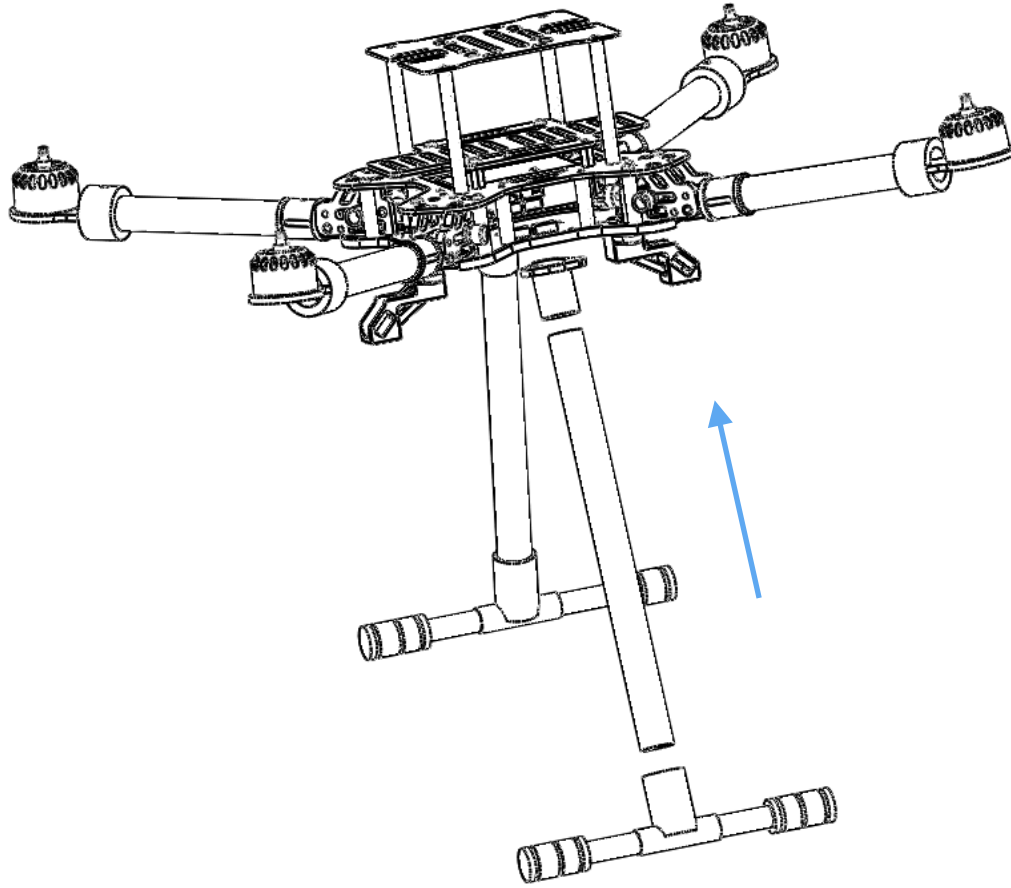


Fig. 4 Assemble leg

## **Antenna (optional)**

**Note** This step is optional if you do not want to use the on-vehicle gust-air radio system.

MX400 is optimized for co-existing of multiple radio systems. Two antenna racks allow mounting of external antennas with different shape and size.

To install, attach the antenna onto the surface of the rack, and tightening it using nylon fastener tape, as shown in figure 5, 6, and 7.

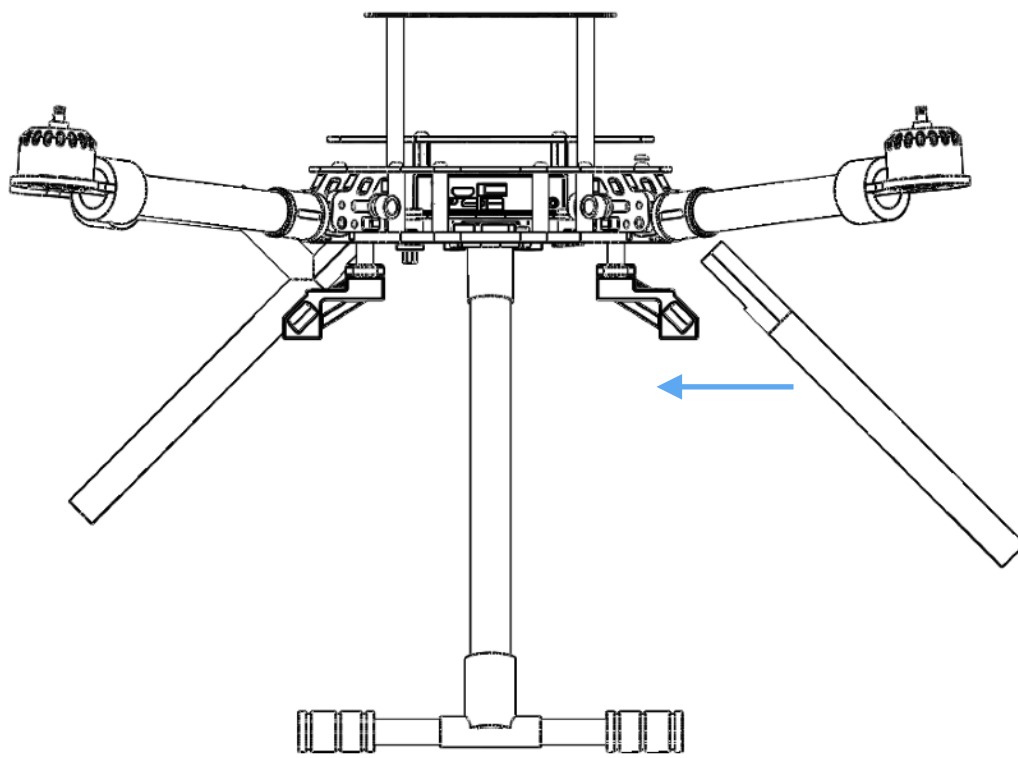


Fig. 5 Install antennas

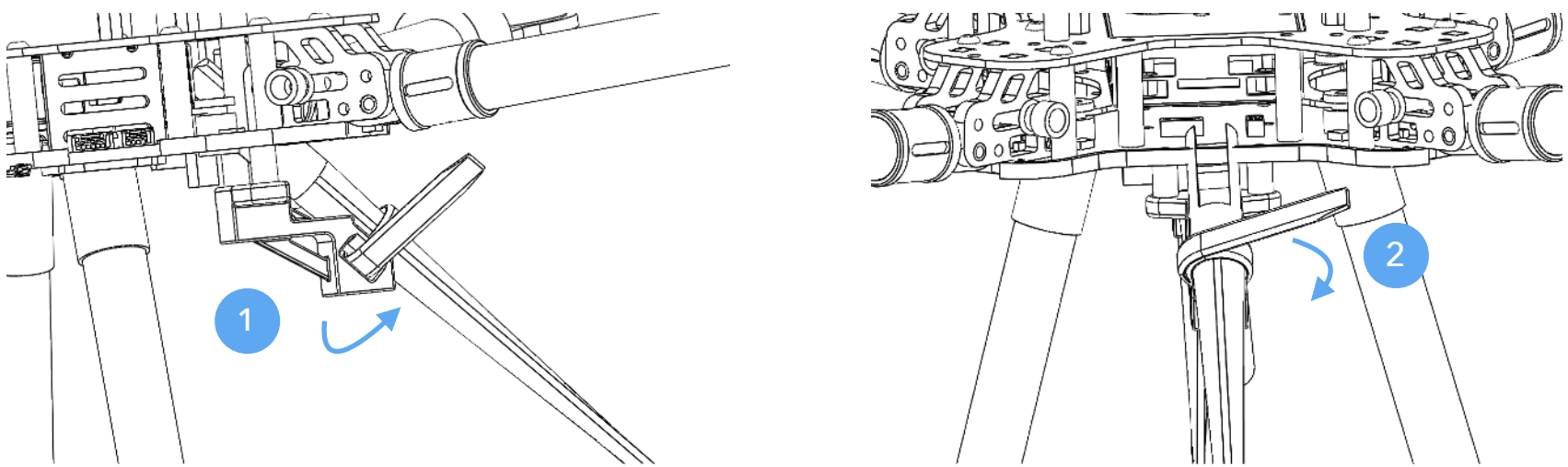
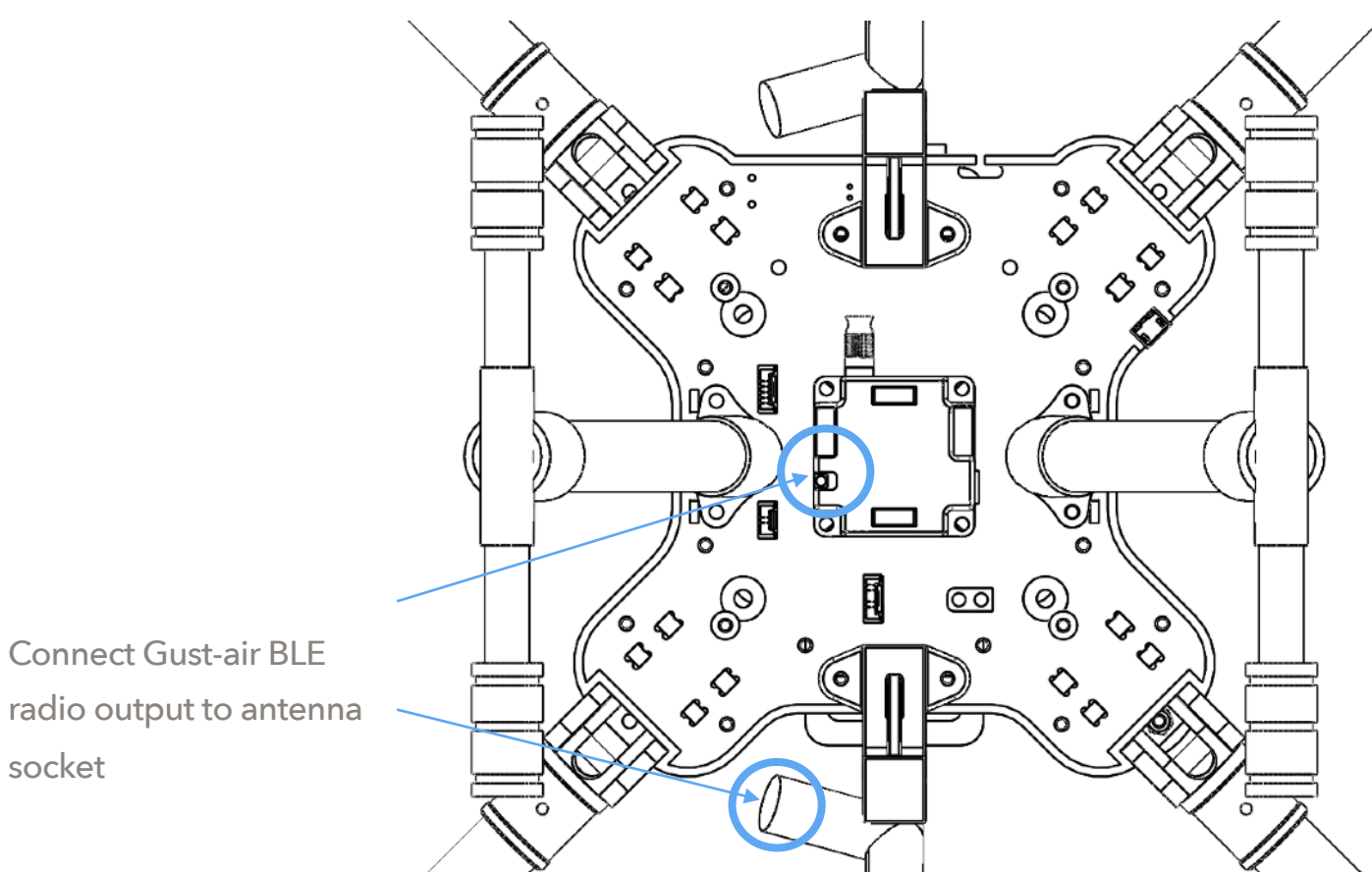


Fig. 6 Fasten antenna



Connect Gust-air BLE  
radio output to antenna  
socket

Fig. 7 Connect gust-air radio with antenna

## GPS/Compass and battery

GPS/compass module needs to be mounted properly to avoid interference from other parts on frame. Fig.8 and 9 shows how the external GPS/compass combo should be mounted. It is important that the direction of external GPS/compass combo MUST align with the head of direction of the frame.

