

MindPX

The Ultimate
Racer



MINDRACER USER MANUAL

Highlights

- Ultra mini size, weight only ~6g
- High performance F4 168MHz floating point processor, super fast throttle response
- Support OneShot ESC
- Support PPM/SBUS/DSM radio receivers, support D.Port/S.Port/Wifi telemetry
- On board flight data recorder
- Support IMU isolation
- DroneCode standard compliant connector

Quick self check

Before mounting please perform following quick check for any potential damages to MindRacer during logistic:

1. Check if any pin headers on the bottom side are bended or contacted
2. Check if the enclosed case is broken or damaged
3. Check if accessories are intact

If any situation above, please contact your local sales representatives for replacement.

In package list

1. MindRacer main board
2. 3M tape
3. Cable set: power cable, debug cable, main output cable, RC input cable, FrSky telemetry cable
4. M3*7+6 hexagon stud x 8



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Physical

	MindRacer
Flight controller / Processor	F427 VIT6
Weight	~6g
Dimension	35 x 35mm
PWM outputs	maximum 6
IMU	10DOF
IMU isolation	YES/Optional
Radio receiver	PPM/SBUS/SPEKTRUM DSM/Satellite
Telemetry	FrSky D.Port, S.Port, Wifi, 3DR radio
on board TF card for flight data recording	YES
OneShot ESC support	YES
Expansion slots	dual 2 x 7(pin) headers
on board Real time clock	YES
connector	JST GH (compliant with DroneCode standard)

Power

MindRacer can be powered through its power port. The input voltage must be within the range from +4.7V ~ +5.2 V.

MindRacer can also be powered through an USB cable. This is usually the case when it is connected to the ground station for configuration or calibration.



Important

Input voltage exceeds the specified range may damage the flight controller permanently.

MindRacer can power small peripheral devices through its ports. MindRacer can provide 2 kinds of voltage, +5V and +3.3V. Check [MindRacer specification](#) for the pin out of power supply.

MindRacer can supply maximum 100mA@5V or 100mA@3.3V.



Important

Please make sure peripheral devices do not draw more currents than the specified range as in specification, or MindRacer may reboot or even be damaged.

Mounting

Direction of head

Before mounting, please make sure the head direction of MindRacer board(see the 'front' direction mark) is consistent with the head direction of airframe.

There are 2 ways of mounting your MindRacer onto your airframe,

- 1) heat sink mount
- 2) pin header mount

Heat sink mount

Heat sink is a piece of CNC processed aluminum alloy that can be mounted on the bottom side of MindRacer. You can directly adhere the MindRacer with heat sink together onto the supporting carbon board of airframe using 3M tape. The 3M tape should be attached to the bottom side of the heat sink.

Heat sink mount is a very flexible mounting method with minimum weight, extremely suitable for cases like racing match or irregular airframe. It can give MindRacer solid and stable support and provide better heat dispense.

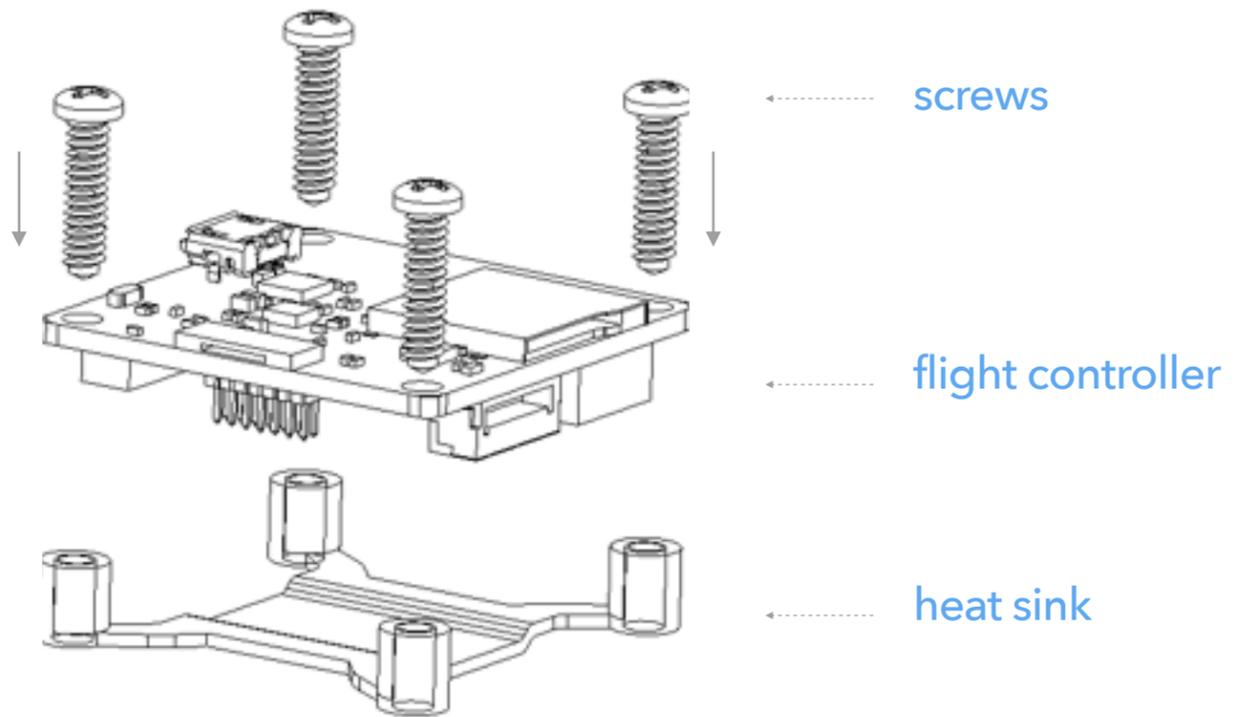


Fig. 1 heat sink mount

IMU isolation

Though has a complete set of IMUs on board, MindRacer can support a redundant set of IMUs in an isolated and vibration dampening rack.

The isolated mounting rack can help reduce the impact of vibration and improve the flight performance.

The rack can be mounted directly on MindRacer board through 4 mounting hole using M3 screws.

* If you use barometer during flight, please use a piece of foam to cover on the surface of it (on the corner of bottom side of the board).

