

**POWERCUBE ONE / POWERCUBE VR**

This short manual shows the necessary steps to get our two carrier boards running with **QGroundControl** and **PX4**.

These steps must be completed before proceeding with the instructions:

- **Select the aircraft type**
- **Calibrate the accelerometers**

You will see this screen once these steps have been completed:

< Exit Vehicle Configuration

Summary

Airframe

Sensors

Radio

Flight Modes

Power

Actuators

Safety

PID Tuning

Parameters

Firmware

WARNING: Your vehicle requires setup prior to flight. Please resolve the items marked in red using the menu on the left.

Airframe

System ID: 1

Airframe type: Standard Plane

Vehicle: Generic Standard Plane

Firmware Version: 1.16.1rc

Custom Fw. Ver.: 0.0.0

Sensors

Compass: Ready

Gyro: Ready

Accelerometer: Ready

Airspeed: Setup required

Radio

Roll: Setup required

Pitch: Setup required

Yaw: Setup required

Throttle: Setup required

Flaps: Disabled

Aux1: Disabled

Aux2: Disabled

Flight Modes

Mode switch: Setup required

Flight Mode 1: Unassigned

Flight Mode 2: Unassigned

Flight Mode 3: Unassigned

Flight Mode 4: Unassigned

Flight Mode 5: Unassigned

Flight Mode 6: Unassigned

Power

Battery Source: Power Module

Battery Full: 4.05 V

Battery Empty: 3.60 V

Number of Cells: 0

Safety

Low Battery Failsafe: Warning

RC Loss Failsafe: Return mode

RC Loss Timeout: 0.5 s

Data Link Loss Failsafe: Disabled

RTL Climb To: 100.0 m

RTL Then: Loiter and do not land

Loiter Alt: 100.0 m

## 1. Activate the S.BUS output

PWM\_SBUS\_MODE Cancel Save

Enabled Reset To Default

Set to 1 to enable S.BUS version 1 output instead of RSSI.

Default: 0

Warning: Modifying values while vehicle is in flight can lead to vehicle instability and possible vehicle loss. Make sure you know what you are doing and double-check your values before Save!

☐ Advanced settings

## 2. Calibrate your radio

Depending on the selected aircraft type you have to learn your controls to the Flightcomputer. Example:

Radio Config

Radio Setup is used to calibrate your transmitter. It also assign channels for Roll, Pitch, Yaw and Throttle vehicle control as well as determining whether they are reversed.

Attitude Controls

Roll

Pitch

Yaw

Throttle

Skip Cancel Calibrate

Additional Radio setup:

Flaps channel

AUX1 Passthrough RC channel

AUX2 Passthrough RC channel

PARAM1 tuning channel

PARAM2 tuning channel

PARAM3 tuning channel

Spektrum Bind CRSF Bind Copy Trims

Mode 1

Mode 2

Channel Monitor

|    |  |    |  |
|----|--|----|--|
| 1  |  | 2  |  |
| 3  |  | 4  |  |
| 5  |  | 6  |  |
| 7  |  | 8  |  |
| 9  |  | 10 |  |
| 11 |  | 12 |  |
| 13 |  | 14 |  |
| 15 |  | 16 |  |
| 17 |  | 18 |  |

Unassigned

Unassigned

Unassigned

Unassigned

Unassigned

Unassigned

Once finished you should be able to control the outputs already in the Bypass mode.

**Note:** If the PowerCube is in standard configuration the channels will show up in following pattern:

- 1 = Output A
- 2 = Output B
- 3 = Output C ...

### 3. Set your Control functions

Depending on your aircraft type and your radio control channel assignment you have to set the controls in the flight computer.

#### Actuators Config

Geometry: Fixed Wing

Motors: 1

Motor 1:

Control Surfaces: 4

| Type                   | Roll Torque | Pitch Torque | Yaw Torque | Trim |
|------------------------|-------------|--------------|------------|------|
| Servo 1: Left Aileron  | -0.50       |              |            | 0.00 |
| Servo 2: Right Aileron | 0.50        |              |            | 0.00 |
| Servo 3: Elevator      |             | 1.00         |            | 0.00 |
| Servo 4: Rudder        |             |              | 1.00       | 0.00 |