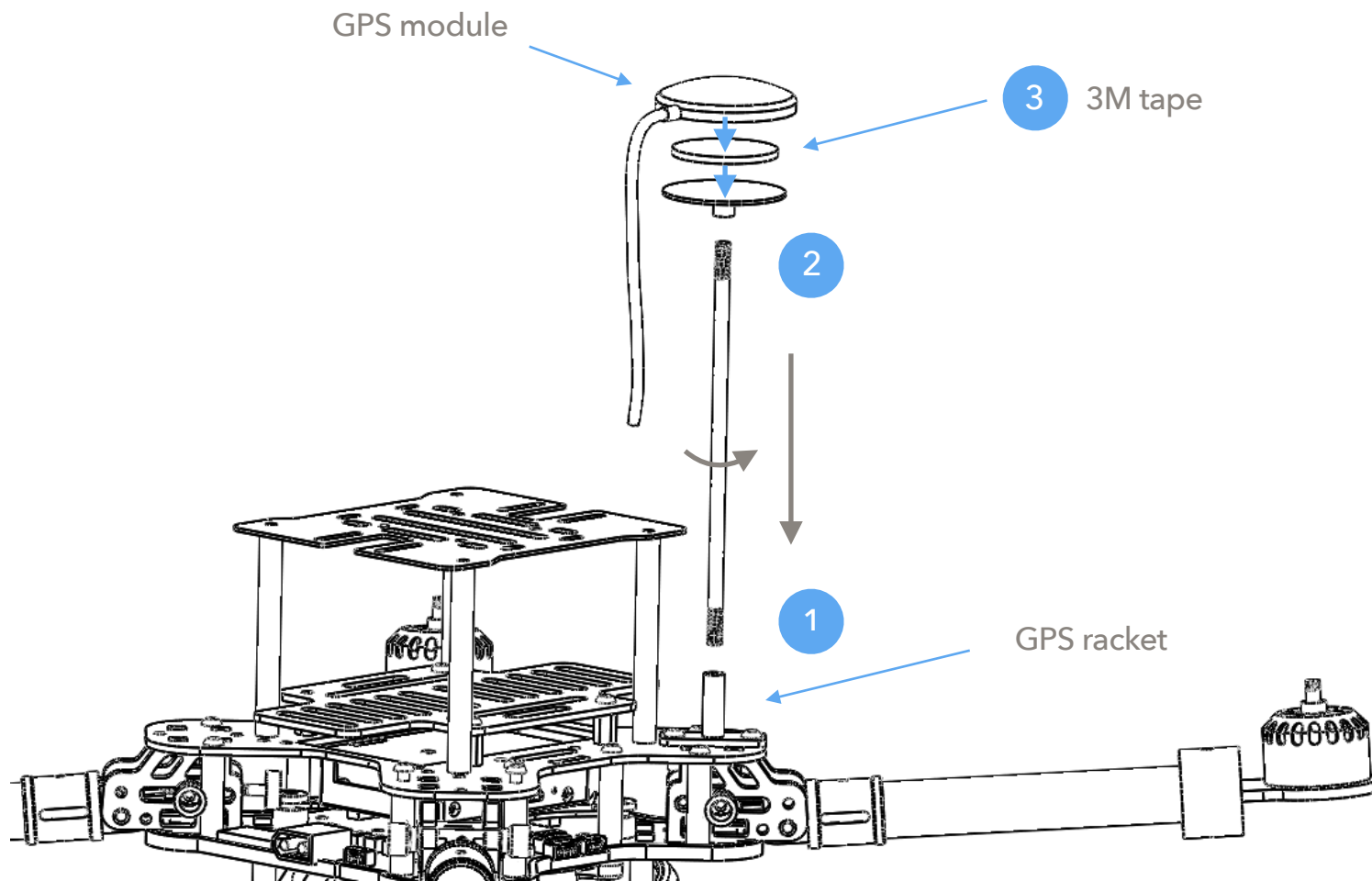


Fig. 8 Mount GPS/Compass

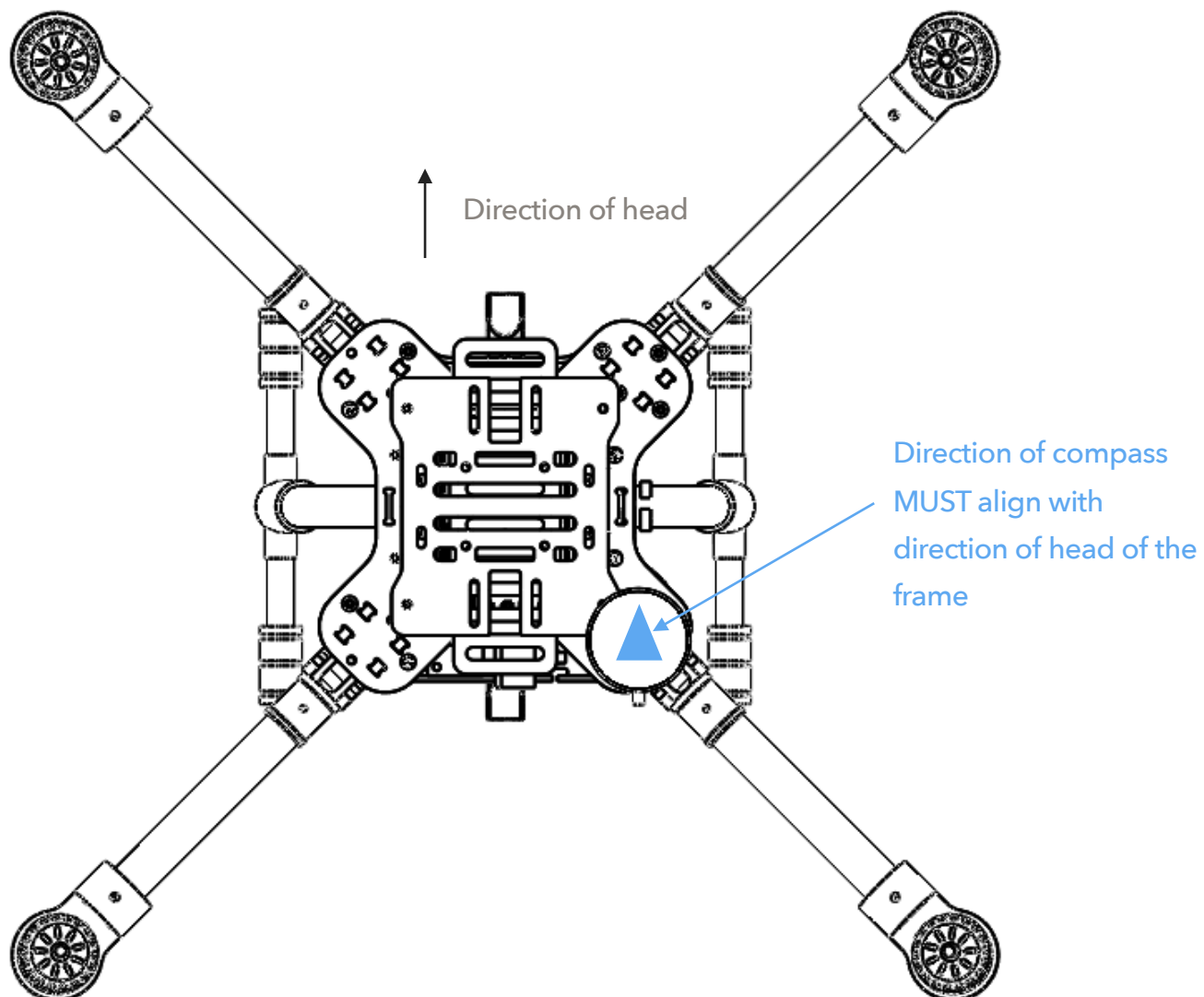


Fig. 9 The direction must be aligned



Finally, connect the external module's cable plug to the sockets on the flight deck.

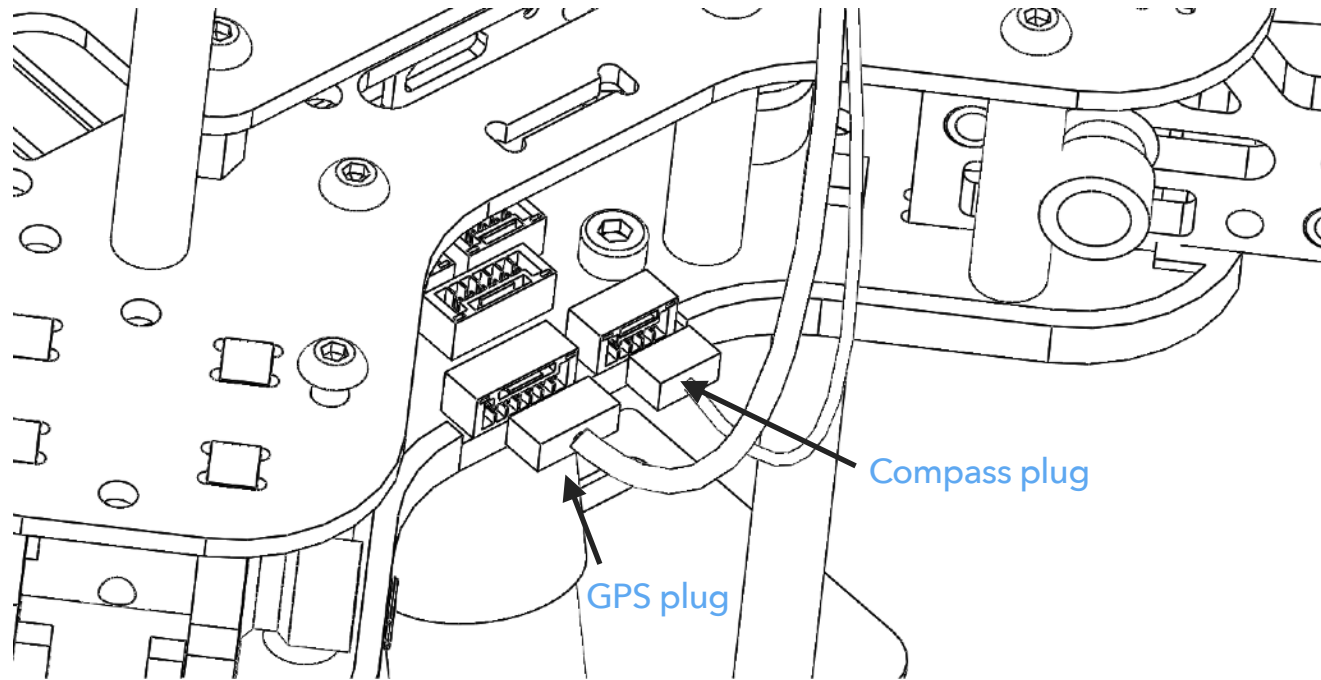


Fig. 10 Connect the sockets

Now it is time to connect the main battery. Insert the battery as shown in Fig. 11, and connect the battery plug to the receptacle on flight deck. Fasten the nylon belt on battery to hold its position.

