Manual of Sensorless Brushless Motor Speed Controller   HiModel™

Thank you for purchasing our Electronic Speed Controller (ESC) for sensorless brushless motor. High power system for RC model can be very dangerous, we strongly suggest you reading this manual carefully.
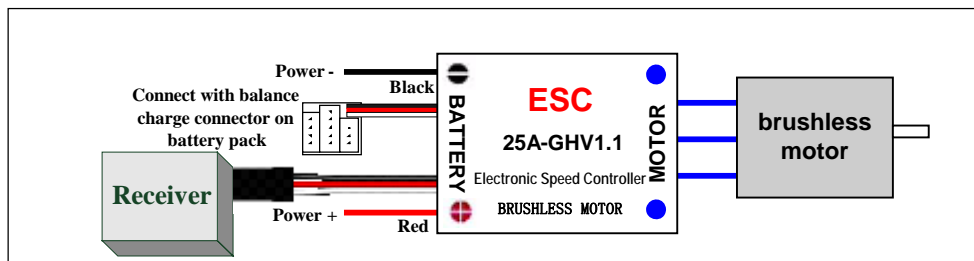
Features:

✓ Dual PCBs for 18A, 25A and 40A series: Control circuit and MOSFET circuit use separate PCB, adiabatic air gap between 2 PCBs reduces the heat exchange from MOSFET to control circuit, so the ESC works more reliable.
✓ Startup music playing functionality.
✓ Extreme low resistance, super current endurance.
✓ Full protection features: Low-voltage cutoff protection / over-heat protection / throttle signal lost protection
✓ 3 startup modes: Normal / Soft / Super-Soft startup, can be used for both fixed-wing aircraft or helicopter models
✓ Throttle range can be configured, fully compatible with all market available transmitters.
✓ Smooth and accurate speed control, excellent throttle linearity.
✓ Microprocessor and BEC(Battery Elimination Circuit) use separate voltage regulator IC , with good anti-jamming capability.
✓ Supported highest motor speed: 210000 RPM(2 poles), 70000 RPM(6 poles), 35000 RPM(12 poles).
✓ Own complete intellectual property rights, software can be upgraded for our customers.
✓ Programming CARD in a very small size can be purchased additionally (for easily programming the ESC on field).

Specification:

MODEL / FUNCTION	40A P1.1	30A P1.1	25A GV1.1	25A GHV1.1	25A S1.1	18A GV1.1	18A GHV1.1	18A S1.1	12A G1.1	12A GH1.1
Balance Discharge Protection	●		●	●		●	●			
Dual Heat Radiators		●		●			●			
Current (Continues)	40A	30A	25A	25A	25A	18A	18A	18A	12A	12A
Current (Burst, ＞10 seconds)	55A	40A	35A	35A	35A	22A	22A	22A	15A	15A
BEC Output	3A	2A	2A	2A	2A	2A	2A	2A	1A	2A
Input: Li-ion / Li-poly	2-5	2—4	2—4	2—4	2—4	2—4	2—4	2—4	2—4	2—4
NiMh / Nicd	5-15	5—12	5—12	5—12	5—12	5—12	5—12	5—12	5—12	5—12
User Programming Function	●	●	●	●	●	●	●	●	●	●
Weight	38g	25g	25g	27g	24g	22g	24g	21g	12g	13g
Size(mm³,width*length*high)	29*55 *18	25*45 *11	24*45 *11	24*45* 12	24*45 *11	24*45 *11	24*45* 12	24*45* 11	24*32 *8	24*32 *10

Remark: 1) "●"= The function is available;
2) "G" means "Best for aircraft", there isn't a heat radiator on BEC circuit; "H" means "Best for Heli", there is a aluminum heat radiator on BEC circuit ,the BEC output is more stabilized; "S" means standard edition, it is suitable for beginners and intermediate Player; "V" means Balance discharge protection function is provided.
3) Balance discharge protection function is unavailable for 12A series because of the lightweight consideration.
4) 40A use switch mode BEC, 3A output allows you to run all 4 servos, receiver, and gyro from the main battery pack.

Wiring Diagram:

Feature Explanation:

1. **Brake Settings**：Brake Enabled / Brake Disabled, default is Brake Enabled
2. **Battery Type**：Li-xx(Li-ion or Li-poly) / Ni-xx(NiMh or Nicd)，default is Li-xx.
3. **Low Voltage Protection Mode(Cutoff Mode)**：Power Reducing / Power Cutoff, default is Power Reducing.
4. **Low Voltage Protection Threshold(Cutoff Threshold)**：Low / Medium / High, default is Medium.
   1) For Li-xx battery，number of battery cells are judged automatically，low / medium / high cutoff voltage for each cell are: 2.5V/2.75V/3.0V. For example: 3 cell Li-Poly, when medium cutoff voltage is set, the cutoff voltage is: 2.75*3=8.25V.

2) For Ni-xx battery, low / medium / high cutoff voltages are 60%/65%/70% of the startup voltage. For example: 6 cell NiMH battery, fully charged voltage is 1.44*6=8.64V, when low cutoff voltage is set, the cutoff voltage is : 8.64*60%=5.2V。

5. **Startup Mode**：Normal /Soft /Super-soft, default is normal startup.
   Normal is good for fixed-wing aircraft. Soft / Super-soft are good for helicopters, the initial speeds of soft / super-soft mode are pretty slow, 1sec(soft startup) / 2secs(super-soft startup) from startup to full speed. But if throttle is closed (throttle stick moves to bottom)and opened again(throttle stick moves up) within 3 seconds after the first startup, the startup will be in normal mode to get rid of the chances of crash caused by slow throttle response in aerobatic fly.
6. **Timing**：Low / Medium / High, default is Medium.
   In normal cases, low timing can be used for most motors. But for high efficiency, we recommend the **Low** timing for 2 poles motor and **Medium** timing for 6 poles and above. For higher speed, **High** timing could be used.
   Attention: High timing could cause problem with some motors. Please test on ground first!

