MINDPX

Autopilot System



User Guide

AirMind

Component List



- 1. MindPX
- 2. 6-pin cable
- 3. 4-pin cable
- 4. 4 to 6 pin convertor cable
- 5. PPM encoder
- 6. Voltage/Current detector

- 7. USB cable
- 8. M2 countersink screw × 6
- 9. Light pipe × 2
- 10. 3M tape
- 11. TF card
- 12. Buzz

Quick self check

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

- 1. Check if any pin headers on the rear 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.

1. Mounting 2. Wiring 3. Calibrating	Quick Start MindPX can control 2-rotors, 3 rotors, 4 rotors and 6 rotors. Follow the instructions to quickly start your air journey!
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1. Mounting



Adhere 3M tape here

Heading

- Adhere on the bottom of MindPX as illustrated
- Attach MindPX to the frame. Please keep the front of MindPX consistent with frame's front.
- Attach MindPX to the frame. Please keep the front of MindPX consistent with frame's front.
- Airframe Orientation





2. Wiring







PIN



- 1. Power
- 2. Debug (refresh bootloader)
- 3. USB1 (refresh firmware)
- 4. Reset
- 5. UART3 (GPS)
- 6. I2C1(external compass)
- 7. TF card slot
- 8. NRF/SPI(Remote Control)



- 9. I2C2 (MindFLow)
- 10. USB2 (Serial 2 to)
- 11. UART4,5
- 12. UART1 (Transmission)
- 13. CAN
- 14. ADC
- 15. Tricolor Light
- 16. Looper



3. Calibrate

Before you take off you need to calibrate the copter first. QGroundControl needs to be installed first which can be downloaded from:

http://www.qgroundcontrol.org/downloads

Install QGroundControl

Please r	eview the license ept all terms of th	agreement before instal e agreement, dick I Agre	ling QGround ee.	control. If
This software is	published under	GNU GENERAL PUBLIC L	ICENSE 3	^
TERMS AND CO 0. Definitions.	NDITIONS			
攢his License License.	?refers to ve	rsion 3 of the GNU G	eneral Pub	lic
⊊opyright?al kinds of wor	lso means copy ks, such as se	right-like laws that miconductor masks.	apply to	other
糟he Program'	refers to anv	coovrightable work	licensed u	nder 🗸
Cancel	Nullsoft Install S	System v3.0b0		I Agree

different folder, click Browse and select and continue.	other folder. C	lick Next to
Destination Folder		
C:\Program Files (x86)\pgroundcontrol		Browse
Space required: 249.2MB		
Space required: 249.2MB Space available: 129.3GB		

3. Start installation

Check the components y you don't want to install	tup: Installat ou want to install a . Click Install to sta	and uncheck the rt the installation	components
Select components to install:	Create Star	t Menu Shortcut	5
Space required: 249.2MB			
Cancel Nulsoft Instal	System v3.0b0	< <u>B</u> ack	Instal

4. Install PX4 driver

週	px4 driver Setup	×
Ð	Welcome to the px4 drive	er Setup Wizard
	The Setup Wizard allows you to chan features are installed on your compu- your computer. Click Next to continue Setup Wizard.	ge the way px4 driver ter or to remove it from a or Cancel to exit the
	Back Eack	t Cancel

5. Agree driver software license

	px4 driver Setup -	-
End-User Licer	nse Agreement	6
Please read the	e following license agreement carefully	Q
	GNU GENERAL PUBLIC LICENSE	^
	Version 3, 29 June 2007	
Everyone verbatim of of this 1 allowed.	is permitted to copy and distribute copies license document, but changing it is not	
	Preamble	~
✓ I accept the t	terms in the License Agreement	
	Datat Dark Nast	Cancel
		1 375/101

6. Select driver installation path

B	px4 driver Setup	×
Destination Fe	older	
Click Next to in	stall to the default folder or click Change to cha	oose another.
Install px4 drive	to:	
C: Program File	s (x86)\px4 driver\	
Change		
	Back	Next

7. Start driver installation

過	px4 driver Setup	×
Ready to inst	all px4 driver	S
Click Install to b installation sett	regin the installation. Click Back to review or change ings. Click Cancel to exit the wizard.	any of your
	Back	Cancel

