

# Brushless setup

The h8, h101 and stm32 based boards could be used with brushless escs with some modifications. Depending on the board, inverted flight might also be supported.

## H8 boards (green)

The h8 boards need a “esc driver” replacing the normal pwm driver file. From the hardware point, the output could be before or after the FETs. If after, a pullup resistor needs to be installed, of 100 - 1000 ohms, and the capacitor, present across the motors, removed. The h8 board supports non inverted flight only.

## H101 boards

The H101 setup is similar to the H8, except it also supports inverted flight, using bidirectional escs. It can also work upright only, using “normal” escs.

## STM32 boards

The stm32 port has the esc driver built in, it just needs to be enabled in hardware.h. From the hardware point, the same options apply, before / after fets and pull-ups. This port supports non-inverted flight only. Additional options exist in the “drv\_esc.c” file, such as PPM limits.

## OneShot 125 note

The blheli escs are not supposed to work with oneshot125 and loop times under 1100. This is the case of this firmwares, in this case, to use oneshot125, the escs have to be flashed with PWM input “OFF”

## Using PWM input

The blheli escs can also be flashed to support “pwm” input, and in such case the esc driver is unnecessary. The motor minimum should be changed from zero to a slightly higher value. To enforce the minimum motor limit in config.h uncomment the following:

```
// limit minimum motor output to a value (0.0 - 1.0)
#define MOTOR_MIN_ENABLE
#define MOTOR_MIN_VALUE 0.05
```

The 0.05 value ( 5%) may need to be adjusted slightly. Use throttle test feature to check for motor start.

The same before/after fets signal options apply. A pwm frequency of 8Khz should be used in the quad code. The pwm input only recognizes certain frequencies.

## PPM limits

The PPM limits are usually found in the esc driver file, and should be set correctly. They do not necessarily correspond with the esc set limits, they may be slightly different. Especially important is the “minimum” limit, as the brushless motors should never stop in flight. The minimum limit should be set slightly higher in the code for this reason. A throttle check should be used to make sure the motors never stop above zero throttle.

## Bidirectional escs

Only the h101 code currently supports inverted flight and bi-directional escs. Not all escs/motors combinations will be able to reverse direction in the short amount of time needed, I recommend damped light as a esc feature as it will improve changeover time.

## BLheli notes

BLheli has option to use "pwm input", PPM input is always enabled. Oneshot125 is also always enabled, and autodetected, but may interfere with the pwm input. BLheli will autodetect the input type after powerup. "Enable pwm input" should be set to off if not used, and "programming by tx" unchecked as well.

## Safety

Keep in mind not to flash the fc with the escs powered.

In the H101 and the current CG023 , the FC will turn off PPM at failsafe and before bind, so it should be safe to flash, but just in case, I don't recommend. However, not safe if the tx is bound and on.

The h8green , and currently blue as it has not been updated, they are not safe to flash while the escs are powered. It's rare, but they can turn on (full power) if the signal cuts off at just the right time.

Always consider that the quad may malfunction, and may go full power suddenly. Do not flash the quad with the escs connected/powered. Always remove props when testing. Do not fly quads that have severe oscillation/wobbles.

Remember, this is **experimental**.

## Links

H101 esc driver : ([rcgroups](#))

H8 mini green board esc driver: ([rcgroups](#))

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