感谢您使用本产品！无刷动力系统功率强大，错误的使用可能造成人身伤害和设备损坏。为此，我们强烈建议您 在使用设备前仔细阅读本说明书，我们不承担因使用本产品而引起的任何责任，包括但不限于对附带损失或间接损失 的赔偿责任；同时，我们不承担因擅自对产品进行修改和错误使用所引起的任何责任。

我们有权在不经通知的情况下变更产品设计、外观、性能及使用要求。

接口定义

接口①：

- 浅蓝色：CAN_L
- 深蓝色：CAN_H
- 黑 色：GND-隔离参考地

接口②：

- 白色：输入电压3.3-5V，电流≤5mA，仅供串口数据输出端口使用。
- 红色：输出电调的实时工作状态信息，电平由隔离供电电压决定。
- 黑色：GND-隔离参考地。

接口③：

- 黄色：PWM/TTL-RX，接收PWM，1000-2000us（可校准），50-400Hz，3.3-5V电平。
- 黑色：GND-隔离参考地

数据输出

- 数据输出采用3线制UART-TTL，波特率38400bps，字符方式。
- 数据包格式：SPD：XXXX TMOS：XXXX TMOT：XXXXTMCX：XXXXXXXXXXXXXXXX CURI：XXXX VOLT：XXXX PWAC：XXXXX SYS：XXXXXXXXXXXX DBG：XXXXXXXXXXXX
  其中：
  SPD：XXXX 电机转速（RPM，误差±12RPM，按电机极数42P换算得出）
  TMOS：XXXX 电调温度（°C,误差±1°C）
  TMOT：XXXX 电机温度（°C,误差±1°C,保留数据）
  TMCX：XXXXXXXXXXXX （调试数据）
  CURI：XXXX 电机电流（X0.01A,误差±10%,主要用于电调的过流保护）
  VOLT：XXXX 电源电压（X0.01V,误差±0.5V）
  PWAC：XXXX （调试数据）
  SYS：XXXXXXXXXXXX （调试数据）
  DBG：XXXXXXXXXXXX ：（调试数据）

关于模式

默认模式：PWM+CAN（电调能在PWM模式或CAN模式下使用）

1. 默认模式下，若使用PWM信号进行控制，首次使用、更换遥控器（油门信号发送设备）前必须校准油门行程。 校 准方式：将油门信号调至最大值，接通电源将启动油门校正，3s 后电机将发出"♪123 3—3-3-3"之后立即将油门信号调至最小值，电机将发出音乐"♪3-3-5-4"，音乐声结束后，油门行程校正完成。
2. 默认模式下，若使用CAN信号进行控制，电调控制指令详见"CKESC-UAVCAN2.1"协议。

安全告知

- 信号脉冲宽度，频率必须符合要求。不要拉拽和带电插拨控制信号线，确保电调信号线连接可靠无松动，以防产生干 扰信号导致控制异常。
- 电源连接可以使用防火插头，但要确保连接可靠（连接不良会导致插头烧蚀，甚至电源故障）；输出相线不要使用 防火插头，不要带电插拨。确保电源电压稳定（如果是电池供电，注意电池放电倍率要高，低温放电性能要好），否则有可能导致电调损坏。
- 保证电调散热良好，电调长期工作于高温状态会加速元器件的老化，大幅减少电调使用寿命。
- 电调余电未放尽前禁止输出相线短路，可能引起电调损坏。
- 本产品应用于飞行器时，需注意如下事项：
1. 请使用合理配置搭配电调，以获得最佳性能（力效，功率，安全性）。若采用不匹配的电机、螺旋桨（甚至不是 螺旋桨负载或变化负载）或非正确的电压，可能达不到最优性能，甚至损坏电调。
2. 每次飞行前建议检查飞行器各部分结构是否有松动、老化或损坏等情况，机臂和螺旋桨固定螺丝必须锁紧牢固。
3. 务必使用稳定负载，螺旋桨被外部堵转时应尽快关闭油门或断电，防止堵转电流过大而损坏电调。
- 严禁超载使用，否则产品性能和安全将无法得到保证。
- 请勿擅自拆解改装产品，否则无法保证使用性能与安全及保修服务。

Thank you for using this product! The brushless power system is powerful, and incorrect use may cause personal injury and equipment damage. Therefore, we strongly recommend that you read this manual carefully before using the device. We do not accept any liability arising from the use of this product, including but not limited to compensation for incidental or indirect losses; additionally, we are not liable for any responsibilities arising from unauthorized modifications to the product and incorrect use.