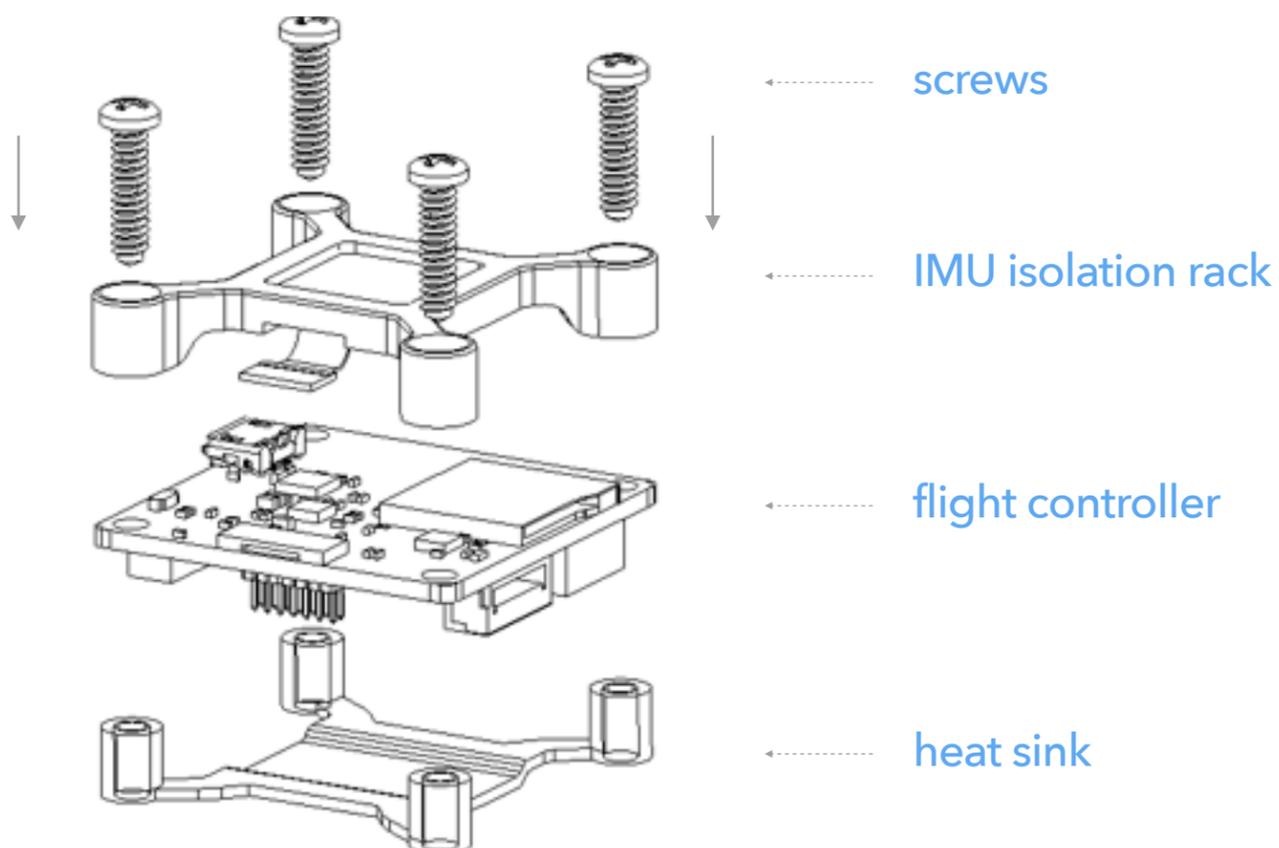


Fig. 2 IMU isolation mount



Important

MRPDB is directional. Please make sure the PDB's "front" direction align with the MindRacer's "front" direction, or the MindRacer board will be damaged.

Wiring

The wiring methods can be little different depending on the airframe you choose. The most important thing is motor mapping that ensure the copter will fly correctly.

MindRacer's motor mapping is shown as following map. The digital numbers map to MindRacer's output pin number.

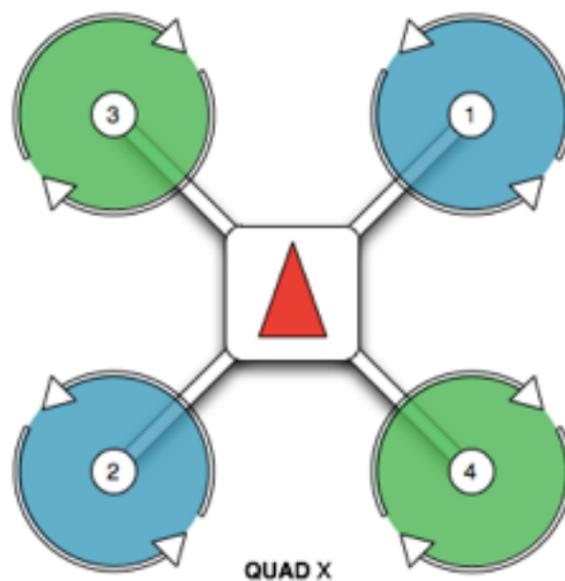


Fig. 4 Quad X motor map

Below is a real mounting & wiring case. Wire the MindRacer's PWM output pin to corresponding numbered ESC/motor.

