

# **KISS ESC**

## **KISS - Keep it super simple. Manual v1.2 for the 24A Race Edition**

### **Scope of Delivery:**

1x KISS ESC 24A RE assembled board

### **Special Features:**

- 32-bit ARM Cortex MCU @48Mhz
- Telemetry capability (voltage, current, temp, rpm)
- Overcurrent protection (measures the current and reduces it to max 30A)
- Over temperature protection (reduces the max power if hotter then 120°C)
- expanded adaptive auto timing (3,25-30° advance will be calculated on each commutation)
- For Race Multicopters (24A continuous also with bad cooling \*)
- High max. RPM (450.000ERpm, 64.000Rpm with a 14Pol Motor)
- Small size (19 x 27 mm)
- Accurate RPM control (~ 950 steps)
- No additional capacitor needed\*\*
- Very fast throttle response
- Linear throttle response
- Active freewheeling (low diode losses)
- Regenerative braking
- Fast FET switching because of the use of gate drivers
- 2-5S LiPo \*\*
- Oneshot42, Oneshot125 and normal (25 – 500Hz) PWM autodetected.

(\*\*) For very long LiPo power lines (more than 20cm) or for smoothing the power supply, attache a 100 - 400µF Low ESR 25V (or more) electrolytic capacitor to the power pads.

Caution! When used with 5S lipo, the use of a electrolytic capacitor is recommended.

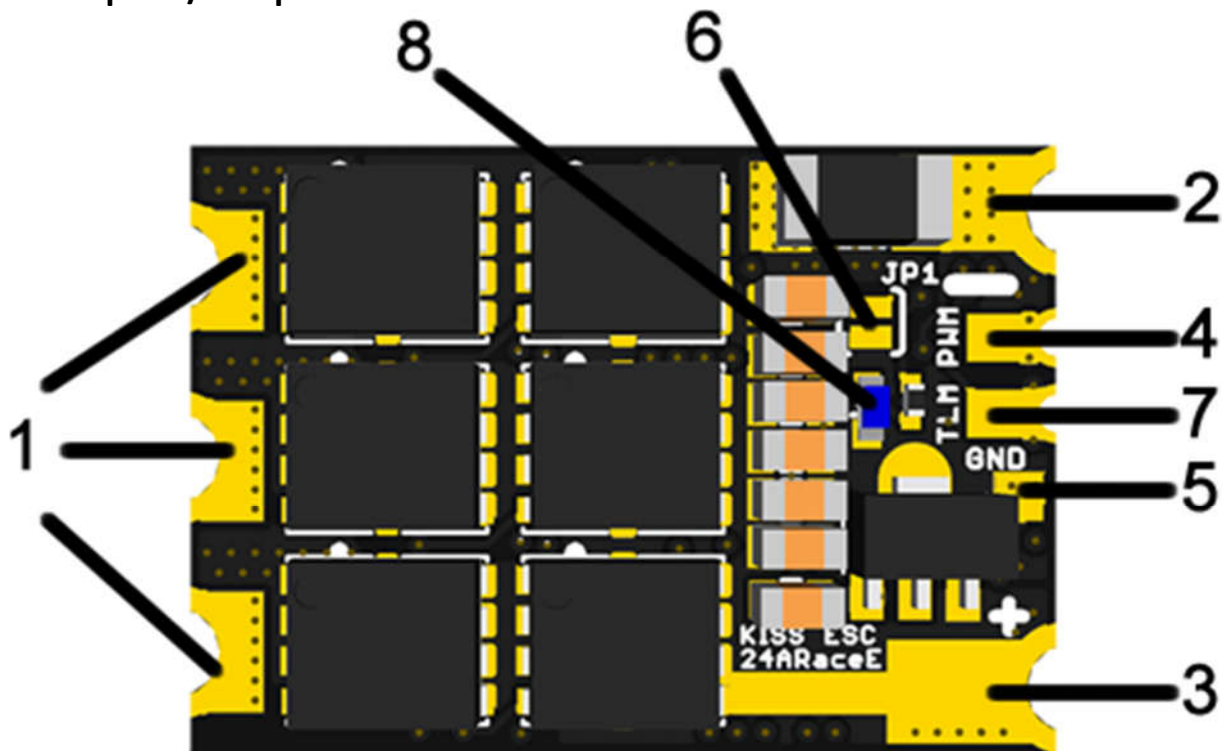
(\*) e.g. When mounted between two CF plates

