pixhawk

AUTOPILOT

QUICK START GUIDE

3D Robotics

PARTS

1 Pixhawk board with SD card
2 Buzzer
3 Safety switch
4 SD card USB adapter
5 Micro-USB cable
6 Six-wire cable x2
7 Power module
8 I²C splitter module
9 Four-position I²C splitter cable
10 Three-wire servo cable
11 Mounting foam

GETTING STARTED

With the help of APM firmware, Pixhawk turns any RC plane, copter, or rover into a full-featured personal drone. Once you have a fully-assembled frame, follow this guide to install Pixhawk.

1. Mount
2. Connect
3. Load firmware
4. Calibrate

1 MOUNT

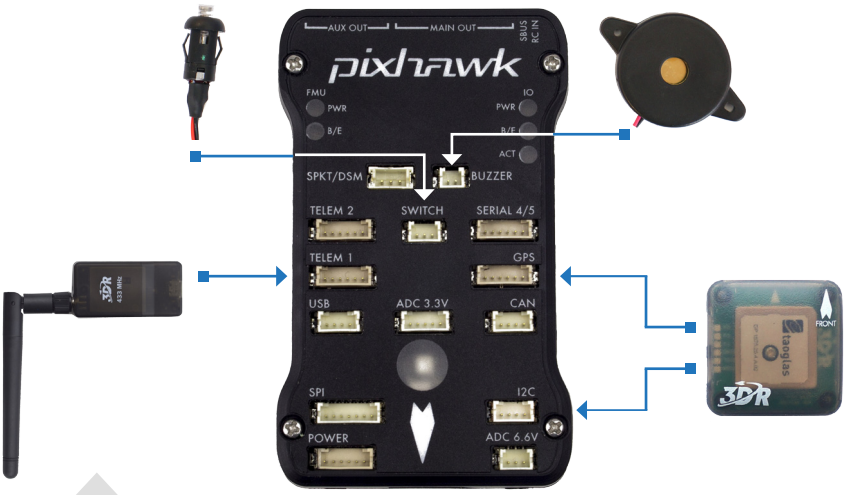
Use the provided foam to mount Pixhawk as close as possible to your vehicle's center of gravity. Make sure to orient the board with the arrow pointing forward.

Attach the foam squares to the corners of the board.

Vehicle front

2 CONNECT

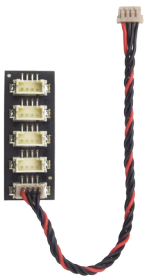
(Required) Connect the buzzer and safety switch.



(Optional) Connect a 3DR Radio to Pixhawk's Telem port using the 6-wire cable provided with your 3DR Radio Kit to receive data and communicate with the autopilot in flight.

(GPS or GPS+Compass required) Connect a 3DR GPS+Compass to provide the autopilot with positioning data during flight. This kit includes a 6-wire cable to connect the GPS ports. Connect the MAG to the I²C port using the 4-wire cable provided with the 3DR GPS+Compass.

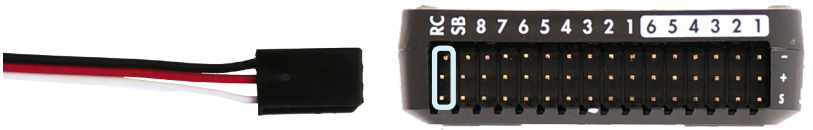
(Required) Connect the 3DR Power Module to the Power port using the 6-wire cable to direct power from your lithium polymer (LiPo) battery to the autopilot.



(Optional) The I²C splitter expands the I²C port to allow up to four additional peripherals to connect to Pixhawk. Use the 4-wire cable to connect the I²C splitter and add a compass module, external LED, digital airspeed sensor, or other peripherals to your vehicle.

CONNECT RADIO CONTROL

FOR PPM RC RECEIVERS AND FUTABA S.BUS RECEIVERS



Connect the ground (-), power (+), and signal (S) wires to the RC pins using the provided 3-wire servo cable.