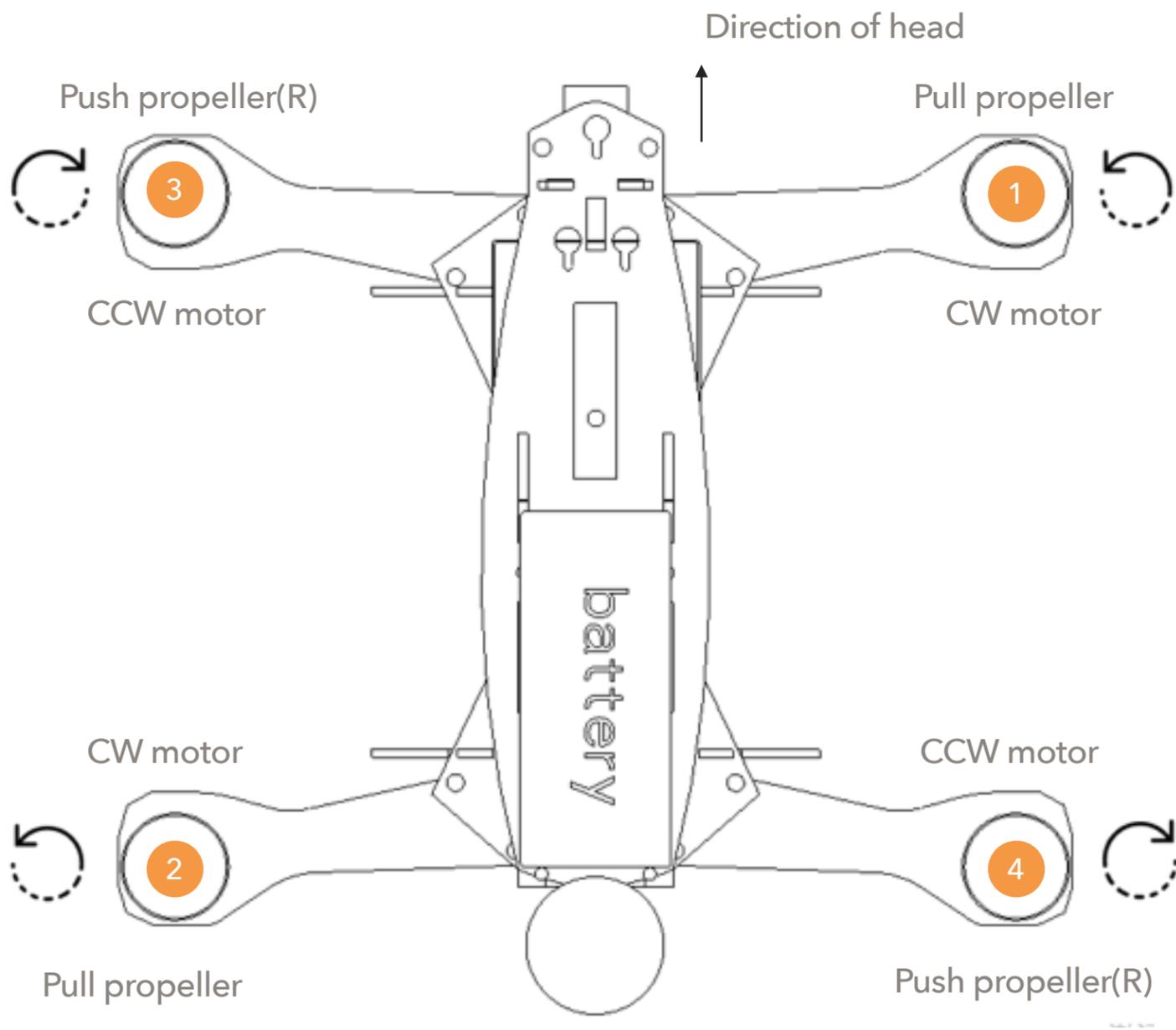


Fig. 5 mounting & wiring example

In some cases you may need a hexarotor layout.

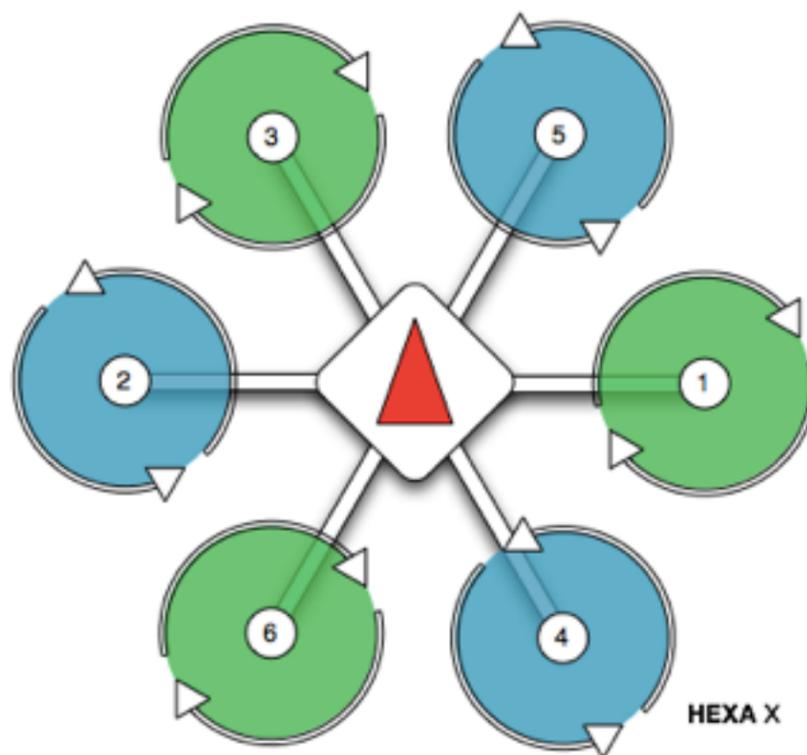


Fig. 6 HEXA X motor map

Heat sink mounting wiring

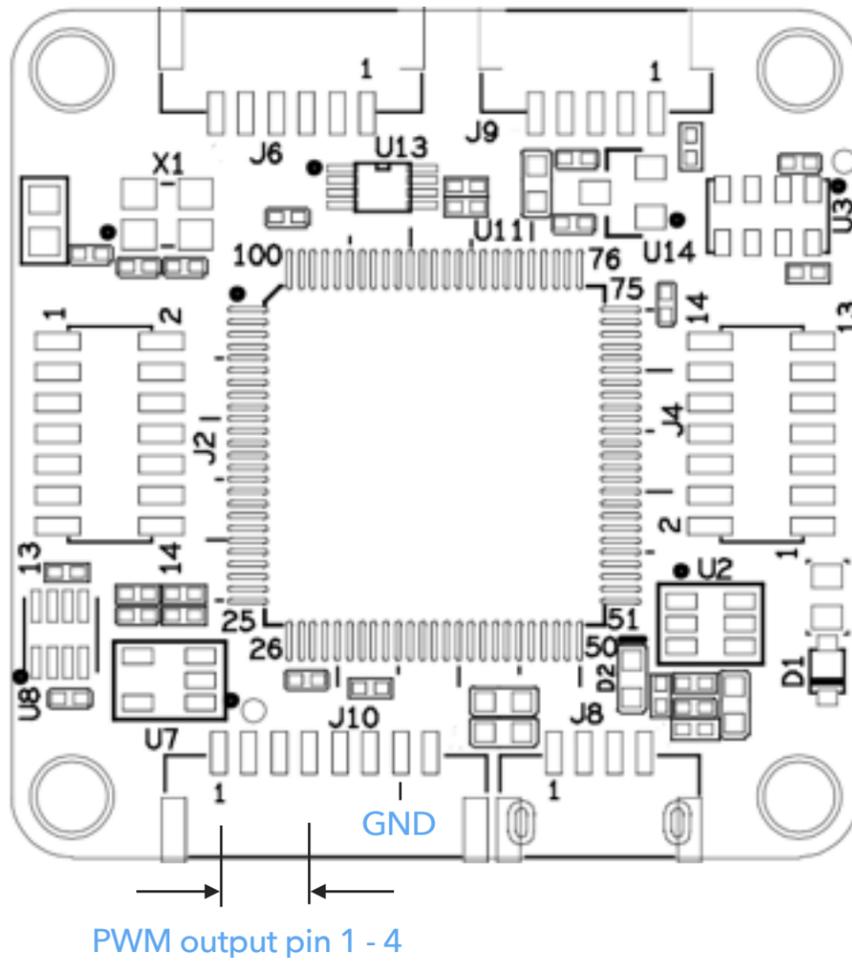


Fig. 7 on board PWM outputs

When use heatsink mounting, just wire the PWM output pin 1-4 to the corresponding numbered motor/ ESC on the frame (and do not forget to wire GND at any possible).

In this mounting you need to power MindRacer through the onboard power interface.