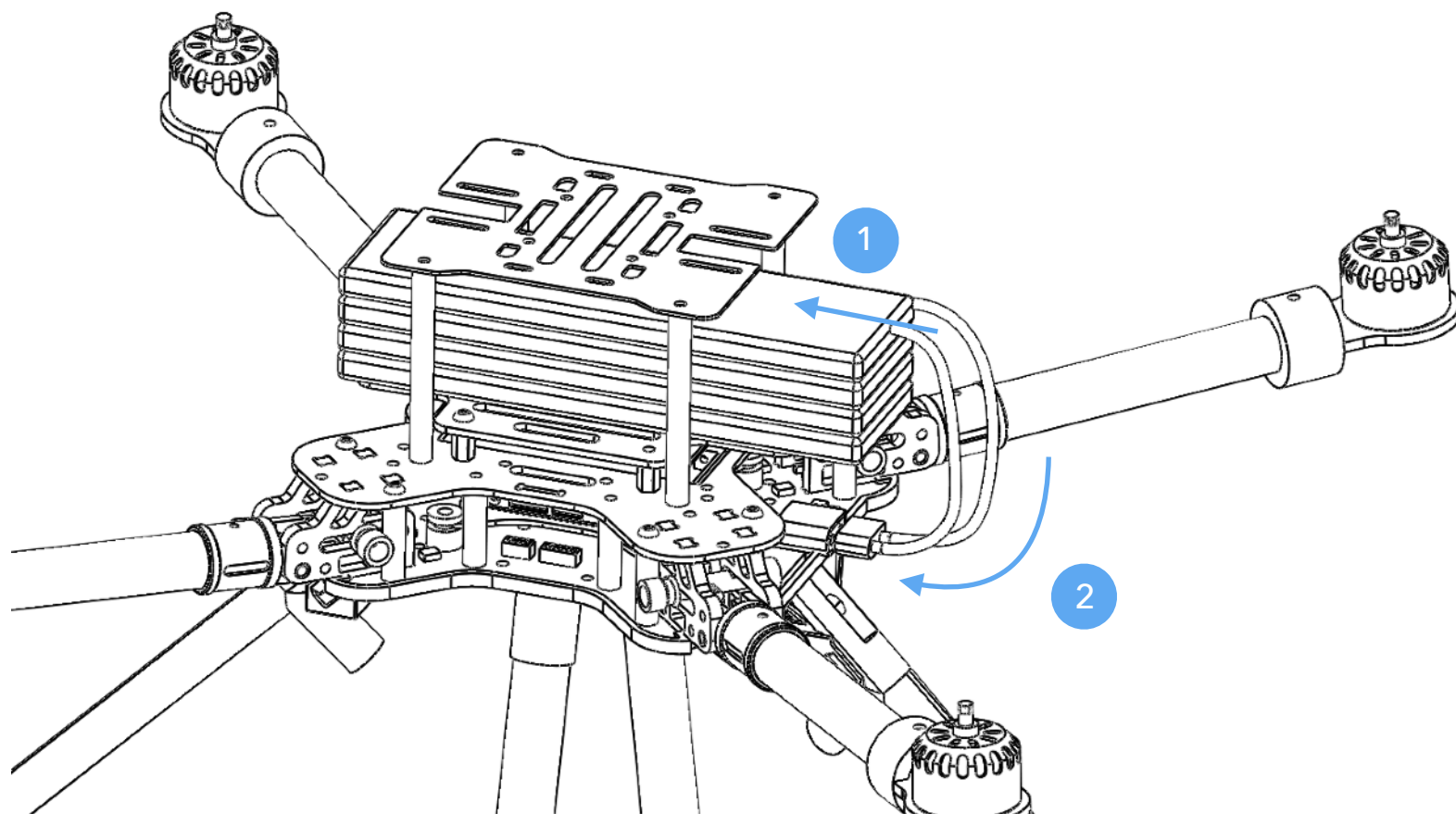


Fig. 11 Connect the main battery

Please note that, the drone's power is controlled by power switch. After connect the battery the drone's power is in OFF status by default. Use power switch to turn it on (see next section).

## Power On/Off

MX400/450's power switch is a LED button to the right side of battery receptacle. By default the button is at OFF status. Short click on the button will turn the power ON, and all parts on MX400/450 will be powered on. Long press on the button for at least **3 seconds** will turn the power OFF again. This will shut down power of all parts on the drone.

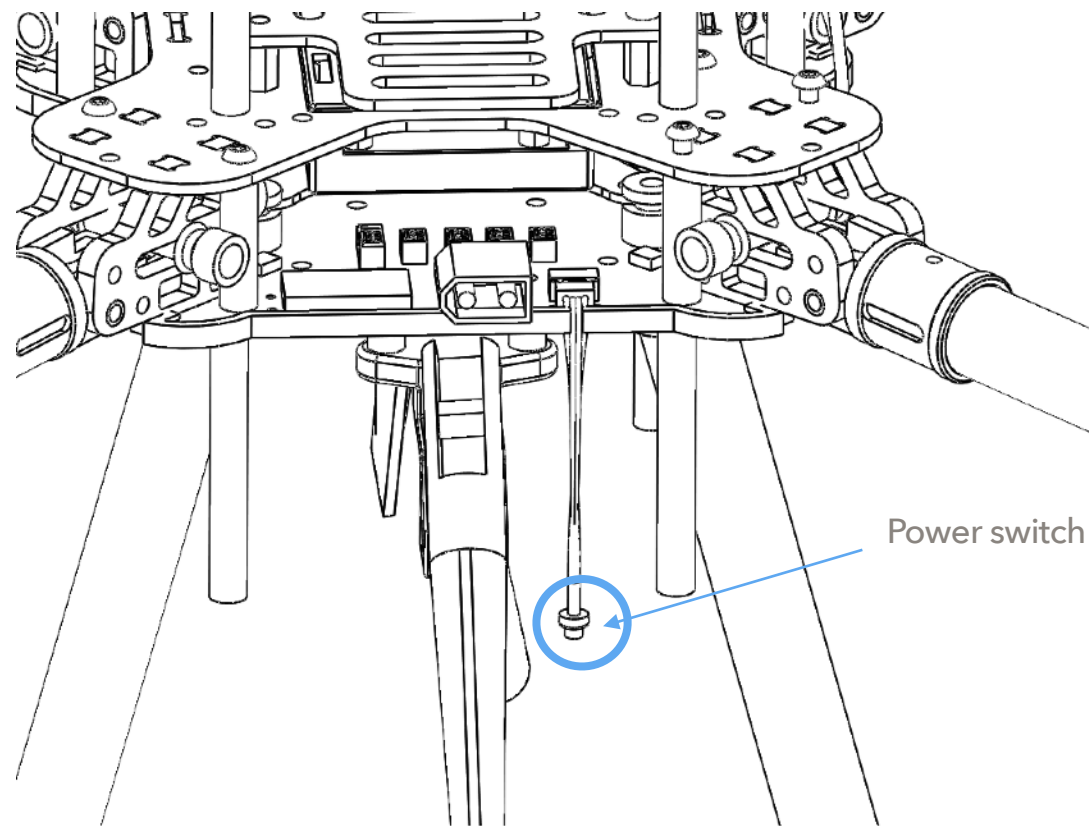


Fig. 12 The power switch

When power is switched on, the motors may beep several times during the process, then wait for the main LED on flight controller to turn into breathing blue, and the drone is now ready for command.

If the drone is not intended to fly for a long period, please also disconnect the battery after power is shut down.

## Propellers

The propellers need to be installed in exact order as in Fig. 13. It is important to notice that installing into wrong position will make the copter overturned and may cause serious harm. The 2 pull propellers should be installed on motor 1 & 2 (clockwise - cw), while the 2 push propellers (marked with 'R') should be installed on motor 3 & 4 (counter clockwise - ccw).

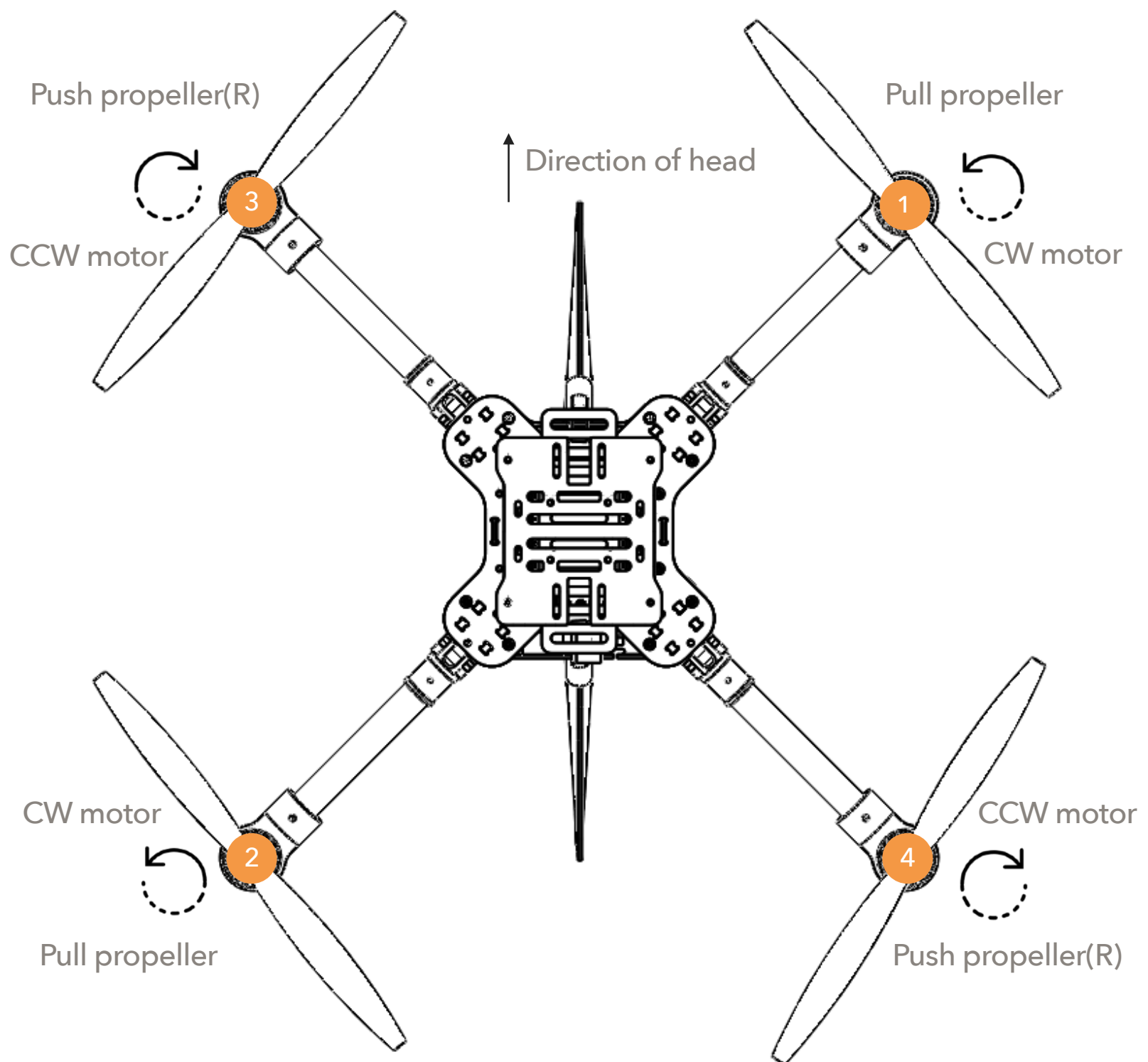


Fig. 13 Install propellers

## RC Pairing

The remote controller needs to be paired with the drone before it can control the drone to fly. Find the tiny pairing button on the left corner of the receiver module on drone's flight deck (to the left side of battery receptacle), as shown in Fig. 14.