### **Safety Warnings:**

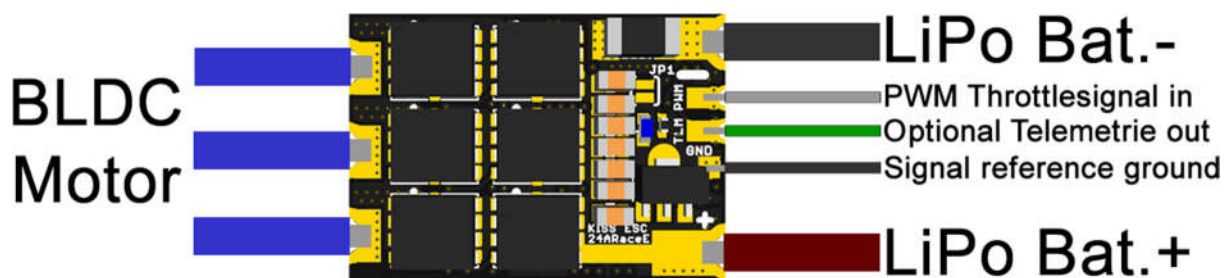
- Due to the regenerative braking, the KISS ESC should only be powered by LiPo batteries. A power supply might get damage when braking. The ESC takes care of itself.

- Never start a brushless motor in your hands!
- While starting up with propellers mounted, always care for distance yourself and objects
- Never power up your ESC/speed controllers without a valid signal transmitter (receiver or FC) is connected.
- The KISS ESC can be locally heated up to 80 ° C during operation!
- While soldering do not connect a voltage source at the ESC / speed controller.
- Some components on the KISS ESC can be destroyed by static charge. When handling such electronics, make sure to be grounded.

### Description/Components:



1. Solder contacts for motor-phase connections
2. LiPo Power supply GND -
3. LiPo Power supply +
4. PWM signal input (servo signal)
5. PWM signal GND (ground reference)
6. Solder jumper, to set the direction of rotation (also in 3D mode)
7. Telemetry (e.g. On the KISS FC connected to TRX)
8. Status LED (indicates validity of the input signal)



### Commissioning of the ESC / speed controller for a brushless electric motor:

- Soldering each of the three motor cables a motor to each one of the three solder pads (1)
- LiPo power cable with plug solder (2 + 3). IMPORTANT !!! Note polarity, otherwise the ESC / controller is immediately destroyed when connecting the power supply. The LiPo can also be damaged.
- Solder signal cable, white or yellow cable (4), the black wire to (5)

### ESC/Speed Controller Settings:

- Programming the throttle path (stick Programming)  
Optional: 3D Mode
- Set the direction of motor rotation (6)

IMPORTANT !!! Change motors setting without propeller mounted, risk of injury!

A) Since the KISS24A RE have very accurate resonators, a throttle calibration isn't really needed. The default setting is 1000 $\mu$ S Min signal, 1050 $\mu$ S Start signal and 2000 $\mu$ S full Throttle signal.

To teach the transmitter path (throttle path) the ESC / controller must be connected to a receiver or FC, set the throttle signal at full throttle (peak throttle). Connect the LiPo to the ESC / controller. A beep indicates the confirmation that the programming mode is activated. Now reduce the throttle signal to minimum (normally 1000 $\mu$ s), and wait for the restart of the speed controller (audible signal high-low-high). The throttle pas is now programmed and the ESC/controller is ready for use.

Caution: The loads that arise for the ESC in the 3D mode, are up to 3 times higher!

3D mode: After the throttle travel has been programmed as described, the 3D mode can be activated as follows: Disconnect the power supply, put the transmitter signal at full throttle, connect power again, wait for the beep. Adjusting the throttle to the middle position (half throttle path) and wait for restart of the ECS/ speed controller (signal: high-low-high). The 3D mode is now active. Important! Speed controller now starts only at the throttle center position. Deactivation: Teach new master travel (A).

**B)** On delivery status JP1 (6) is open. If a change of direction of motor rotation is desired, the jumper can be closed. Close the jumper by adding solder to the pads → building a solder bridge

### Functionality:

After powering up the KISS ESC (attaching a Lipo battery) the LED (8) lights up for about half a second and the motor beeps (high-low-high). This signaled the ESC receives a valid PWM / servo signal, the LED (8) lights up again and stays on. About the engine, another longer beep is heard. Now the KISS ESC is armed and ready to start the engine. If the LED goes out it means that either the input signal is no longer valid or that the engine does not respond as expected (starts). If the motor is blocked while running (eg crash), the KISS ESC disable after several failed start attempts, to protect the engine from damage.

### Technical Details:

- Operating voltage 6 - 25V
- Maximum continuous current 24A
- Instantaneous maximum current 30A active limited
- 500000 ERPM maximum field speed (use to 450000 recommended)

### Failure Analysis :

#### Error:

#### Solution:

The ESC shows no reaction

Check the power supply (LiPo terminal 2 and 3)  
LiPo connected?