MRPDB mounting wiring

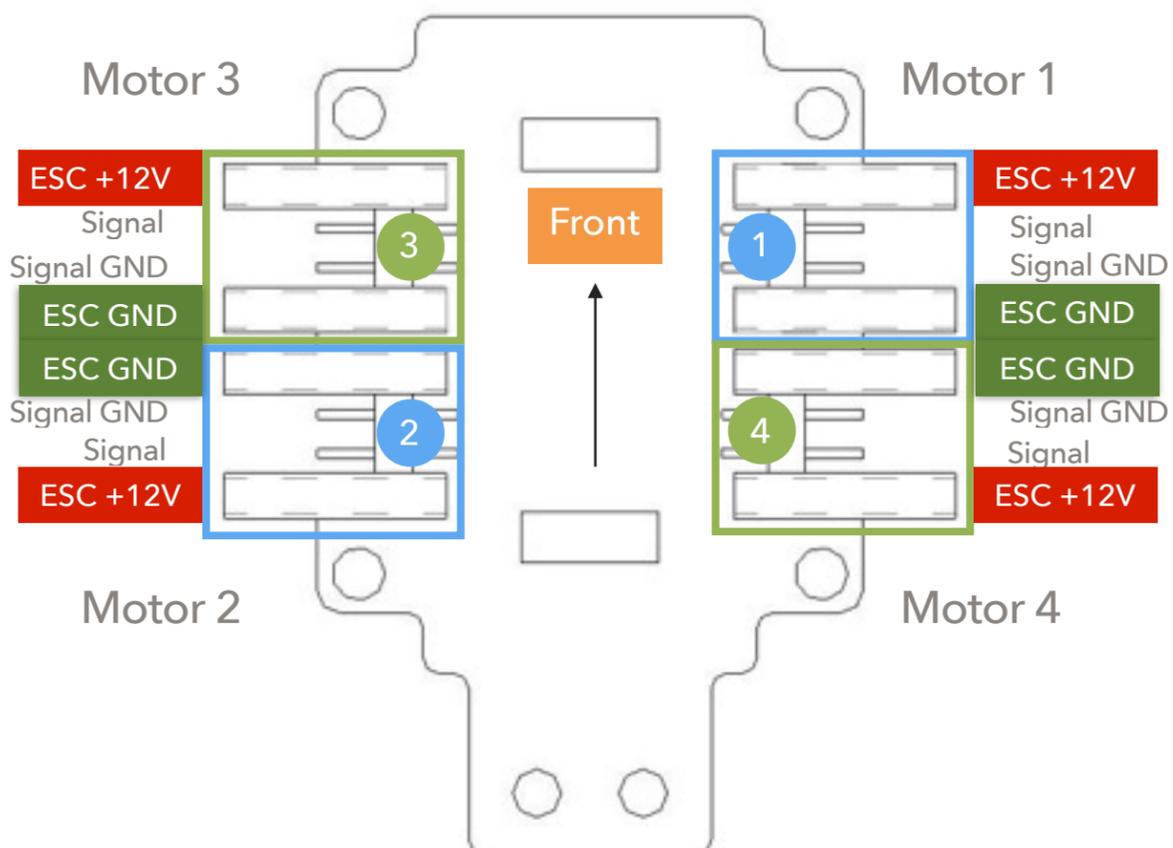


Fig. 8 MRPDB pin out map

MindRacer is directly powered through the power pin through pin headers, no need to wire any power cable.

Using MRPDB the wiring process is soldering-free. When mounted on MRPDB, the PWM outputs is routed to the MRPDB. The wiring work is as simple as just plug the ESC headers into corresponding numbered motor ports on MRPDB, as illustrated in above picture, and that is all.

For more detailed wiring guide, please refer to [MindRacer specification](#) for complete pin out map.

On board Connectors

The MindRacer board provide all necessary interfaces in a racing configuration, including power, RC in, TELEM2, and PWM outputs.

Remote

MindRacer can support most of the popular remote controller on the market through its one-wire input interface.

For PWM output receiver, please use a PWM-to-PPM encoder to convert the signal and connect to MindRacer's RC input port.

For most of the PPM/SBUS remote controller, you can directly connect the output of the receiver to MindRacer's RC input port.

For Spektrum DSM/Satellite series, +3.3V power supply is used. The connection cable between the receiver and MindRacer's RC input is different.

Before any flight, you need to make sure the remote controller is already paired with the receiver. Please check remote controller/receiver vendor's product manual on how to pair.

Calibration

MindRacer needs to be calibrated before it can fly. Use QGroundControl(QGC) to connect MindRacer, and calibrates the flight controller following the instructions in QGC.

Connect to Ground Station

As a professional flight controller, MindRacer has hundreds of parameters that user can tune. Using QGroundControl software from computer is the best way to carefully adjust these parameters.

QGroundControl is a free software that anyone can download and use it on the fly. It can be downloaded from <http://www.qgroundcontrol.org>. Currently it can support all major PC OS platforms including Windows, MacOS, Linux, etc. Select the right version for your OS.

To connect, launch QGroundControl on your PC (Fig. 9).