Start from the drone's power is off. Hold the pairing button, and turn on the power switch, this will get the receiver into pairing mode. Then turn on the power of the remote controller, enter menu interface and navigate to page #2, scroll down through the menu items and find "bind" button, click on it and the remote controller will start the pairing process with the receiver. When the green LED on receiver goes solid the pairing is done.

The pairing process is a one-time job and the binding will be saved. Next time when you power on the receiver will automatically connected with the remote controller.

**Tips:** One remote controller can be paired with multiple drones.

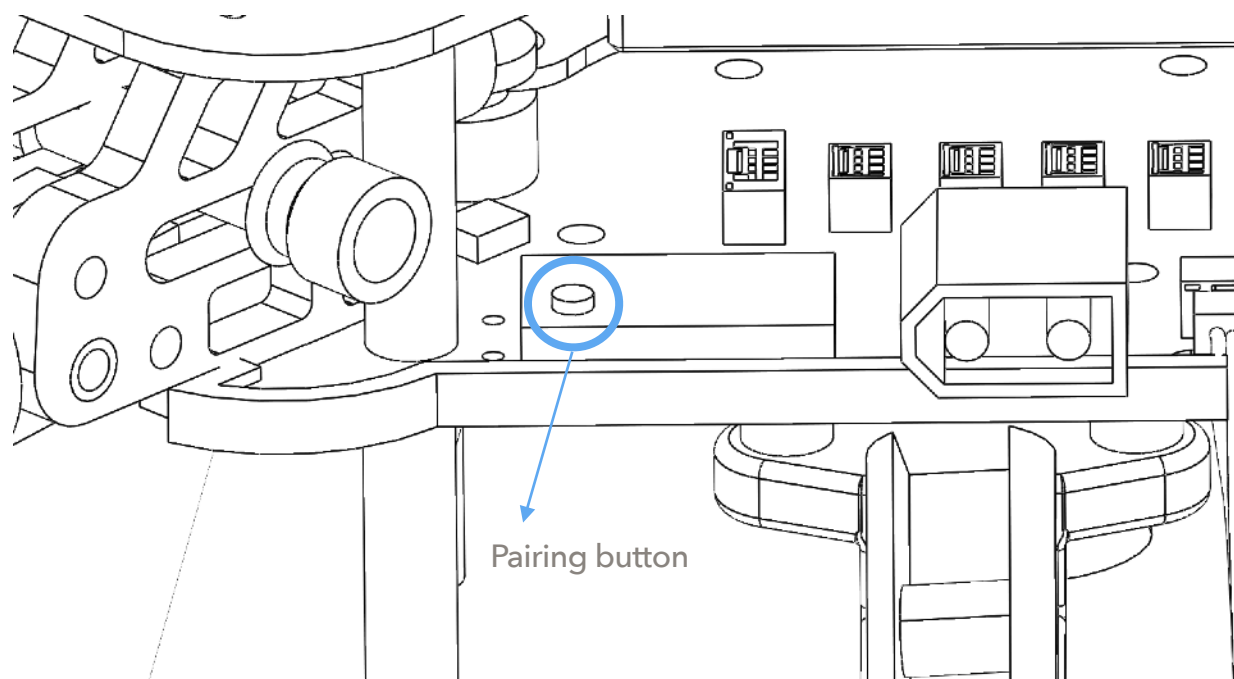


Fig. 14 RC pairing

Before you use the remote controller to command the drone, it needs to be setup properly. Follow instructions in this link to configure the remote controller correctly for MX400/450.

[Taranis Q X7 remote controller setup instructions](#)

## Arm/Disarm

**Warning:** Before arming, please make sure no obstacle can be occluded with drone's spinning propeller.

After the remote controller is powered on and paired, lower the throttle stick to the low-right corner for a few seconds. The propeller will start to spin at a minimum speed. The drone is then in armed state and ready to take off.

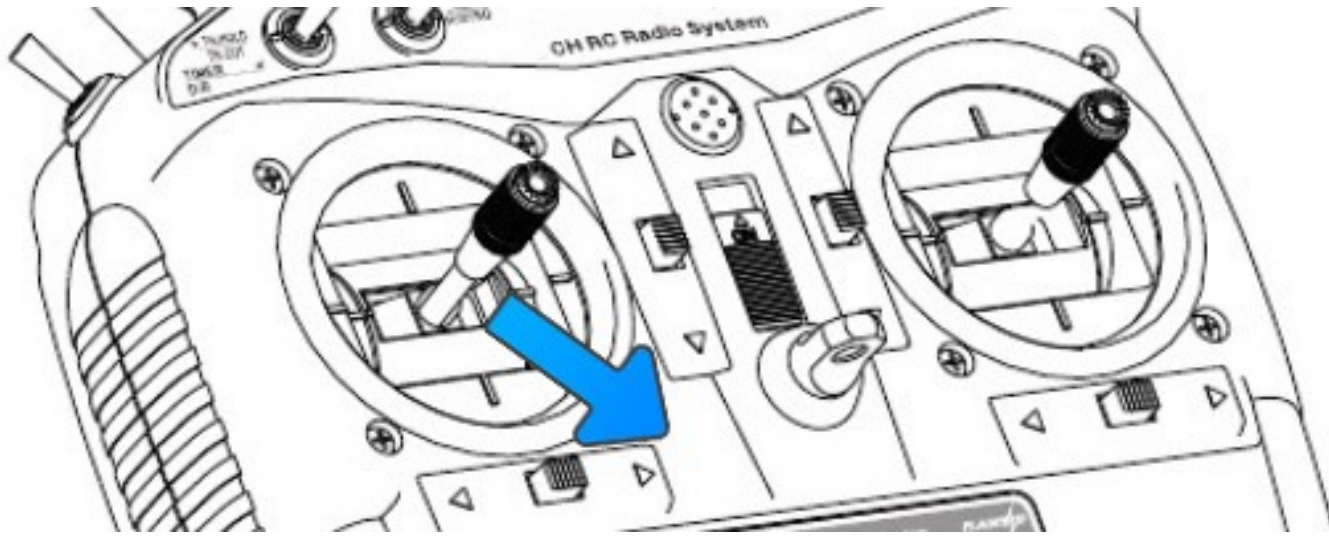


Fig. 15 Arming

To disarm, lower the throttle stick to the low-left corner for a few seconds, the propellers will stop spinning.

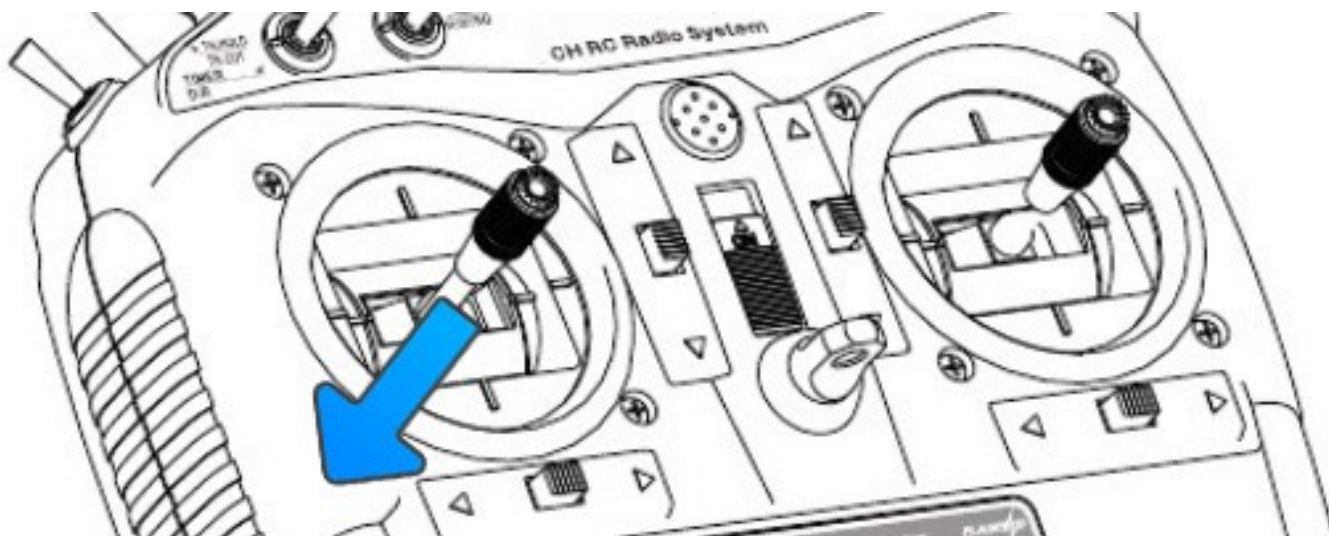


Fig. 16 Disarming

## Select Flight Mode

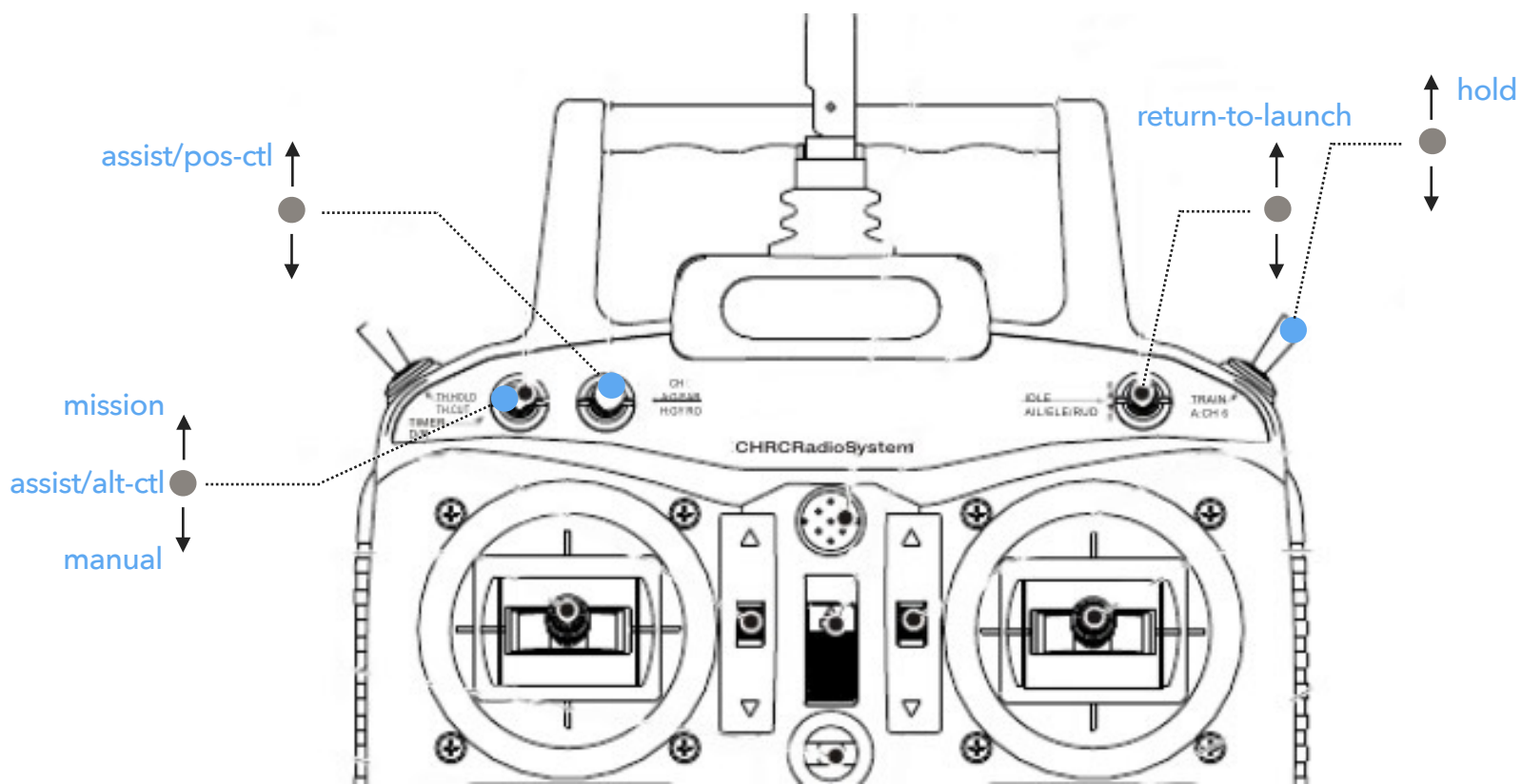


Fig. 17 select flight modes

Flight modes is pre-set on remote controller as in Fig.17. By default 4 flight modes are configurable through remote controller: manual, assist/altitude control, assist/position control, and hold mode.