8. Continue driver installation

设备驱动程序安装向导 欢迎使用设备驱动程序安装向导! 此向导帮助您安装软件驱动程序。没有这些驱动程 序,有些计算机设备无法运行。
要继续,请单击"下一步"。 < 上一步(B) 下一步(N) > 取消

9. Finish PX4 driver installation

正在完成设备驱动和	程序安装向导	
此计算机上成功地安装了此 现在您可以将设备连接到此 请先阅读。)驱动程序。 2计算机。如果此设备	附有说明,
驱动程序名	状态	^
驱动程序名 VArduino LLC (www.a.	状态 可以使用了	î

谩	px4 driver Setup	- • ×
6	Completed the px4 dr	iver Setup Wizard
	Click the Finish button to exit the	: Setup Wizard.
	Back	Finish Cancel

10. finish QGroundcontrol installation

墹	QGroundcontrol Setup: Completed	- • ×
1	Completed	
S	how details	
_		
	Cancel Nullsoft Install System v3.0b0 < Back	Glose

The calibration process

Connect MindPX USB1 port to your PC with USB cable, and start QGroundcontrol.

1. Drop down "connect" menu on top right corner, and select pixhawk on COMx(depending on your computer configuration)



2. Select frame type

- After frame selected, the "airframe" label on the left will turn from red to green, indicating setting is successful. The corresponding label will turn to green after each calibration succeeds.



Calibration for 250 frames

Because QGroundControl doesn't originally support 250 frames, at the first step of calibration, you should choose DJI Flame Wheel 330 as a replacement. Before taking off, it is necessary to adjust parameter of airframe 330.

Choose PARAMETER Tab, adjust PID parameters in Multicopter Attitude Control, set MC_PITCHRATE_P, MC_ROLLRATE_P to 0.1, MC_YAWRATE_P to 0.22.

SUNDARY	PARAMETER EDITOR			
-1	Component #: 50 🔨	Multicopter Att:	itude Control	
-	sOafault Group	MC_ACRO_P_MAX	90 deg/s	Max acro pitch rate
PIRMARE	+Delait Group	MC_ACRO_R_MAX	90 deg/s	Max acro roll rate
	Attitude EEF estimate	MC_ACRO_Y_MAX	120 deg/s	Max acro yaw rate
		MC_PITCHRATE_D	0:003	Pitch rate D gain
AIRFRAME 🙁	Battery Calibration	MC_PITCHRATE_FF	0	Pitch rate feedforward
	Circuit Breaker Commander Data Link Loss	MC_PITCHRATE_I	0.05	Pitch rate I gain
		MC_PITCHRATE_MAX	360 deg/s	Max pitch rate
B (BIA)		MC_PITCHRATE_P	0.1	Pitch rate P gain
10010		MC_PITCH_P	7 1/s	Pitch P gain
FLICHT WODEL	GPS Failure Navigatic Geofence Land Detector	MC_ROLLRATE_D	0.003	Roll rate D gain
		MC_ROLLRATE_FF	0	Roll rate feedforward
		MC_ROLLRATE_I	0.05	Roll rate I gain
		MC_ROLLRATE_MAX	360 deg/s	Max roll rate
100		MC_ROLLRATE_P	0.1	Roll rate P gain
SENSORS	WAVLink	MC_ROLL_P		Roll P gain
	ACT AND A DECIMA	MC_YATRATE_D	0	Yaw rate D gain
((*))	Miscellaneous	MC_YAFRATE_FF	0	Yaw rate feedforward
	Wission	MC_YAFRATE_I		Yaw rate I gain
POVER O		MC_YATRATE_MAX	120 deg/s	Max yaw rate
×	Iticopter Attitude Con	MC_YAVRATE_P	0.22	Yaw rate P gain
SAFETY O	Iticopter Position Con	MC_YAT_FF	0.5	Yaw feed forward
		MC_YAT_P	2.8 1/s	Yaw P gain
â	Position Estimator			
-	Position Estimator IN			
PARAMETERS	Radio Calibration			
	Radio Signal Loss			

3. Caliberating remote controller

- Mode 1 is set to left throttle, Mode 2 is set to right throttle.