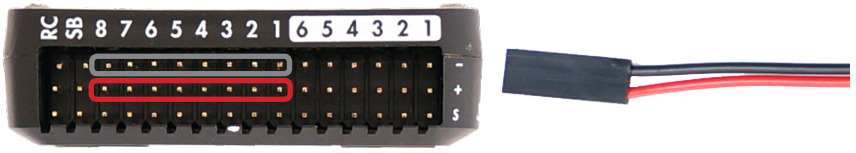
FOR SPEKTRUM SATELLITE RECEIVERS

For a Spektrum DSM, DSM2, or DSM-X Satellite RC receiver, connect to the SPKT/DSM port.

FOR PWM RECEIVERS

Purchase a PPM Encoder module to connect a PWM RC receiver to Pixhawk at store.3dr.com.

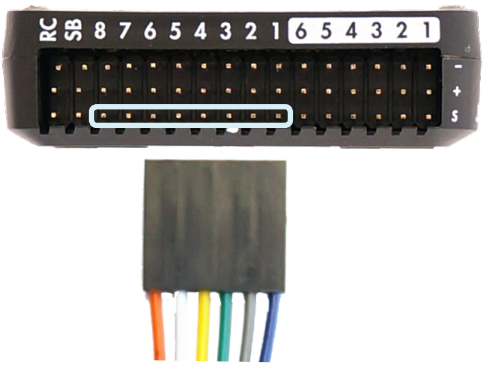
CONNECT PDB (COPTERS ONLY)



Connect the red and black 2-wire cable from the power distribution board (PDB) to any of Pixhawk's main ground (-, black wire) and power (+, red wire) output pins.

LEARN MORE
about assembling a copter with a power distribution board at 3dr.com/learn.

CONNECT OUTPUTS



FOR COPTERS

Connect each signal wire from the PDB to the main output signal (S) pins by motor number. Connect one wire for each motor to the corresponding pin.

Pin 1 = Motor 1
Pin 2 = Motor 2
Pin 3 = Motor 3
Pin 4 = Motor 4
Pin 5 = Motor 5
Pin 6 = Motor 6
Pin 7 = Motor 7
Pin 8 = Motor 8

FOR PLANES

For planes, connect the control channel wires to the main output signal pins.

Pin 1 = Aileron
Pin 2 = Elevator
Pin 3 = Throttle
Pin 4 = Rudder

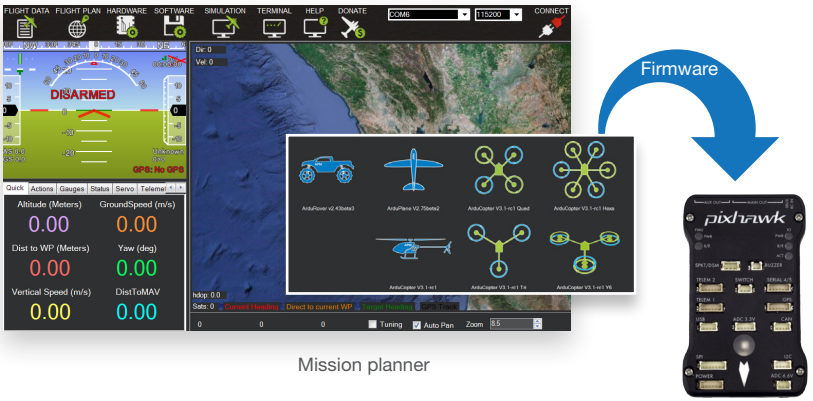
FOR ROVERS

For rovers, connect the throttle and steering wires to the main output signal pins.