The modes can be chosen by switches in the remote controller.

For beginners, manual mode is a good start point, as the drone will auto stabilize its attitude during the flight which makes it easier for pilots to control.

### Flight log - Using a SD Card

All flight data can be recorded into the SD card. It is important for reproducing flight course either for training or analysis purpose. So it is recommended that pilot inserts a SD card before taking off.

The SD card must be formatted with FAT32.

### Connect to Ground Station

As a professional drone, MindPX has hundreds of parameters that user can tune. Using MindCentral software from computer is the best way to carefully adjust these parameters.

MindCentral is a free software that supports all major PC OS platforms including Windows, MacOS, Linux, etc. Select the right version for your OS.

There are two methods to connect a MindPX to MindCentral, through Gust radio system, or using an USB cable. For how to connect through Gust radio system, please refer to Gust radio user manual. Here is the introduction of connecting using an USB cable.

Launch MindCentral on your PC. Turn OFF the drone's power. Use a micro-USB cable to connect the 'USB-GCS' port on MX400/450's flight deck (Fig.18) to an USB port on PC.

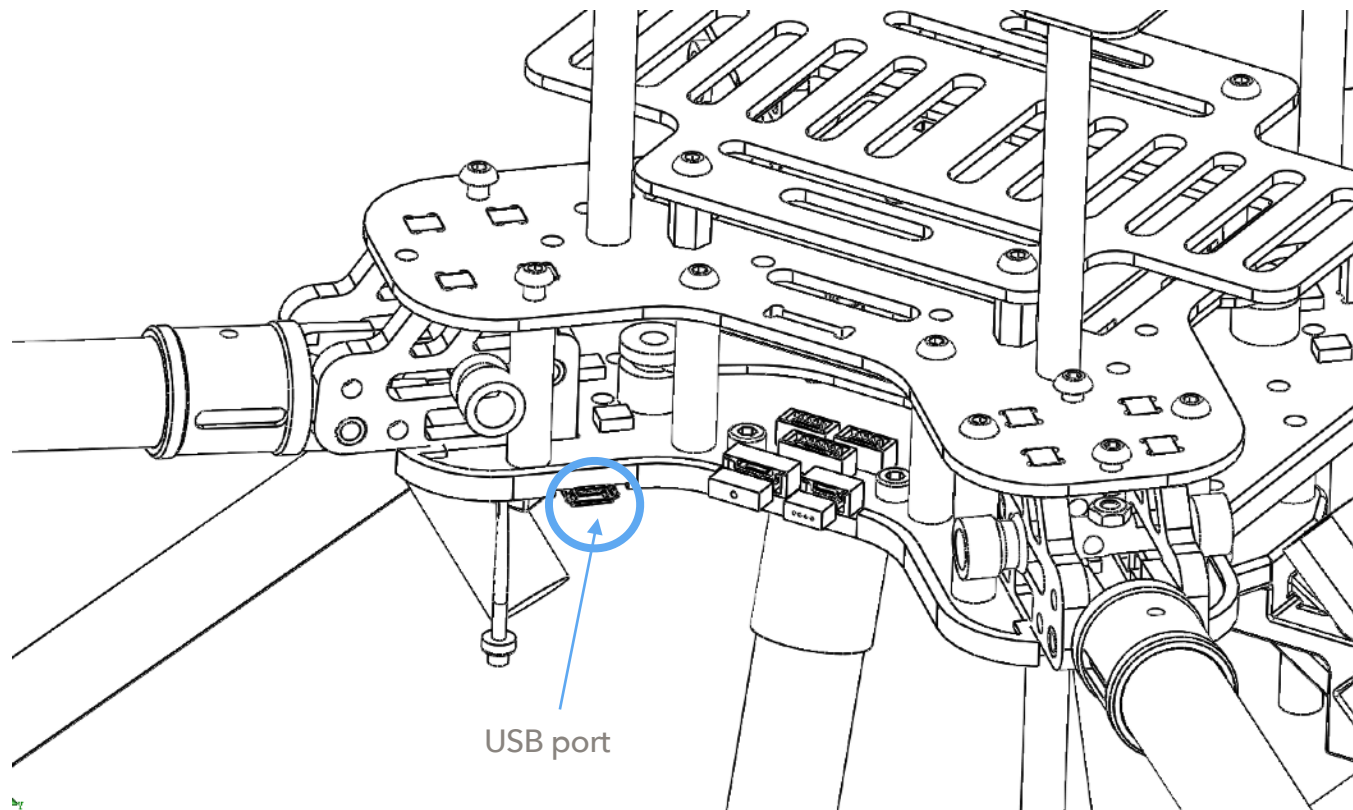


Fig. 18 Connect to ground station

The flight controller should be powered on. Wait for a few seconds until the flight controllers main LED turns in to any stable color.

The MindCentral should auto-connect to the flight controller by now, and update its UI with drone's status information.

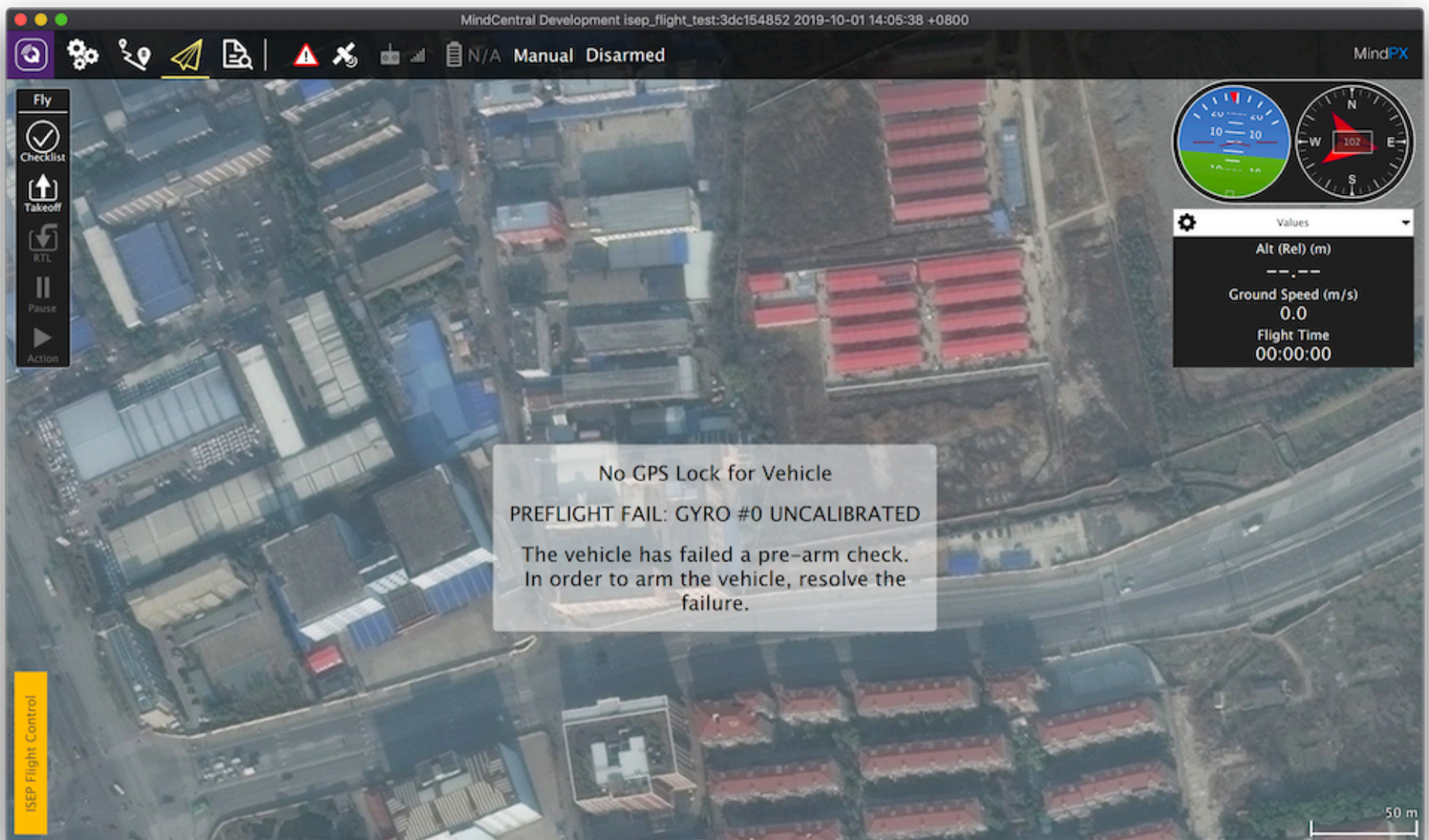


Fig. 19 Launch MindCentral

## Calibrate the drone in GCS

MindPX drone has multiple sensors integrated and needs to be carefully calibrated to achieve a stable flight quality. MindCentral provides intuitive GUI for this process and you can do all calibration processes with the software.

Please refer to [this tutorial](#) on how to calibrate a MindPX drone.

**Note** Every time when pilot adds a new sensor or removes a sensor to the drone, it needs to be calibrated again. For example, if pilot connects the external GPS/compass module to the drone, or disconnects from it, the calibration process needs to be performed again.

### **Verify the calibration**

Before close this procedure, verify if the calibration is done successfully.

Return to the 'flight view', check the attitude and compass gadget on the top right of the UI. The attitude of the drone should now be leveled when drone is still on the ground, and the north of compass should be aligned with the TRUE north of your geo-location.

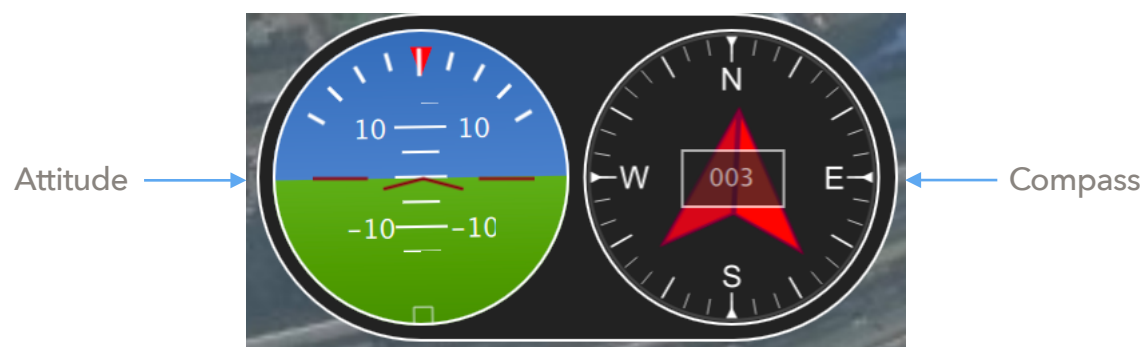


Fig. 20 Verify calibration success

## Preflight checks

To ensure flight safety, it is a highly recommended practice to perform preflight check every time before a flight. Recommended items in preflight check list includes:

- Propeller installation
- battery status
- GPS lock
- Radio signal strength
- RC throttle position
- Failsafe setting
- Audio feedback

You can also add your own preferred items to the list.