- Move throttle stick according to prompts in software

Attitude Controls Roll	🕑 Mode 1 🌑 Mode 2
Pitch	
Yaw	
Throttle Skip Cancel Next	
Lower the Throttle stick all the way down as shown in diagram. Reset all transmitter trims to center.	
It is recommended to disconnect all motors for additional safet	Channel Monitor
Click Next to continue	1
RADIO CONFIG Attitude Controls Boll Pitch Yew Throttle Skip Cancel Next Nove the Throttle stick all the way down and leave it there	♥ Node 1 ● Node 2
	Channel Monitor

- Move all the transmitter switches/dials to their extreme position

RADIO CONFIG	
Attitude Controls Boll	⊙ Mode 1 ● Mode 2
Fitch Yex	
Throttle Ekip Cancel Next	
Nove all the transmitter switches and/or dials back and forth to their extreme positions.	
	Channel Monitor 1 2

- Skip remaining steps

RADIO CONFIG Attitude Controls Roll Pitch Yaw Throttle Skip Cancel Next Nove the switch or dial 700 want to use	• Node 1 • Node 2
Click Next to continue. If you won't be using Flaps, click Skip. RADIO CONFIG Attitude Controls Boll	Channel Monitor
Pitch Tax Throttle Skip Cancel Show	
Nove the switch or dial you want to use for Auxi. You can click Skip if you don't want to assign.	Channel Monitor



4. Configure Channels

- Set main mode to channel 5, set position control to channel 6 (channel number may vary depending on your remote controller)



- Use channel 5 to select between 3 modes: manual mode, assist mode, and auto mode.
- Under assist mode, use channel 6 to switch between altitude-control mode or position-control mode

5. Sensor Calibration Compass

SUMMARY	SENSORS CONFIG
-1	Calibrate: Compass • Gyroscope • Accelerometer •
FIRMTARE	
<u></u>	
AIRFRAME 😑	Start the individual calibration steps by clicking one of the buttons above.
0	
RADIO 🙁	
00	
FLIGHT WODES	
W	
SENSORS .	
((•))	

- Rotate frame to specified orientation according to software prompts.





Gyro

- Place frame into one of the incomplete orientation show on software screen, and hold it still. Proceeds according to software prompts.



SENSORS CO	NFIG		n: (12)	48 - 17 AB	
Californie:	Company	Cottosooge 🔍	Accelermeter 🧶		Carrel
Calibration	complete				
-	×				
	Completed				

Accelerometer

- Place frame into one of the incomplete orientation show on software screen, and hold it still. Proceeds according to software prompts.





FAQ

1. MindPX

Q: What is the environments requirements for MindPX? A: MindPX working temperature range: -10C ~ 100C; MindPX working humidity range: 10%~90% RH

Q: What is the maximum controllable range of MindPX A: 1~2km, depending on transmiting power of your remote controller

Q: What is the maximum flight speed? A: About 100km/h (depends on your rotors and frames)

Q: What is the hardware requirements for hardware ground station? A: MindPX can be connected to ground station via a USB cable, or a wireless data transmission module.

Q: Can navigation mode be interrupted?

A: You can switch mode using remote controller.

Q: What if MindPX loosing connection with remote controller during flight? A: MindPX will control the copter return to where it launches automatically in this case. Or you can also set it to auto landing as you demanded.

Q: How to retrieve MindPX source code and hardware schematics/layouts? A: You can download *source code* from: <u>https://github.com/airmind/MindPX</u> You can download schematics/*layouts* from: <u>https://github.com/airmind/Hardware</u>

2. Accessories

Q: What is the cruise time of battery in one charge, and how long it takes to charge a battery?

A: Typically for a 1500mah battery, the cruise time is about 15 minutes for normal load. It takes about 2 hrs to charge the battery to full.

Q: What if the copter ran out of battery?

A: MindPX will trigger alarm when battery level goes down below threshold. The flashing LED will turn yellow and buzzer beeps.

Q: Can MindPX filming from the air and transmit video back to ground? A: You can purchase additional video capture and transmitting devices and mount it onto the frame.