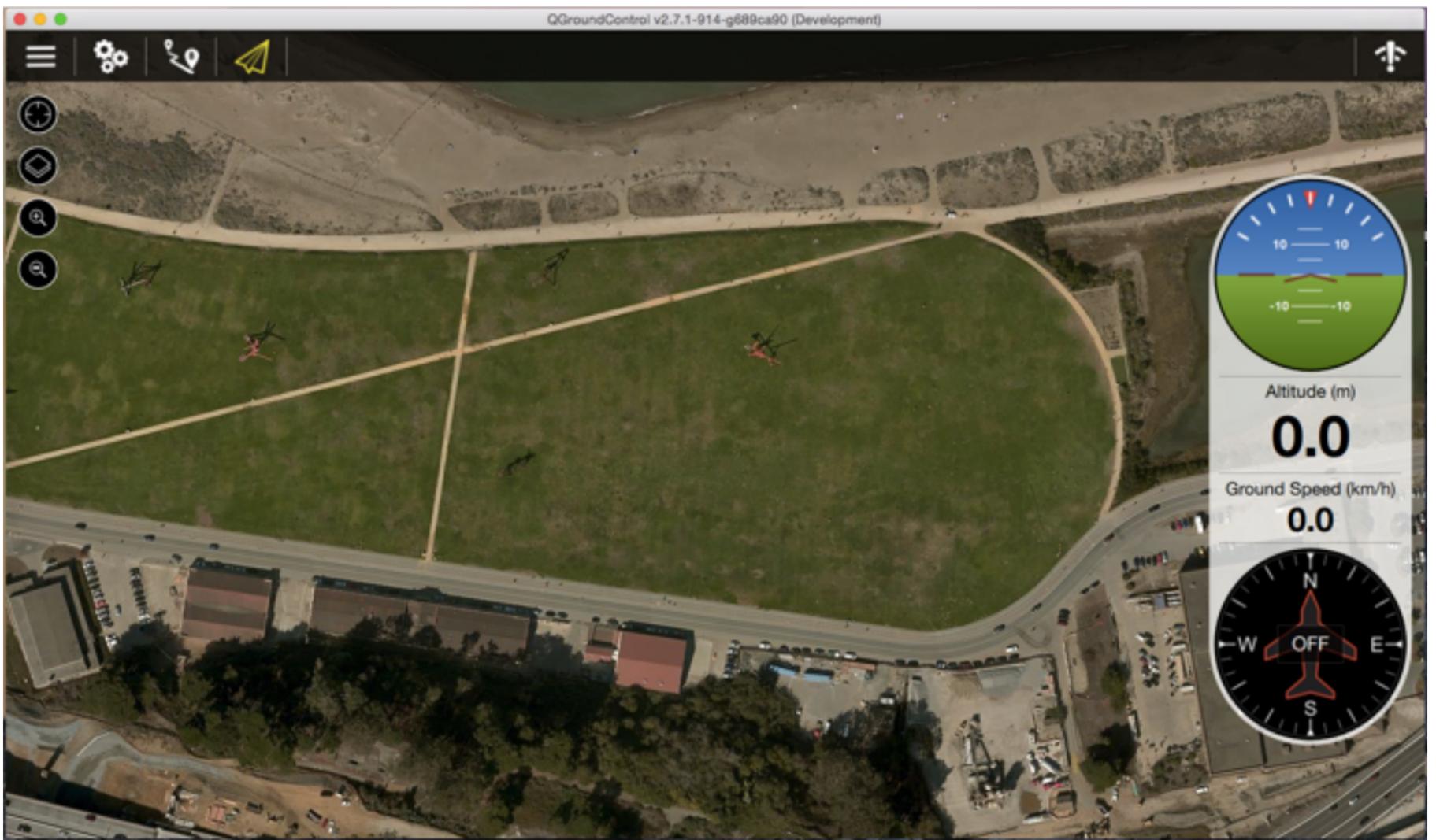


Fig. 9 Launch QGroundControl

Power OFF the drone first. Use a micro-USB cable to connect the USB port of MindRacer to a PC USB port. The MindRacer flight controller should be powered on. Wait for a few seconds until the flight controller's main LED turns into any stable color.

For older versions of QGroundControl, click on the 'Wifi' icon in the top-right corner and select the displayed drone name to connect. For versions after V2.9.0, QGroundControl can recognize MindRacer and connect automatically.

After a successful connection, the ground station will update its UI with the drone's status information.

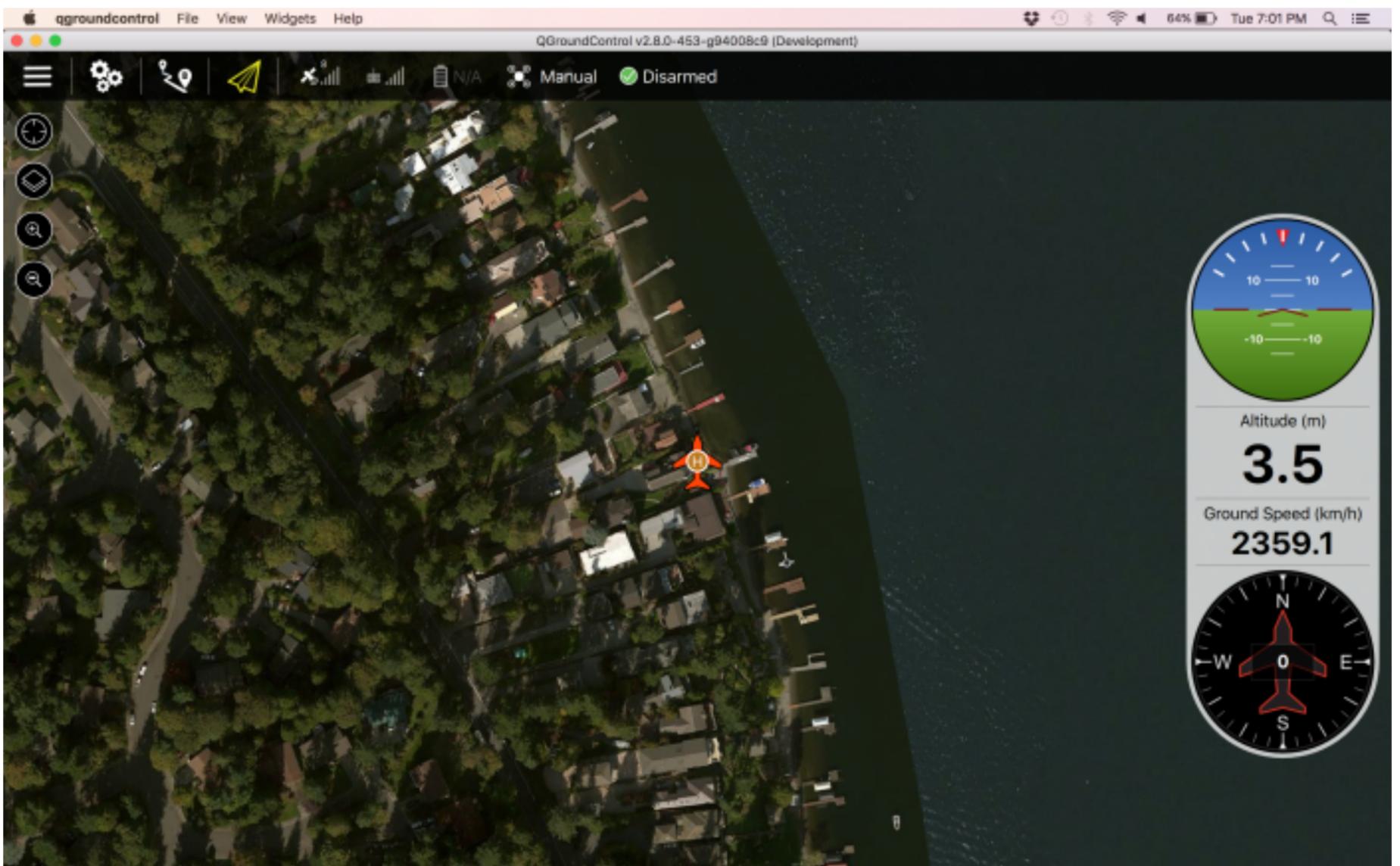


Fig. 10 drone status information

Select Flight Mode

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

The modes can be chosen by switches in the remote controller (use WFLY/7 7-channel remote controller as an example) as in Fig. 11.