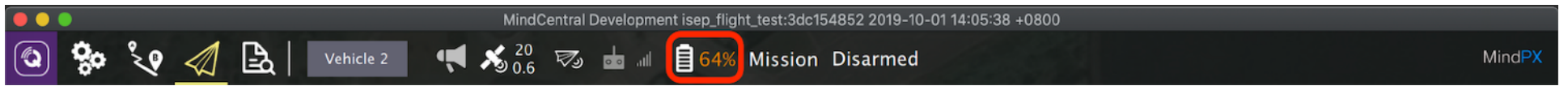
### **Propeller installation**

Check if propellers are installed in correct order. Try to arm the vehicle (but do not takeoff), check if the spinning direction of propellers are correct.



## **Battery status**

To start a new flight, lower than 70% remaining battery is not recommended unless you know exactly what you are doing.

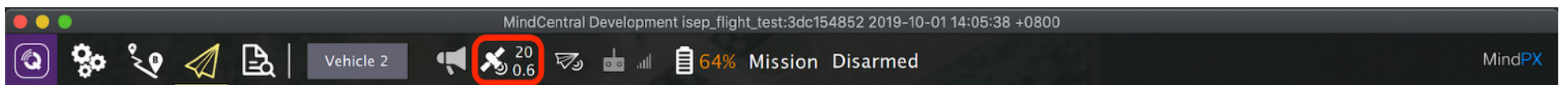


Recharge battery to ensure enough air time of your vehicle.

## **GPS lock**

Drone flight requires high accuracy of GPS coordinates. Upon power on, on-board GPS needs up to few minutes to lock into position with enough accuracy.

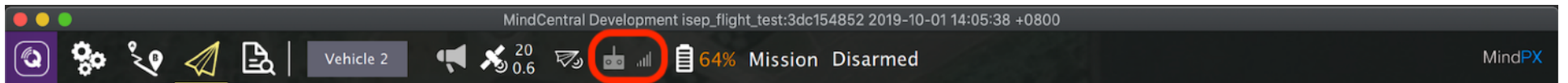
Watch the GPS indicator on MindCentral's top menubar. Wait until HDOP value goes under 1.0.



**Tips** On first GPS synchronization, MindCentral will automatically download the map of your geo-location (need an Internet connection). The map is cached locally, so next time you do not need a network connection to fly.

## **Radio signal strength**

Check the remote controller's signal strength on top menubar.



Check Gust Radio's RSSI in the pop-up menu on the right side (if Gust radio connected). It is not recommended to fly with a RSSI lower than -79dBm.

## **RC throttle position**

When performing a manual flight, RC throttle should be at lowest position before arming.

When performing an autonomous flight, it is recommended to leave remote controller on, and put throttle in central position.

## **Failsafe setting**

Always think ahead. Have a plan for failure before it actually happens. This can save the vehicle in many accidents.

Use failsafe settings to trigger failsafe action when foresee failures happen, as in Fig.21 & 22.

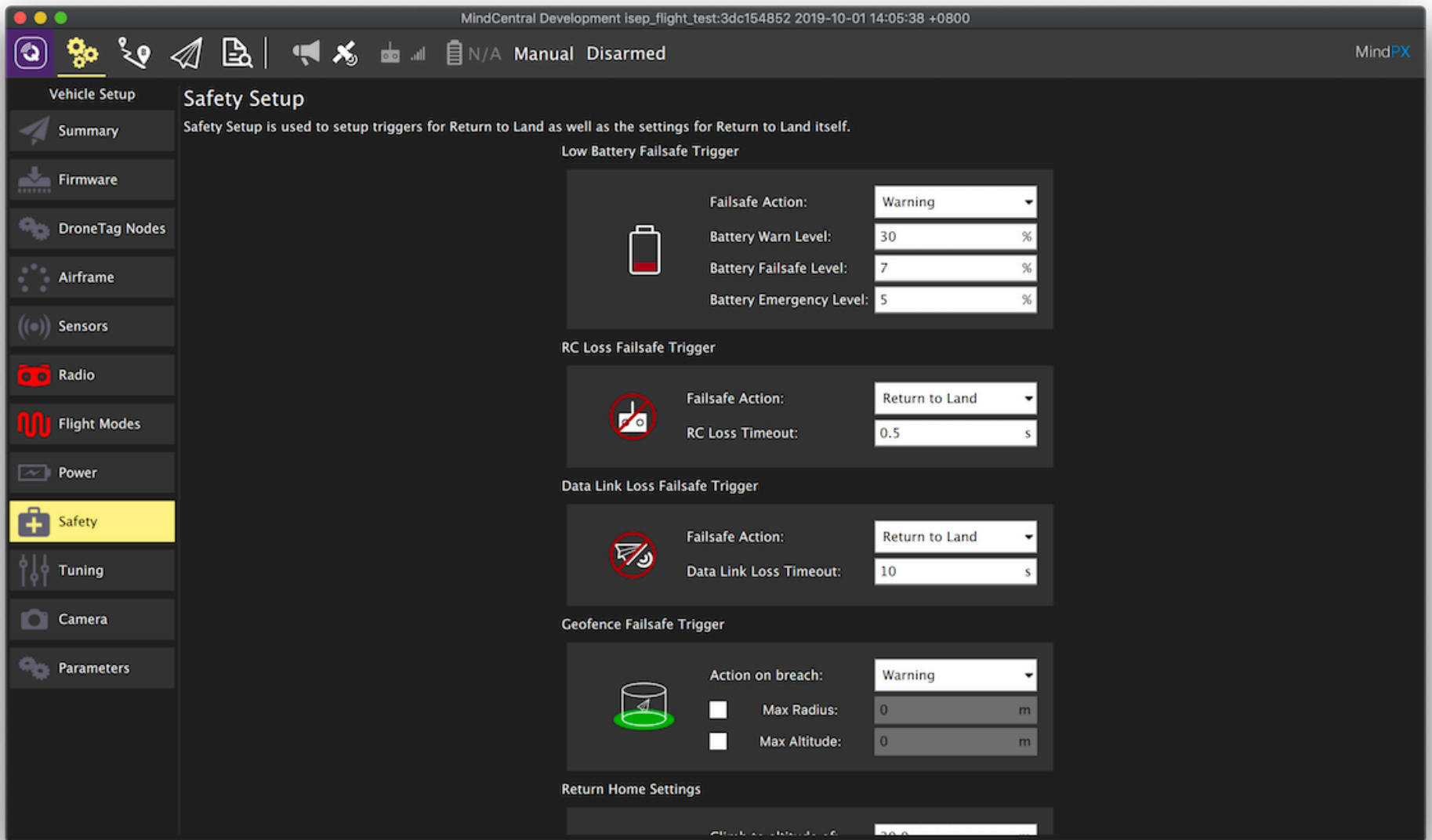


Fig. 21 Safety settings

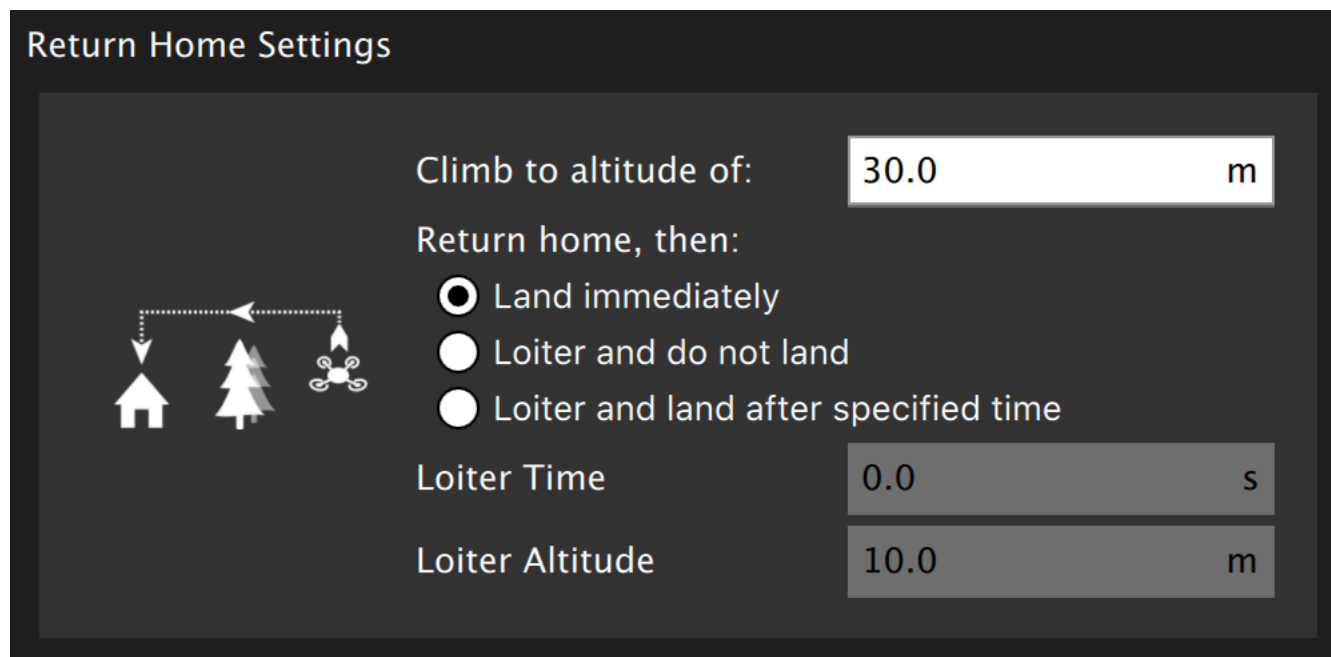


Fig. 22 Return home settings

The exact settings under 'Safety' tab should depend on your specific flight plan and terrain. Fig.21 & 22 is just an example setting. Adjust these settings to best fit into your own flight plan.

### **Audio feedback**

Try to switch flight mode for few times and make sure you can hear voice feedback from MindCentral, as it can alert you when something happens while you were looking into other things.

## Autonomous flight

Autonomous flight requires to use Gust radio as telemetry. After preflight check OK, pilot can command take off from MindCentral UI.

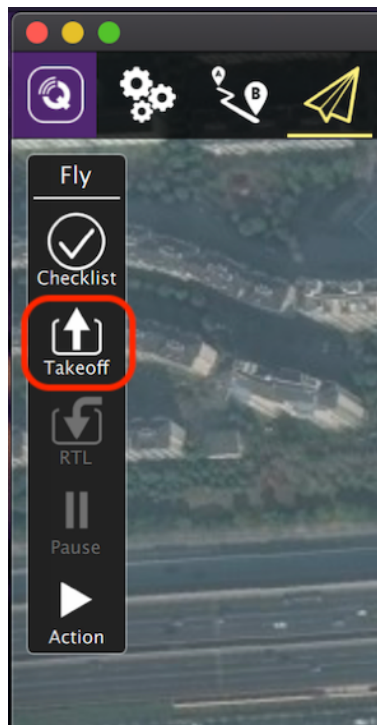


Fig. 23 Take off command from MindCentral

There are 2 major types of autonomous flight, **goto** mode and **mission** mode.

### **Goto mode**

In this mode the drone will hold its position by default after take off, until pilot specifies a spot in map and issue the 'goto' command. The drone will then fly to the exact point pilot designated and hold its position again after arrived, waiting for the next instruction from pilot.

Note pilot needs to specify flight altitude upon take off. Altitude value below 5 meters is not recommended.