We reserve the right to change the product design, appearance, performance, and usage requirements without prior notice.

Interface definition

Interface ①:

- Light blue: CAN_L
- Dark blue: CAN_H
- Black : GND-Isolated Reference Ground

Interface ②:

- White: Input voltage 3.3-5V, current ≤5mA, for serial data output port only.
- Red: Outputs real-time working status information of the electronic speed controller, with the level determined by the isolated power supply voltage.
- Black : GND-Isolated Reference Ground

Interface ③:

- Yellow: PWM/TTL-RX, receives PWM, 1000-2000us (calibratable), 50-400Hz, 3.3-5V level.
- Black : GND-Isolated Reference Ground

Data output

- Data output adopts 3-wire UART-TTL, baud rate 38400bps, character mode.
- Packet format：SPD:XXXX TMOS:XXXX TMOT:XXXXTMCX:XXXXXXXXXXXXXXXX CURI:XXXX VOLT:XXXX PWAC:XXXXX SYS:XXXXXXXXXXXX DBG:XXXXXXXXXXXX
  Of which:
  SPD:XXXX Motor speed (RPM, error ±12RPM, converted according to the number of motor poles 42P)
  TMOS:XXXX ESC temperature (°C, error ±1°C)
  TMOT : XXXX Motor temperature (°C, error ±1°C, data retained)
  TMCX: XXXXXXXXXXXX (debugging data)
  CURI:XXXX Motor current (X0.01A, error ±10%, mainly used for ESC overcurrent protection)
  VOLT:XXXX Power supply voltage (X0.01V, error ±0.5V)
  PWAC: XXXX (debugging data)
  SYS:XXXXXXXXXXXX (debugging data)
  DBG:XXXXXXXXXXXX : (debugging data)

About the model

Default mode: PWM+CAN (ESC can be used in PWM mode or CAN mode)

1. In default mode, if PWM signal is used for control, the throttle travel must be calibrated before first use or replacement of remote control (throttle signal sending device). Calibration mode: Set the throttle signal to the maximum value, turn on the power to start the throttle calibration, after 3s, the motor will emit "♪123 3-3-3-3" After that, immediately set the throttle signal to the minimum value, the motor will emit the music "♪3-3-5-4", after the music is finished, the throttle travel calibration is completed. The motor will emit music " ♪3-3-5-4 ", after the music is finished, the throttle stroke correction is completed.
2. In default mode, if CAN signal is used for control, the ESC control commands are detailed in the "CKESC UAVCAN2.1" protocol.

Safety Notice

- Signal pulse width and frequency must meet the requirements. Don't pull and drag the control signal line, make sure the ESC signal line is connected reliably without loosening, in order to prevent the generation of interference signals leading to abnormal control.
- The power supply connection can use anti-ignition plug, but make sure the connection is reliable (poor connection will lead to plug ablation and even power failure); do not use anti-ignition plug for the output phase line, and do not plug or unplug it with electricity. Make sure the power supply voltage is stable (if it is battery powered, pay attention to the battery discharge multiplier should be high and the low temperature discharge performance should be good), otherwise it may lead to ESC damage.
- Ensure that the ESC heat dissipation is good, ESC long-term work in the high temperature state will accelerate the aging of components, significantly reducing the service life of the ESC.
- Do not short-circuit the output phase line before the residual power of the ESC is exhausted, which may cause damage to the ESC.
- When this product is applied to aircraft, the following matters should be noted:
1. Please use a reasonable configuration with the ESC to get the best performance (force efficiency, power, safety). If you use mismatched motors, propellers (not even propeller loads or variable loads) or non-correct voltages, you may not achieve optimal performance or even damage the ESC.
2. Before each flight it is recommended to check all parts of the aircraft structure for looseness, deterioration or damage, etc. The arm and propeller fixing screws must be locked firmly.
3. Be sure to use a stable load, when the propeller is blocked externally, the throttle should be closed or the power should be cut off as soon as possible to prevent the ESC from being damaged by excessive blocking current.
- It is strictly forbidden to overload the product, otherwise the performance and safety of the product cannot be guaranteed.
- Please do not disassemble and modify the product without authorization, otherwise the performance and safety of use and warranty service cannot be guaranteed.

接口① CAN_L / CAN_H / GND
接口② Vin(3.3-5V 10mA) / RX / GND
接口③ PWM / GND