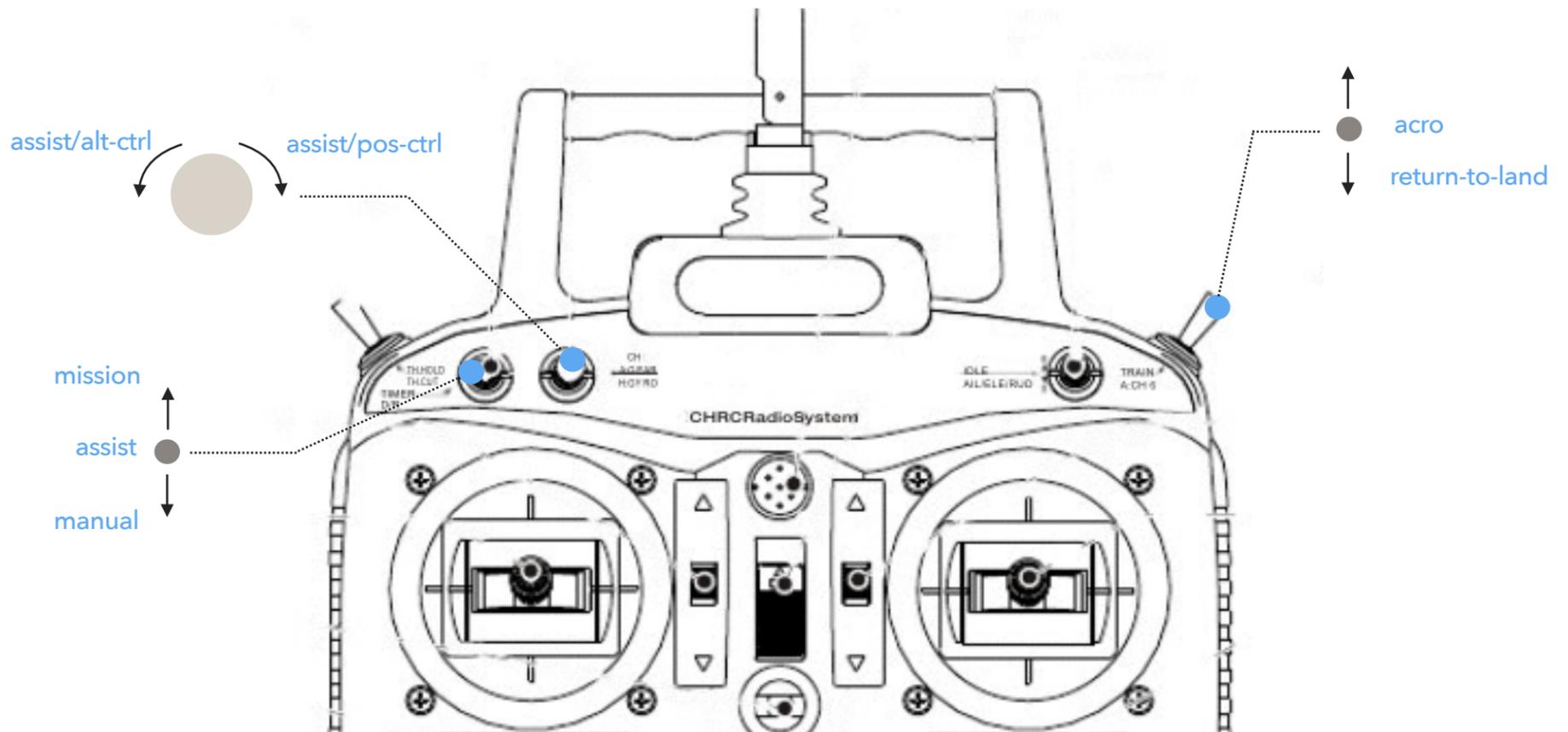


Fig. 11 remote controller mode switch setting

You can customize and define more flight modes through QGroundControl. Please refer to MindRacer User Guide document for details.

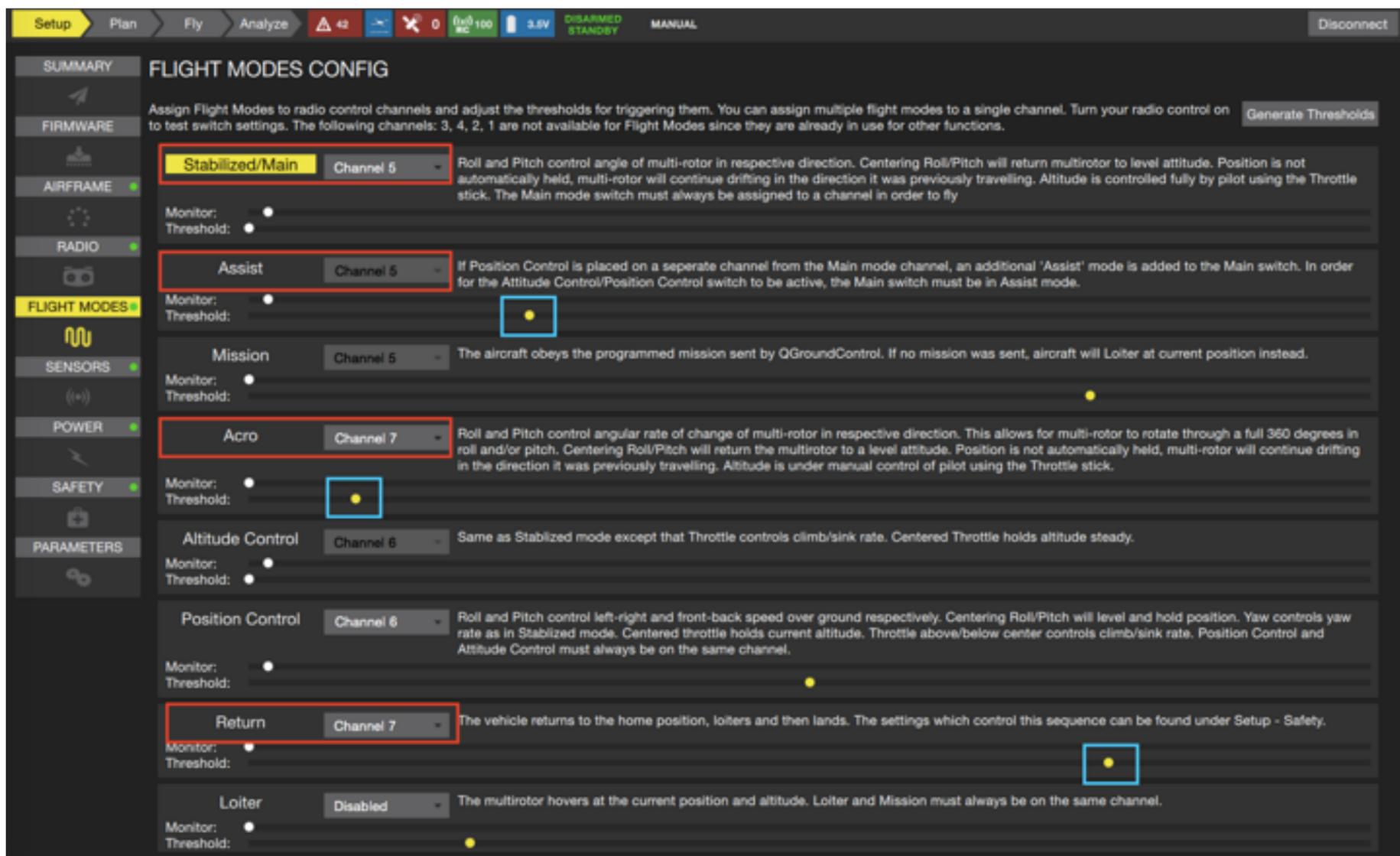


Fig. 12 flight modes selection

Arm/Disarm

Warning: before arm, 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.