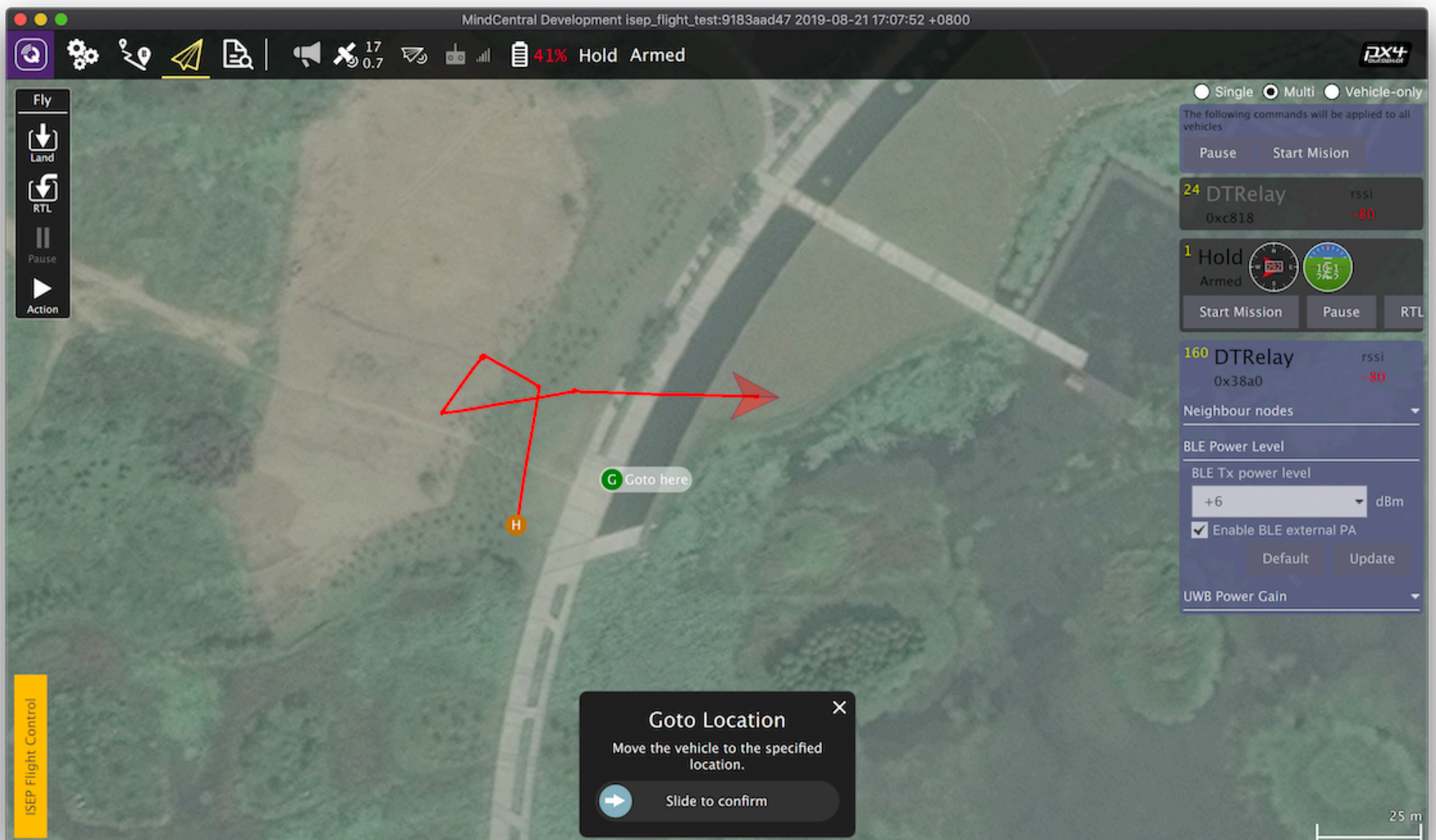


Fig. 24 Fly in goto mode

**Warning** The drone flies constant altitude by default. Check if any obstacles standing in the way of your selected path, and adjust altitude value before issue the command, or the drone may crash into it.

## **Mission mode**

In this mode the drone will flight a preset route after take off. The route is planned by pilot in advance in MindCentral, and upload to MindPX.

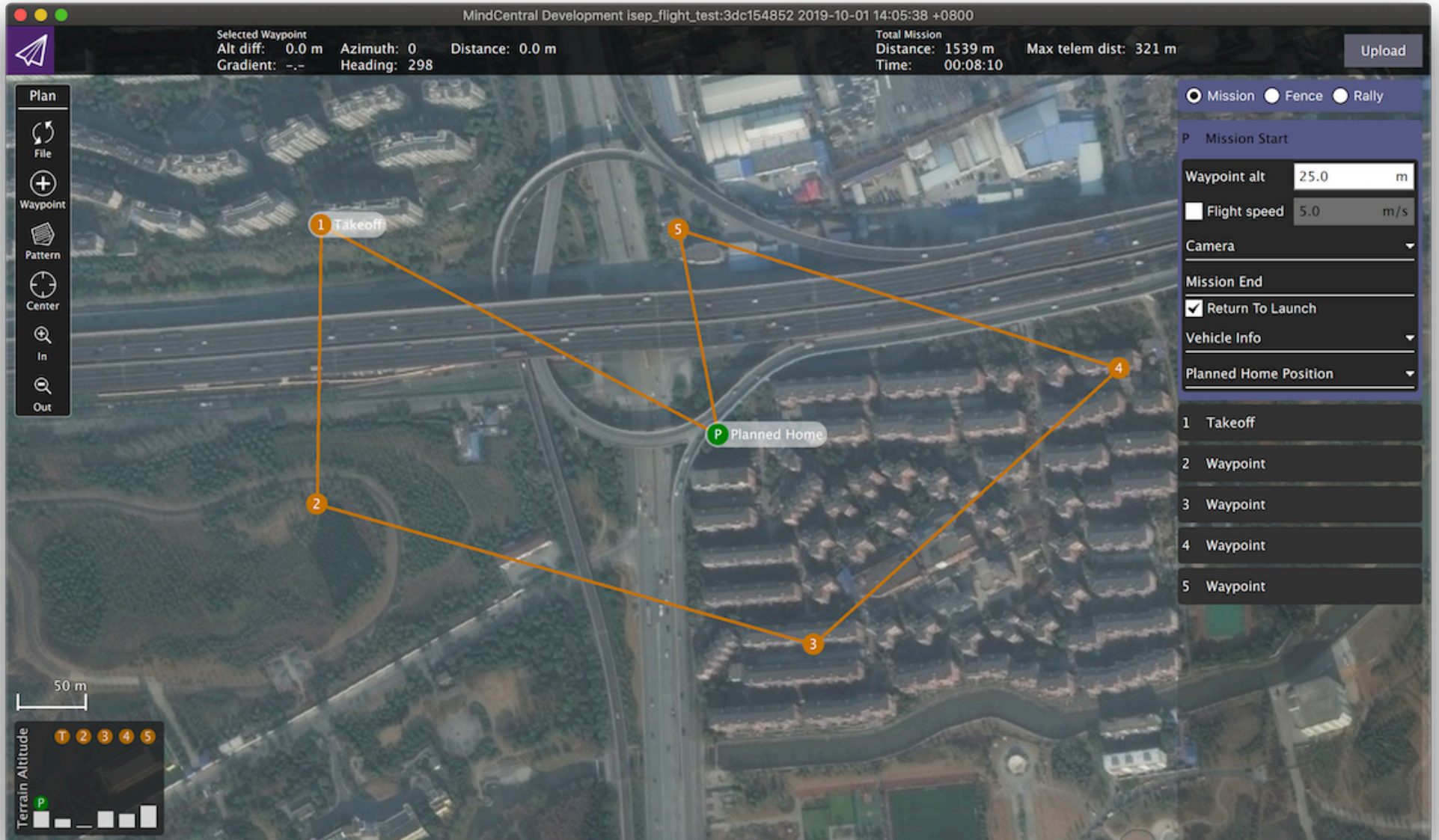


Fig. 25 Mission editor

**Warning** The drone flies constant altitude by default. Check if any obstacles standing in the way of your planned path and adjust waypoint altitude values accordingly, or the drone may crash into it.

## MX400/450/MindPX Firmware Upgrade

**Warning** Upgrade firmware will change the function and behavior of your vehicle/parts. Make sure you know what you are doing before performing this operation.

MX400/450 can do online firmware upgrade using MindCentral.

Your computer running MindCentral needs to have an internet connection.

Disconnect MX400/450 or other devices if still connected with MindCentral.

Launch MindCentral and select Set up view. Tap on the 'Firmware' tab. Then Use a micro-USB cable to connect MX400/450's USB-GCS port to computer running MindCentral. Wait for a few seconds and a pop up menu will show up on the right side of screen (Fig. 26).

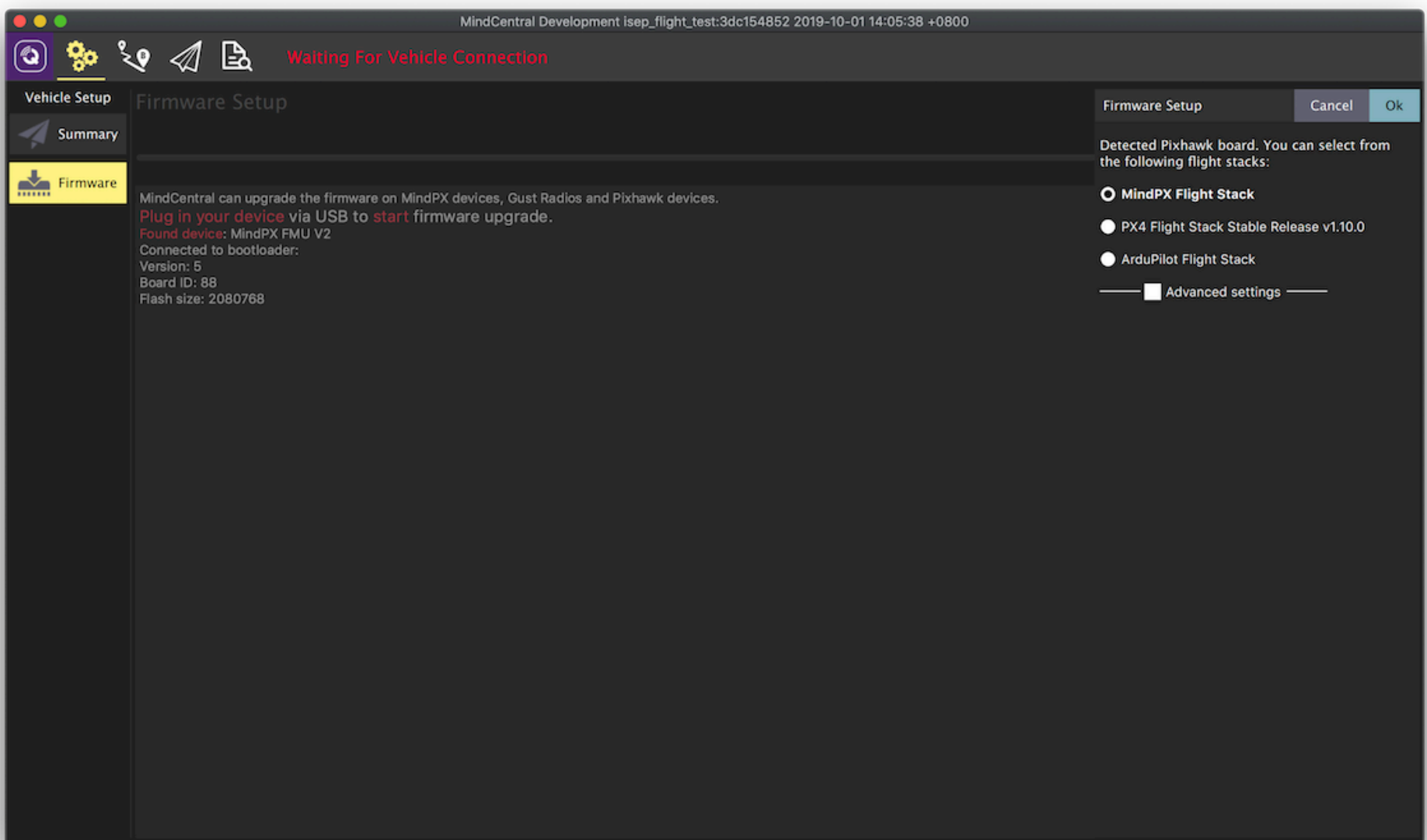


Fig. 26 MindPX firmware upgrade

Tap on 'OK' button, and MindCentral will download latest firmware and do the upgrade.