Actuator Testing

☐ Propellers are removed - Enable sliders

All Motors

Motor 1

Left Aileron

Right Aileron

Elevator

Rudder

RC Flaps

RC AUX 1

RC AUX 2

RC AUX 3

RC AUX 4

RC AUX 5

RC AUX 6

#### Actuator Outputs

PWM AUX | **PWM MAIN** | UAVCAN

MAIN 1-2: PWM 100 Hz

| Function              | Disarmed | Minimum | Maximum | Rev Range (for Servos)   |
|-----------------------|----------|---------|---------|--------------------------|
| MAIN 1: Right Aileron | 1500     | 1000    | 2000    | <input type="checkbox"/> |
| MAIN 2: Elevator      | 1500     | 1000    | 2000    | <input type="checkbox"/> |

MAIN 3-4: PWM 100 Hz

| Function             | Disarmed | Minimum | Maximum | Rev Range (for Servos)   |
|----------------------|----------|---------|---------|--------------------------|
| MAIN 3: Left Aileron | 1500     | 1000    | 2000    | <input type="checkbox"/> |
| MAIN 4: Rudder       | 1000     | 1000    | 2000    | <input type="checkbox"/> |

MAIN 5-8: PWM 100 Hz

| Function         | Disarmed | Minimum | Maximum | Rev Range (for Servos)   |
|------------------|----------|---------|---------|--------------------------|
| MAIN 5: Motor 1  | 1000     | 1000    | 2000    | <input type="checkbox"/> |
| MAIN 6: RC Flaps | 1000     | 1000    | 2000    | <input type="checkbox"/> |
| MAIN 7: Disabled | 1000     | 1000    | 2000    | <input type="checkbox"/> |
| MAIN 8: Disabled | 1000     | 1000    | 2000    | <input type="checkbox"/> |

#### 4. Set the battery monitor

Unfortunately, PX4 doesn't support the full DroneCan messages for battery status. Only one of the two batteries can be seen in the telemetry fields on the main screen. Using the analog inputs from the Cube shows the correct analog data in the MavLink console **[board\_adc test]** but doesn't show them in the telemetry fields on the main screen.

To show at least one of the two batteries activate the CAN-Bus function:

|                  |                        |                                              |
|------------------|------------------------|----------------------------------------------|
| UAVCAN_BITRATE   | 1000000 bit/s          | UAVCAN CAN bus bitrate                       |
| UAVCAN_ENABLE    | Sensors Automatic ...  | UAVCAN mode                                  |
| UAVCAN_LGT_ANTCL | When autopilot is p... | UAVCAN ANTI_COLLISION light operating mode   |
| UAVCAN_LGT_LAND  | Always off             | UAVCAN LIGHT_ID_LANDING light operating mode |
| UAVCAN_LGT_NAV   | Always on              | UAVCAN RIGHT_OF_WAY light operating mode     |
| UAVCAN_LGT_STROB | When autopilot is a... | UAVCAN STROBE light operating mode           |
| UAVCAN_NODE_ID   | 1                      | UAVCAN Node ID                               |
| UAVCAN_PUB_ARM   | Disabled               | publish Arming Status stream                 |
| UAVCAN_PUB_MBD   | Disabled               | publish moving baseline data RTCM stream     |
| UAVCAN_PUB_RTCM  | Disabled               | publish RTCM stream                          |
| UAVCAN_SUB_ASPD  | Enabled                | subscription airspeed                        |
| UAVCAN_SUB_BARO  | Disabled               | subscription barometer                       |
| UAVCAN_SUB_BAT   | Raw data               | subscription battery                         |
| UAVCAN_SUB_BTN   | Disabled               | subscription button                          |
| UAVCAN_SUB_DPRES | Disabled               | subscription differential pressure           |
| UAVCAN_SUB_FLOW  | Disabled               | subscription flow                            |
| UAVCAN_SUB_FUEL  | Disabled               | subscription fuel tank                       |
| UAVCAN_SUB_GPS   | Enabled                | subscription GPS                             |
| UAVCAN_SUB_GPS_R | Enabled                | subscription GPS Relative                    |
| UAVCAN_SUB_HYGRO | Disabled               | subscription hygrometer                      |
| UAVCAN_SUB_ICE   | Disabled               | subscription ICE                             |
| UAVCAN_SUB_IMU   | Disabled               | subscription IMU                             |
| UAVCAN_SUB_MAG   | Enabled                | subscription magnetometer                    |
| UAVCAN_SUB_RNG   | Disabled               | subscription range finder                    |

In this example we use the CAN-ASA as an airspeed sensor, for this we activate **UAVCAN\_SUB\_ASPD**.