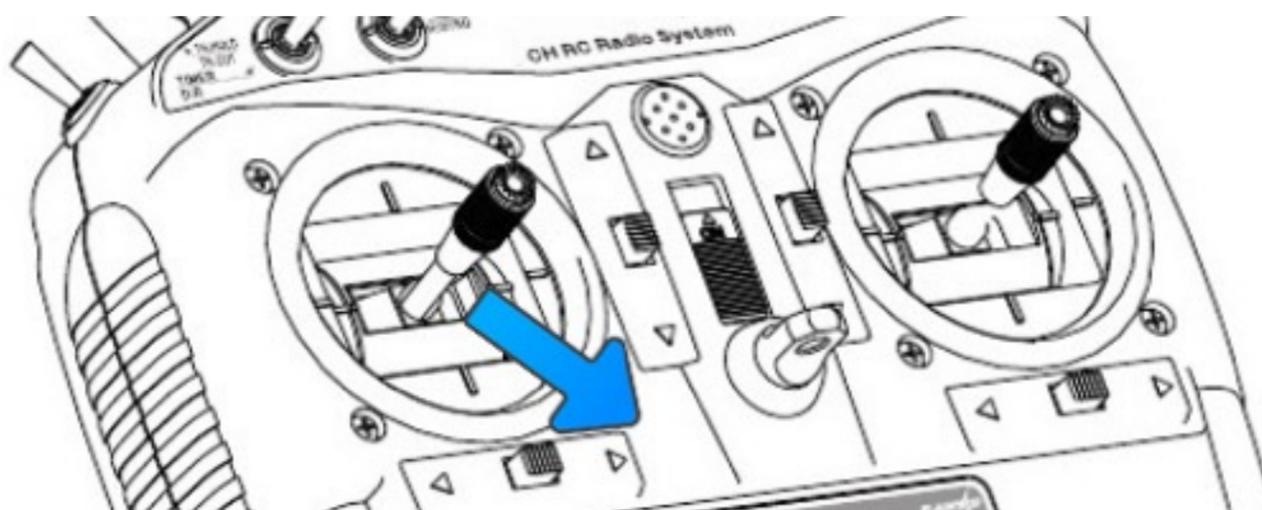


Fig. 13 Arming

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

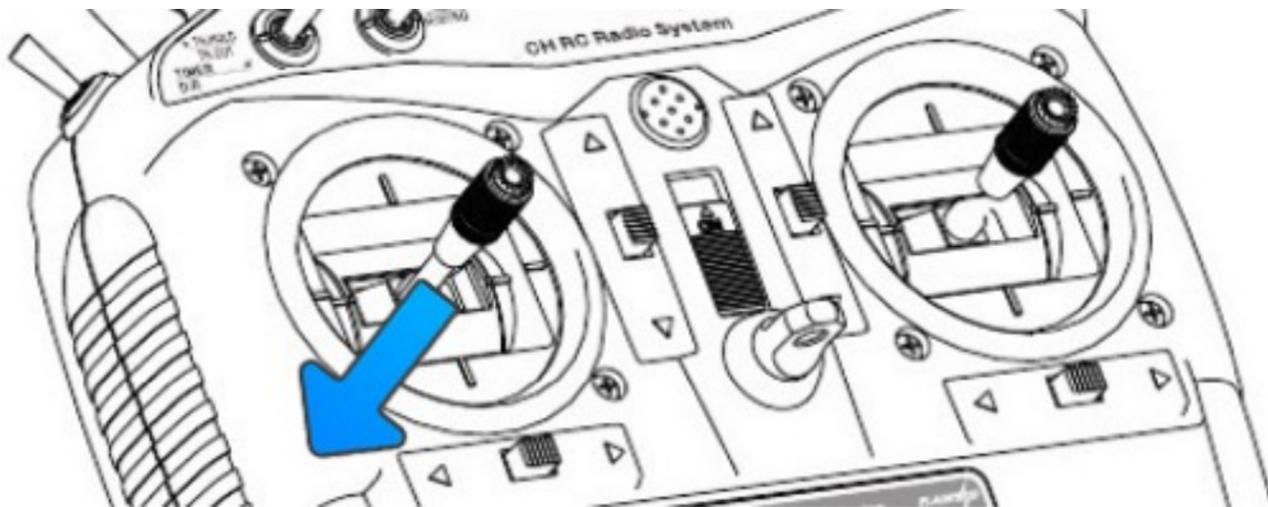


Fig. 14 Disarming

Flight Black Box - Using a SD Card

MindRacer has a micro SD (TF) card slot. MindRacer will record flight data into the SD card. It is important for reproducing flight course either for training or maintenance purpose. So it is strongly recommended that user inserting a SD card before take off.

The SD card must be formatted with FAT32.

OSD

To use an OSD, connect it to MindRacer's TELEM2 port. You may need to adjust baud rate from QGroundControl depends on the model of OSD you are using.

The interface breakout board

When using MindRacer in situation other than racing, you may need the breakout board to access other interfaces provided by MindRacer through the pin headers. The breakout board leads out almost all ports available of the processor including GPS, CAN, I2C, UART, etc.

You can also customize your own breakout board on your needs. Check MindRacer's specification for header pin out definition.