Or if you would like to flash a local version of firmware instead, check the 'Advanced setting' checkbox, and select 'Custom firmware' as in Fig. 27.

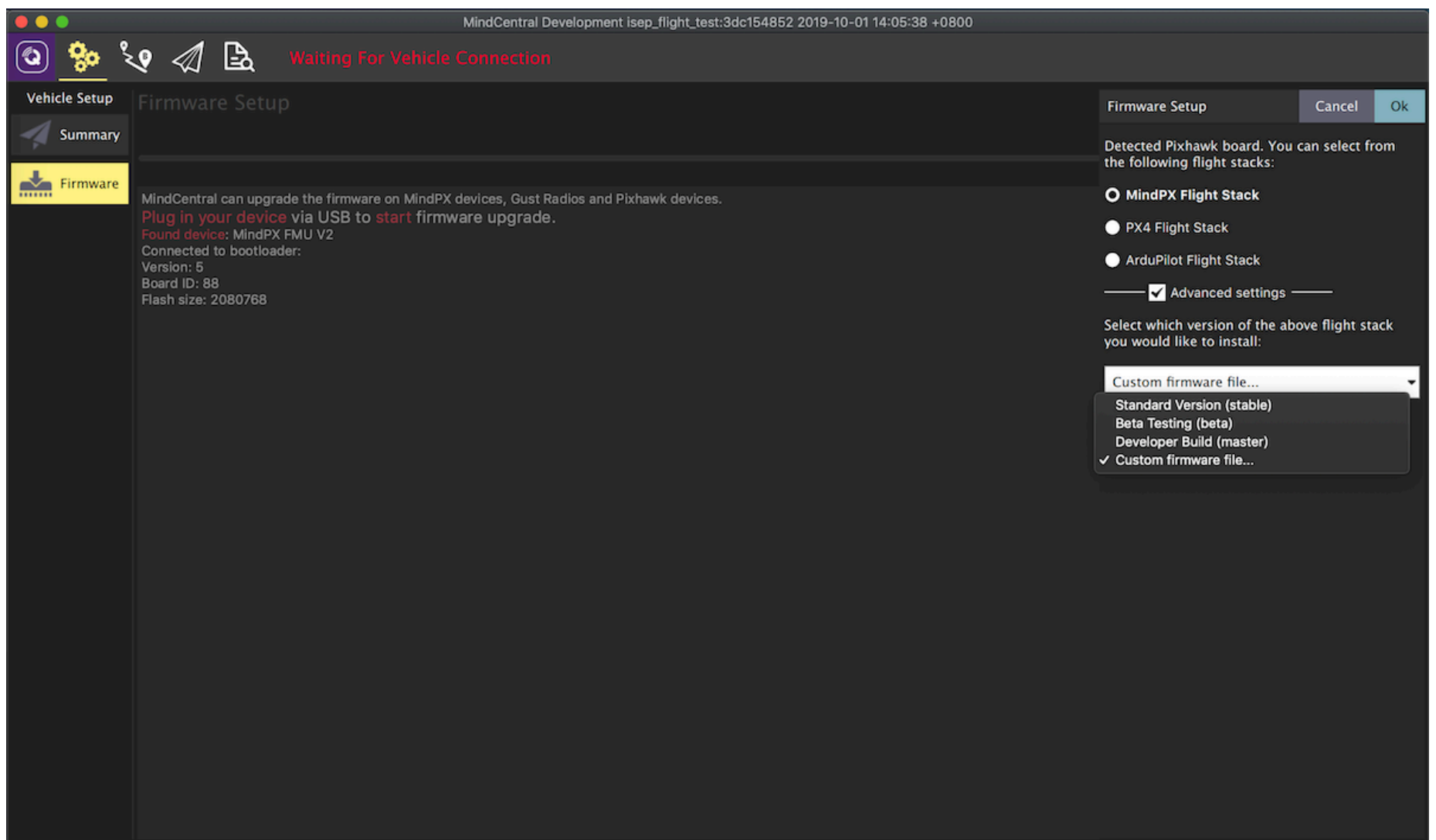


Fig. 27 use local firmware

## Gust-air Firmware Upgrade

**Note** this feature requires an external python tool to be installed as prerequisite. See **[how to install this python tool](#)** under Linux & MacOS.

The on-vehicle gust-air radio firmware can also be upgraded through MindCentral.

Disconnect MX400/450 if it is still connected with MindCentral.

Disconnect Gust-air if it is still connected with MindCentral.

Launch MindCentral and select Set up view. Tap on the 'Firmware' tab. Then use a micro-USB cable to connect Gust-air's usb port to the computer running MindCentral. Wait for a few seconds and a pop up menu will show up on the right side of screen, reporting a Gust-radio device has been found, as in Fig. 28.

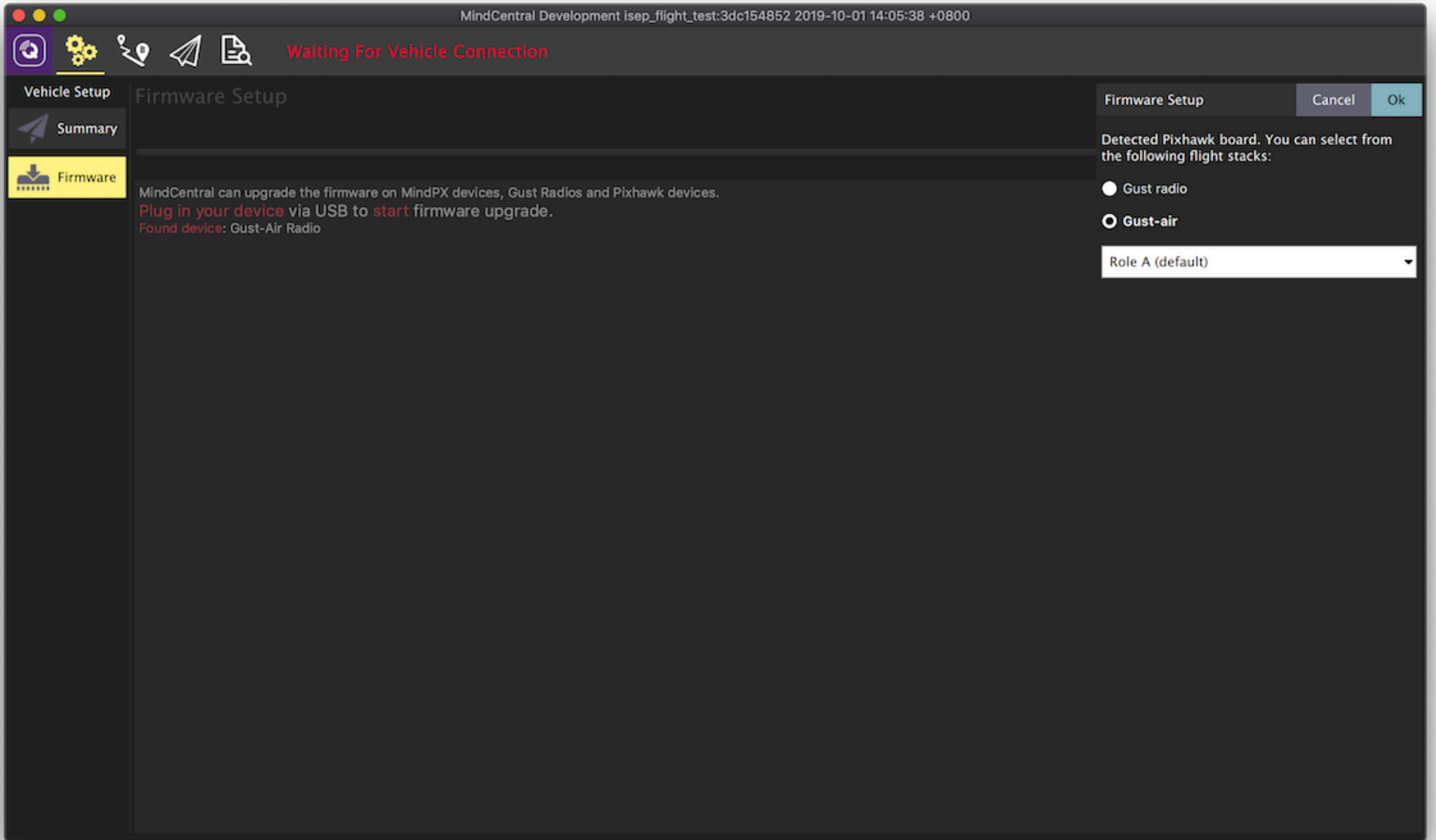


Fig. 28 Gust Radio firmware upgrade

Currently Gust-air can have 2 roles, Role A and Role B. Role A can accept connection while can also actively make connection to another Gust-air node. Role B can accept 2 connections but can not make connection to other nodes.

Use the drop-down menu to select which role you would like the on-vehicle Gust-air node to act as (Fig. 29).

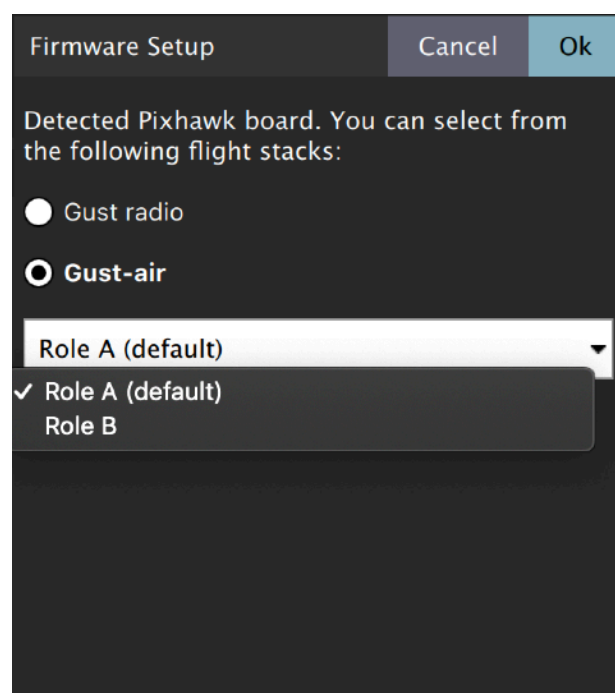


Fig. 29 Select role

After all set, tap on 'OK' button and MindCentral will update Gust-air's firmware automatically.

## Color LED Indicator

The main LED indicator is a tricolor LED and can show different status information with the combination of different colors and blinks. The status information it indicates is listed below:

LED color	meaning (status)	remark
Solid any color	Armed	
Breathing any color	Standby	
Amber	Low battery or Failsafe	(Return to home, etc)
Blue	GPS not locked	
Green	GPS Locked	
Fast Blink & Red	Arming error	
Blink & Red	Other error	
Transitional Green	Mode switch success	

Fig. 20 LED indicator

## Support

Please visit [www.mindpx.net](http://www.mindpx.net) for more information. If you have any technical issues related to our products, please post on [MindClub forum](#) to ask for help.

## Where to buy

You can buy MX400/450/MindPX or related accessories/spare parts at [AirMind Store](#), Or you can send email to [support@mindpx.net](mailto:support@mindpx.net) for inquiry.