**Note:** Without an airspeed sensor, the flight computer cannot be activated unless the airspeed measurement is completely deactivated.

## 5. Set the battery type

As a next step – set the battery type:

|                  |             |                                                                   |
|------------------|-------------|-------------------------------------------------------------------|
| BAT1_A_PER_V     | -1.00000000 | Battery 1 current per volt (A/V)                                  |
| BAT1_CAPACITY    | -1 mAh      | Battery 1 capacity                                                |
| BAT1_N_CELLS     | 2S Battery  | Number of cells for battery 1                                     |
| BAT1_R_INTERNAL  | -1.0000 Ohm | Explicitly defines the per cell internal resistance for battery 1 |
| BAT1_SOURCE      | External    | Battery 1 monitoring source                                       |
| BAT1_V_CHARGED   | 4.05 V      | Full cell voltage                                                 |
| BAT1_V_DIV       | -1.00000000 | Battery 1 voltage divider (V divider)                             |
| BAT1_V_EMPTY     | 3.60 V      | Empty cell voltage                                                |
| BAT2_A_PER_V     | -1.00000000 | Battery 2 current per volt (A/V)                                  |
| BAT2_CAPACITY    | -1 mAh      | Battery 2 capacity                                                |
| BAT2_N_CELLS     | Unknown     | Number of cells for battery 2                                     |
| BAT2_R_INTERNAL  | -1.0000 Ohm | Explicitly defines the per cell internal resistance for battery 2 |
| BAT2_SOURCE      | Disabled    | Battery 2 monitoring source                                       |
| BAT2_V_CHARGED   | 4.05 V      | Full cell voltage                                                 |
| BAT2_V_DIV       | -1.00000000 | Battery 2 voltage divider (V divider)                             |
| BAT2_V_EMPTY     | 3.60 V      | Empty cell voltage                                                |
| BAT3_CAPACITY    | -1 mAh      | Battery 3 capacity                                                |
| BAT3_N_CELLS     | Unknown     | Number of cells for battery 3                                     |
| BAT3_R_INTERNAL  | -1.0000 Ohm | Explicitly defines the per cell internal resistance for battery 3 |
| BAT3_SOURCE      | Disabled    | Battery 3 monitoring source                                       |
| BAT3_V_CHARGED   | 4.05 V      | Full cell voltage                                                 |
| BAT3_V_EMPTY     | 3.60 V      | Empty cell voltage                                                |
| BAT_AVRG_CURRENT | 15.00 A     | Expected battery current in flight                                |
| BAT_CRIT_THR     | 7.00 %      | Critical threshold                                                |
| BAT_EMERGEN_THR  | 5.00 %      | Emergency threshold                                               |
| BAT_LOW_THR      | 15.00 %     | Low threshold                                                     |

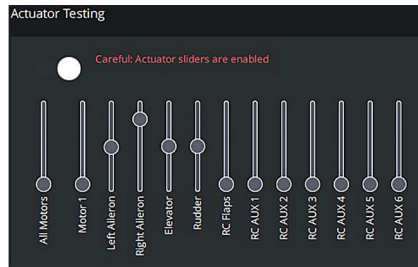
Restart the flight computer now:

|                                       |
|---------------------------------------|
| Refresh                               |
| Reset all to firmware's defaults      |
| Reset to vehicle's configuration d... |
| Load from file for review...          |
| Save to file...                       |
| Clear all RC to Param                 |
| Reboot Vehicle                        |

You can see the battery voltage here and in the Log-Data:



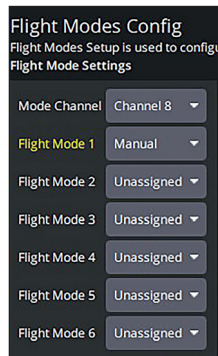
Also, you can manually check the servo outputs here:



## 6. Set a Flight mode

To control the outputs from the radio through the flight computer, two more things are necessary.

At least one flight mode (manual control) is necessary:



## 7. Arm the aircraft

Last but not least **ARM** the aircraft. If the default settings have not been changed, the model is **armed** using the rudder stick. Hold the rudder stick to the **right** for 2 seconds to arm the outputs. Hold it to the **left** for 2 seconds to **disarm** the outputs again.

**Ensure that no propellers are mounted during the setup phase if electric motors are used!**

Your PowerCube is now set up and ready for use. You can now adjust all other settings to suit your aircraft.

For technical questions you can contact us here:  
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