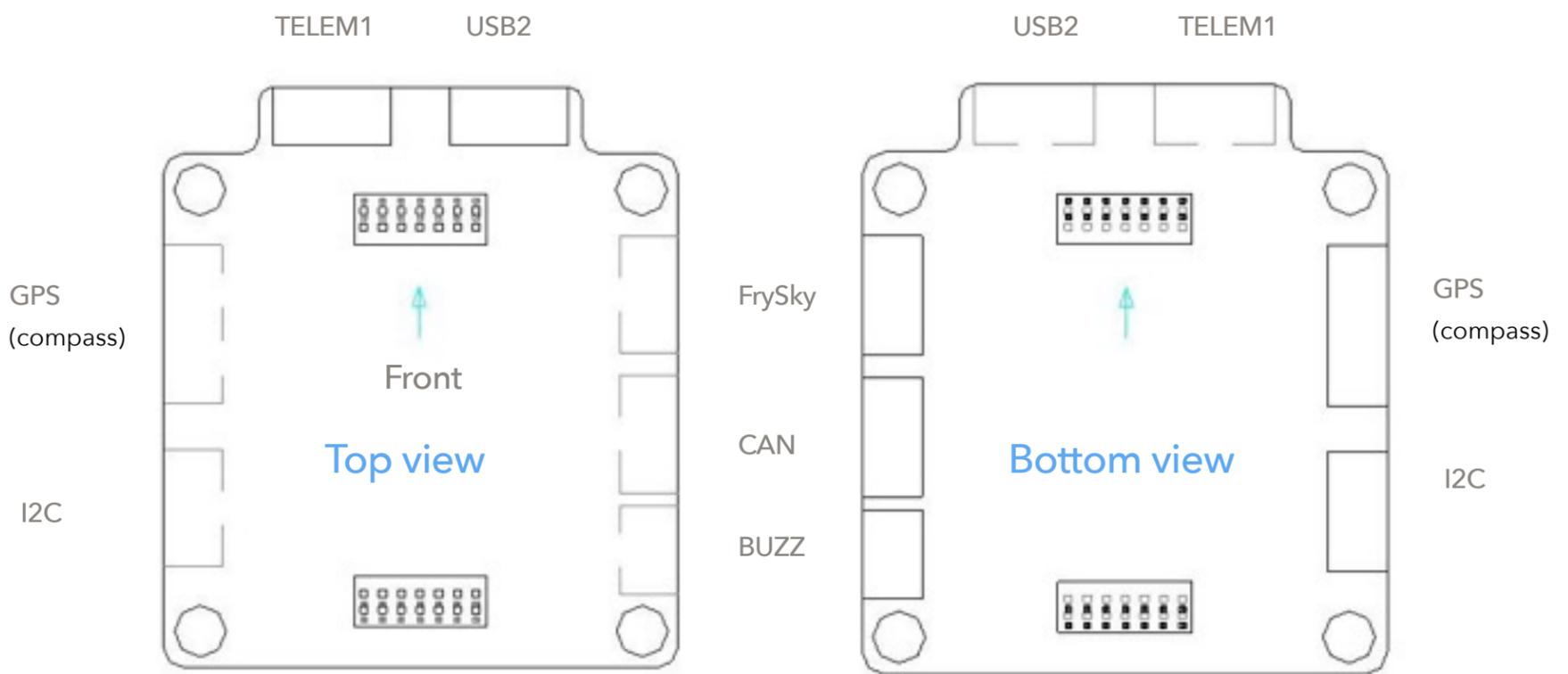


Fig. 14 interface board pin out map

The interface board can be stacked together with MindRacer and MRPDB as illustrated in Fig. 15.

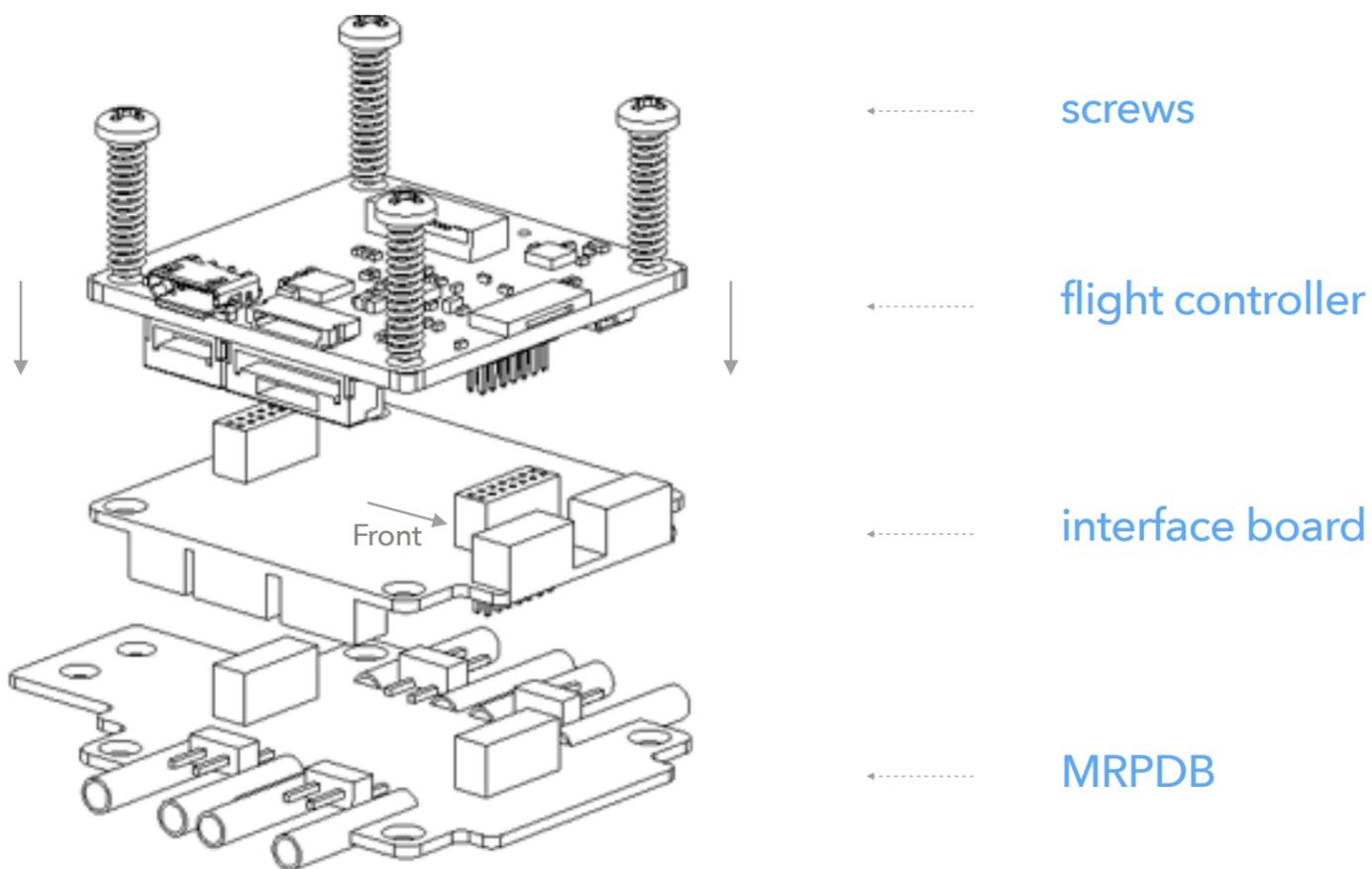


Fig. 15 interface board mounting

Telemetry

MindRacer supports Wifi/FrSky telemetry besides of 3DR and other compatible telemetry.

3DR and its compatible telemetry

3DR and other compatible telemetry can be connected to either onboard TELEM2 port, or the UART1 port on breakout board.

Wifi telemetry

Wifi telemetry module can be connected to MindRacer board's TELEM2 port, or UART1 on breakout board.

FrSky telemetry (Smart Port)

FrSky telemetry can be connected to UART4/FrSky port on breakout board.

Connect a GPS

MindRacer can also use an external GPS to locate its global position. Connect GPS module's connector to MindRacer's 'GPS' socket on breakout board.

Check the signal strength before take off using a GPS. When connect to QGroundControl you can see the GPS signal strength indicator on screen. More bars mean better signal. The GPS can only work well when there are at least 3 bars.

In order to use external compass instead of internal compass, you need to re-calibrate the compass sensor in QGroundControl.

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. 16 LED indicator

Where to buy

MindRacer is available at [AirMind store](#) on internet. You can also find MindRacer at Amazon or eBay.

Support

Please visit www.mindpx.org for more information. Or you can send email to support@mindpx.net for any inquiries or help.