Pin 3 = Throttle
Pin 4 = Steering

3 LOAD FIRMWARE

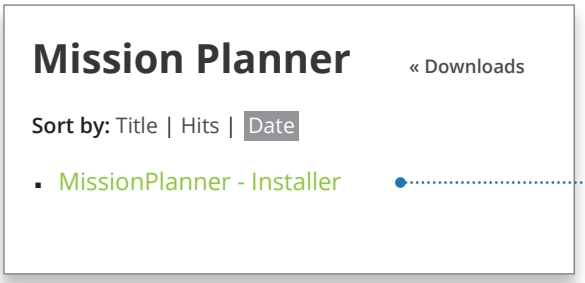
APM firmware is the brains of your autopilot operation and must be installed before using Pixhawk. To load firmware onto Pixhawk, install a mission planner application on your ground station computer. Choose either Mission Planner (Windows) or APM Planner for (Windows, Mac, and Linux). Both applications are available for free download from ardupilot.com.



Mission planner

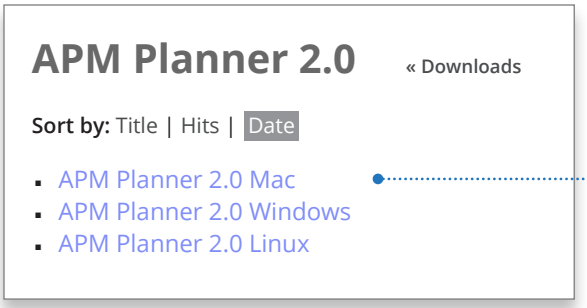
Download **Mission Planner** (Windows)

Ardupilot.com → Downloads → Mission Planner



Download **APM Planner** (Windows, Mac, and Linux)

Ardupilot.com → Downloads → APM Planner 2.0



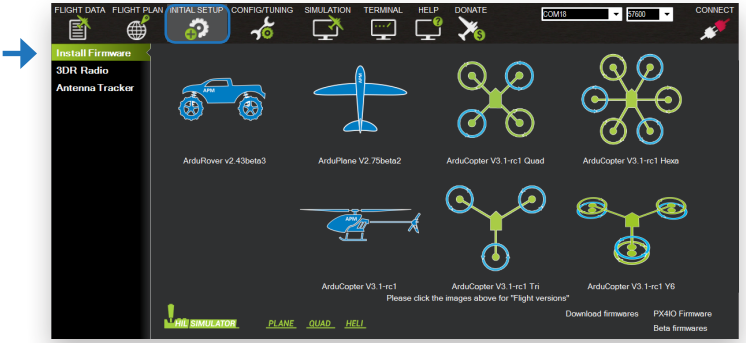
INSTALL PLANNER

After selecting the correct file, read the safety information and select Download.

Open the file to run the setup wizard. Proceed through any security warnings, and install all suggested drivers. When the installation is complete, open the application, and connect Pixhawk to your computer using the micro-USB cable.

Your computer will automatically install the correct drivers. Do not select Connect at this time; Pixhawk can only load firmware while unconnected to Mavlink.

Select Initial Setup, Install Firmware, and select your vehicle.



When prompted, follow the directions to load the firmware. Once the status bar shows that the download is complete, power cycle the board by disconnecting and reconnecting the USB.

If you hear a musical tone, your firmware installation is complete. If you hear a series of tones followed by three beeps, disconnect the USB and reconnect while holding down the safety button. Upon restart, listen for a series of tones followed by two beeps indicating that your firmware has loaded successfully.

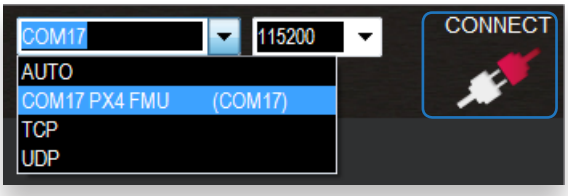
Everything is OK:
musical tone

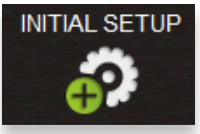
Pixhawk needs your attention:
beep BEEP beep... BEEP BEEP BEEP

