

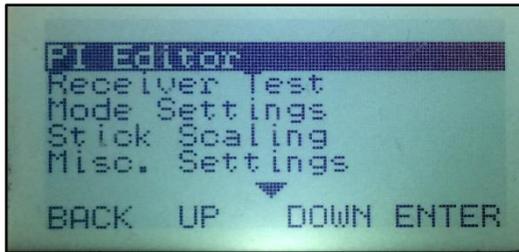
PI Settings - Tuning Guide for KK2.1.X

The **PI Editor** enables you to adjust the control loop feedback parameters for Roll, Pitch and Yaw. The **Proportional term (P)** produces an output value that is proportional to the current error value. A high proportional gain results in a large change in the output for a given change in the error. If the proportional gain is too high, the multicopter will overshoot and start to oscillate. Since the control loop compensates for errors 400 times a second, too high a **“P Gain”** will result in a high frequency oscillation. If the proportional gain is too low, the control action will be too slow to react on the multicopter, and it will be difficult to control.

The contribution from the **Integral term (I)** is proportional to both the magnitude of the error and the duration of the error. The integral in a **PI controller** is the sum of the instantaneous error over time and gives the accumulated offset that should have been corrected previously. If the integral term is too high, the multicopter will start to oscillate. Since the **I term** is related to the duration of the error over time, too high an **“I Gain”** will result in a low frequency oscillation. Too low an **“I Gain”** will result in a less “locked in” feeling.

If you wish to fine tune your PI Settings:

1. With **PI Editor** selected, click the **ENTER** button.



2. Using the **PREV**, **NEXT**, and **CHANGE** buttons, enter the following values:

Note: Pitch and Roll Axes are linked together so when one is adjusted, the other will be likewise automatically adjusted. Yaw has its own dedicated adjustment screen.

Roll/Pitch P-Tuning:

Reset the Gains and Limits to the following values:

Axis: Roll (Aileron)	Axis: Pitch (Elevator)	Axis: Yaw (Rudder)
P Gain: 30	P Gain: 30	P Gain: 50
P Limit: 100	P Limit: 100	P Limit: 20
I Gain: 0	I Gain: 0	I Gain: 0
I Limit: 20	I Limit: 20	I Limit: 10

Now, increase **Roll/Pitch P-Gain** by 10 at a time, and test your aircraft response by hovering and move the left stick in short fast movements.

As you increase the **P-Gain**, you will notice:

1. The aircraft reacts faster and feels more connected to the stick movement and will wander less on its own.
2. The aircraft may oscillate for a short time. If it oscillates continuously, the **P-Gain** is too high.
3. The aircraft may be harder to land, it bounces back when touching down.
4. The aircraft may climb.

When the aircraft has a good response, and does not oscillate or climb when testing, the **P-Gain** is good.

Roll/Pitch I-Tuning:

1. Trim it level.
2. Fly fast forward and center the stick.

If it levels itself, increase the **I-Gain**.

If it stays in attitude, the **I-Gain** is good.

- (Alternatively, you can set the **I-Gain** to 50-100% of **P-Gain**).

Yaw P-Tuning:

Increase **Yaw P-Gain** by 10 at a time, and test your aircraft response by hovering, then moving the Yaw control stick until it has yawed about a quarter of a circle, and then center it.

As you increase the **P-Gain** you will notice:

1. The aircraft starts and stops faster.
2. The aircraft overshoots less.
3. The aircraft may start to climb or descend.

When the aircraft has a good response, has a minimum of overshoot and does not climb or descend, **P-Gain** is good.

- (Alternatively, you can set it to 100% of Roll/Pitch P-Gain).

Yaw I-Tuning:

Increase **Yaw I-Gain** by 10 at a time, and do the same test as above.

When the aircraft overshoots even less, the **I-Gain** is good.

- (Alternatively, you can set it to 100% of Yaw P-Gain).

A good YouTube video for this is:

<https://www.youtube.com/watch?v=0W7PiV6qvWc>