The LED (8) lights up after connecting the power plug but then stays off.

1. Check signal connections (4 or 5).  
2. Teach the master travel again (see ESC/ speed controller settings).

The engine trundles only and does not rotate properly

Check the 3 motor connections (1) on contact (some motor cables are painted and must be stripped).

The Copter loses power after some time and the LED(8) on the ESC flickers when i come down.

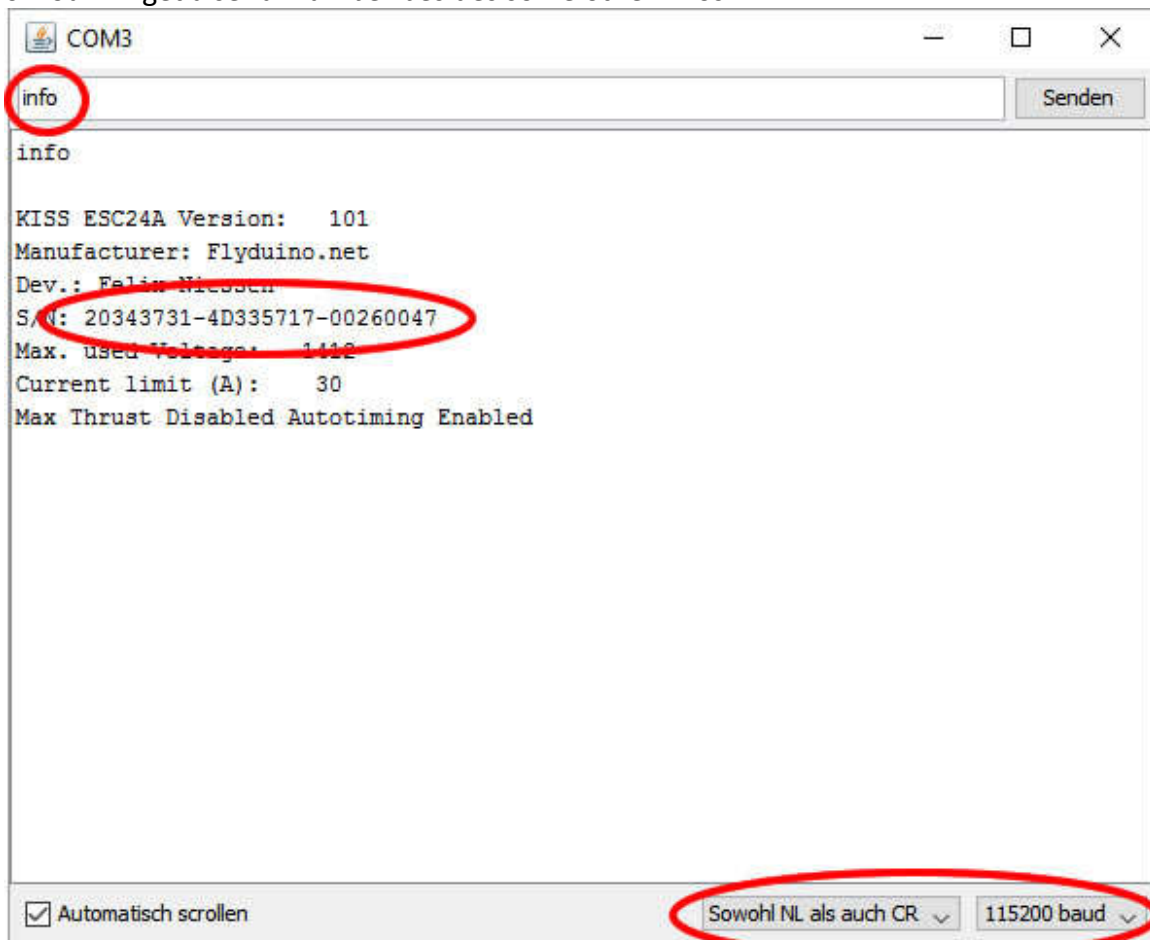
The ESC goes into its temperature protection.  
Reduce the load or give it more cooling.

1. if you use 5S you might use a external capacitor, or if you already have one it might be to weak.

2. the ESC might go to its overcurrent protection. In this case it reduces its max current to 30A. This reduction can confuse the FC. Please lower the load in this case.