beep BEEP beep...
BEEP BEEP

4 CALIBRATE

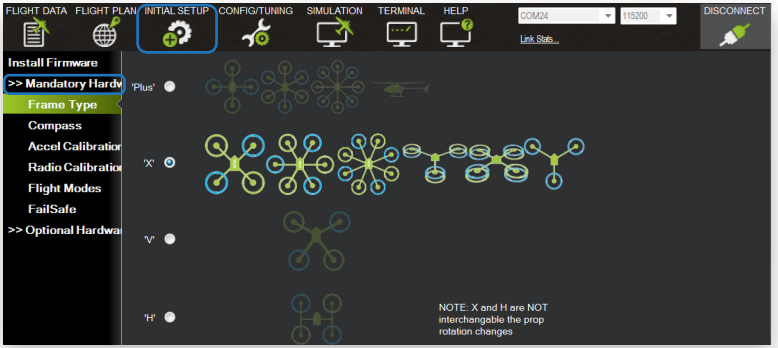
With Pixhawk connected to your computer, select the communication option from the drop-down menu for PX4 FMU, set the rate to 115200, and select the Connect icon. Select Initial Setup and Mandatory Hardware to access the calibration wizards.





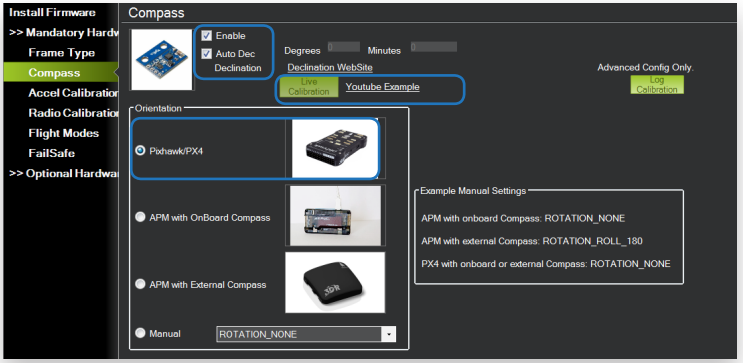
Remove propellers before performing calibration.

SELECT FRAME TYPE (COPTERS ONLY)



For copter, select your frame orientation.

CALIBRATE COMPASS

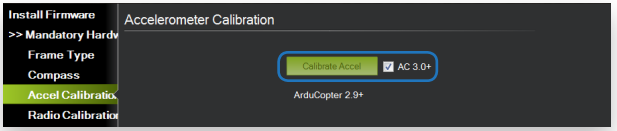


Select the options to enable the compass; to allow automatic declination calculation; and to specify Pixhawk. Select Live Calibration to launch the wizard, and follow the prompts.

Show Me

videos demonstrating live calibration techniques at 3dr.com/learn.

CALIBRATE ACCELEROMETER



Select Accel Calibration, check the box for AC 3.0+, select Calibrate, and follow the prompts to calibrate Pixhawk's accelerometer. Make sure to wait a couple of seconds before and after changing the positions of the vehicle.

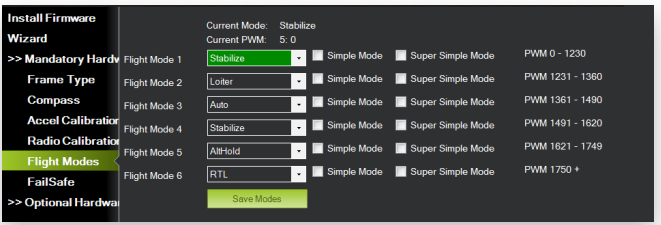
RC CALIBRATION

Left stick

Right stick

Select Radio Calibration to teach Pixhawk to work with your RC transmitter. Turn on your transmitter, select Calibrate Radio, and move all sticks and switches to their extreme positions. Select Click when Done once the red bars are set for all available channels.

SELECT FLIGHT MODES



Move each switch on your transmitter to its available positions. The mission planner will indicate the currently selected position with green highlighting. Select a mode for each switch position, and select Save Modes to assign.

LED MEANINGS

Flashing red and blue: initializing. Please wait.

Double flashing yellow: error. System refuses to arm.

Flashing blue: disarmed, searching for GPS. Autonomous, loiter, and return-to-launch modes require GPS lock.

Flashing green: disarmed, GPS lock acquired. Ready to arm. Quick double tone when disarming from the armed state.