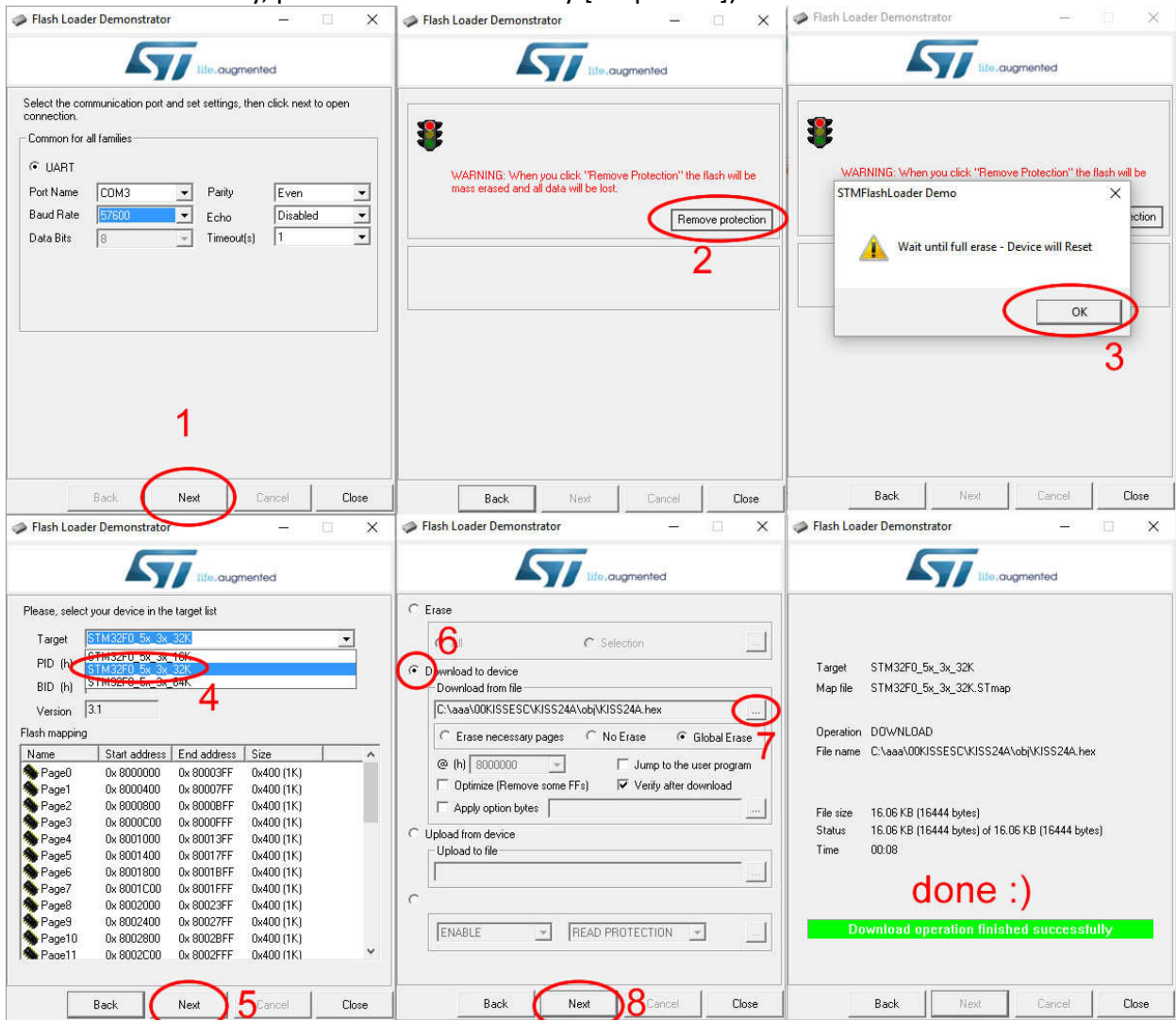
### DIY Instructions: Flashing the KISS ESC 24A

1. Connect the USB-UART to one ESC (RX-TX TX-RX and GND-GND)
2. Unmount all propellers!
3. Connect the USB- UART to your computer and then power the ESC.
4. Wait 5seconds and open a serial monitor (Putty or arduino serial monitor) with 115200 baud and linwrap enabled.
5. Type in "info" without the ""
6. You will get a serial number besides some other infos.



Note that serial number and repeat this process for all ESC's you like to update.

7. If you have all serial numbers, go to <http://ultraesc.de/hexGen/index.php>, enter your serial numbers and press "get hexfile"
8. You will get a hex file that will work on the ESC's with the entered serial numbers.
9. Download and install <http://www.st.com/web/en/catalog/tools/PF257525>
10. Connect one ESC to the USB UART and close its boot jumper (BT on the bottom side) before you power it. then flash the new hex file (if the demonstrator doesn't find the 32k stm32f051 variant automatically, please select it manually [dropdown])



11. open the boot jumper and you are done