Solid green plus single long tone: armed with GPS lock. Ready to fly!

Flashing yellow: RC failsafe activated.

Flashing yellow plus quick repeating tone: battery failsafe activated.

Flashing yellow and blue plus high-high-high-low tone: GPS glitch or GPS failsafe activated.

SAFETY SWITCH MEANINGS

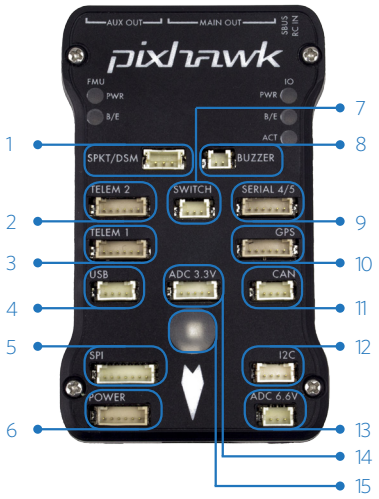
Quick, constant blinking: performing system check. Please wait.

Intermittent blinking: system ready. Press the safety button to activate.

Solid: ready to arm. Proceed to the arming procedure.

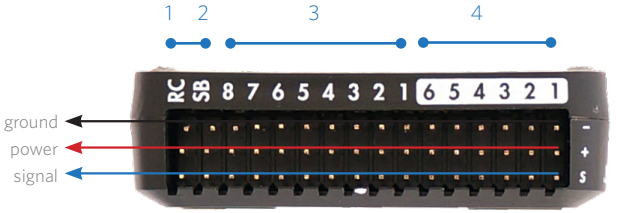
Learn more
about LED meanings and buzzer tones at **3dr.com/learn**.

PORTS



1 Spektrum DSM receiver
2 Telemetry (radio telemetry)
3 Telemetry (on-screen display)
4 USB
5 SPI (serial peripheral interface) bus
6 Power module
7 Safety switch button
8 Buzzer
9 Serial
10 GPS module
11 CAN (controller area network) bus
12 I²C splitter or compass module
13 Analog to digital converter 6.6 V
14 Analog to digital converter 3.3 V
15 LED indicator

1 Input/output reset button
2 SD card
3 Flight management reset button
4 Micro-USB port



1 Radio control receiver input
2 S.Bus output
3 Main outputs
4 Auxiliary outputs

SPECIAL NOTE

Please note that these instructions describe basic setup for Pixhawk and do not represent the complete set of configuration procedures required to build a copter, plane, or rover.

For more information on ESC calibration, battery monitoring, failsafes, mode descriptions, and more, visit **ardupilot.com**. Do not operate your vehicle without a complete understanding of the online instructions.

SPECIFICATIONS

Processor

32-bit ARM Cortex M4 core with FPU
168 Mhz/256 KB RAM/2 MB Flash
32-bit failsafe co-processor

Sensors

ST Micro 16-bit gyroscope
ST Micro 14-bit accelerometer/magnetometer
MEAS barometer
MPU6000 accelerometer/magnetometer

Power

Ideal diode controller with automatic failover
Servo rail high-power (7 V) and high-current ready
All peripheral outputs over-current protected, all inputs ESC protected

Interfaces

5x UART serial ports, 1 high-power capable, 2x with HW flow control
Spektrum DSM/DSM2/DSM-X Satellite input
Futaba S.BUS input and output
PPM sum signal
RSSI (PWM or voltage) input
I^2C, SPI, 2x CAN, USB
3.3 and 6.6 ADC inputs

Dimensions

Weight 38 g (1.3 oz)
Width 50 mm (2.0”)
Height 15.5 mm (.6”)
Length 81.5 mm (3.2”)

SUPPORT

For more information about Pixhawk and other documentation, visit 3dr.com/learn. For more instruction on using APM firmware and planner software, visit **ardupilot.com**.

For customer support, contact us at help@3dr.com or call our support line at +1 (858) 225-1414 Monday through Friday, 8 am to 5 pm, PST