Special Hint

Some high KV out-runner motors have very special configuration, the space between each alnico is very large, and some ESC can't startup these motors. After updating the program, our ESCs have very good compatibility with them. But some RC fans still have several questions about the programming value for special motors. So we just give some suggestion as follows:

Programming Value Suggestion Motor	Timing	Startup Mode
General in-runner motor	Low	Aircraft use "normal"startup mode Helicopter use "super-soft" startup mode
General out-runner motor	Medium	
Align 420LF (Made in TAIWAN, out-runner)	High (MUST)	
450TH (Made in TAIWAN, out-runner)	Medium	Soft (MUST)

Begin To Use Your New ESC

Before using your new ESC, please check all the connections to make sure that they are reliable, then start up the ESC in the following sequence:
1. Move the throttle stick to bottom, and then switch on the transmitter.
2. Connect battery pack to ESC, the ESC begin the self-test process, after 2 seconds a long "beep-----" tone should be emitted, which means self-test is OK, and then the motor begin to play music, now the aircraft/helicopter is ready to go flying.
   ➢ If nothing is happened, please check the battery pack and all the connections;
   ➢ If a special tone " 56721" is emitted after 2 beep tone (beep-beep-), means the ESC has entered the programming mode, i.e. the throttle channel of your transmitter is reversed, please set it correctly;
   ➢ If a very rapid "beep-beep-, beep-beep-" tone is emitted, means the input voltage is too high or too low, please check your battery.
3. After the motor begin to play music, several "beep-"tones should be emitted, present the setting value of each program item. You can move throttle stick upwards to go flying at this time. It is unnecessary to wait the "beep-"tone finished.
4. "**VERY IMPORTANT**!"   Because different transmitter has different throttle range, we strongly suggest you using the "Throttle Range Setting Function" to calibrate throttle range. Please read the instruction on page 3------"Throttle Range Setting".

Alert Tone

1. Input voltage abnormal alert tone: The ESC begin to check the voltage of battery pack when power on, if the voltage is not in acceptable range, such a alert tone will be emitted: "beep-beep-, beep-beep-,beep-beep-"(every "beep-beep-" has a time interval about 1 second.)
2. Throttle signal abnormal alert tone: When the ESC can't detect the normal throttle signal, such a alert tone will be emitted: "beep-,beep-,beep-"(every "beep-" has a time interval about 2 seconds.)
3. Throttle stick not in bottom alert tone: When the throttle stick is not in bottom (lowest) position, a very rapid alert tone will be emitted: "beep-,beep-,beep-" (every "beep-" has a time interval about 0.25 second.)

Protection Function
1. Start up protection: If the motor failed to start up in 2 seconds while the throttle stick moving up, the ESC will cut off the output power. In this case, the throttle stick **MUST** be moved to bottom again to restart the motor. (Such a situation happens in the following cases: The connection between ESC and motor is not reliable, Propeller is blocked, Gearbox is damaged, etc.)
2. Over-heat protection: When the temperature of control circuit PCB is over 110℃, the ESC will reduce the output power.
3. Throttle signal lost protection: The ESC will reduce output power if throttle signal lost for 1 second, further lost for 2 seconds will cause its output cut off.

Normal startup procedure:

Switch on transmitter, move throttle stick to bottom	Connect battery pack to ESC, special tone like "♪123" means power supply is OK	When self-test is finished, a long "beep-----"tone should be emitted	Begin to play music, ready to go flying	Several "beep-" tones should be emitted, present the value of each program item	Move throttle stick upwards to go flying

Throttle range setting: (Throttle range should be set each time when using a new transmitter)

Switch on transmitter, move throttle stick to top	Connect battery pack to ESC, and then wait for about 2 seconds	"Beep-beep" tone should be emitted, means throttle range highest point has been confirmed	Move throttle stick to bottom, wait for about 1 seconds	"Beep-" tone should be emitted, means throttle range lowest point has been confirmed	Begin to play music, ready to go flying

Programming with transmitter(4 Steps):

1. enter programming mode
2. select items
3. set item value
4. exit programming

1. Enter programming mode

1) Switch on transmitter, move throttle stick to top, connect the battery pack to controller

2) Wait for 2 seconds, the controller should emit tone like "beep-beep-"

3) Wait for another 5 seconds, special tone like "5672i" should be emitted, this means programming mode is entered

2. Select items:

After entering programming mode, you can hear 8 tones in a loop in following sequence. After one tone within 3 seconds, if you move the throttle stick to bottom, then this item is selected.

1. "beep"   brake   (1 short tone)
2. "beep-beep-"   battery type   (2 short tone)
3. "beep-beep-beep-"   cutoff mode   (3 short tone)
4. "beep-beep-beep-beep-"   cutoff threshold   (4 short tone)
5. "beep-----"   startup mode   (1 long tone)
6. "beep-----beep-"   timing   (1 long 1 short)
7. "beep-----beep-beep-"   set all to default   (1 long 2 short)
8. "beep-----beep-----"   exit   (2 long tone)

Remark: 1 long "beep-----" = 5 short "beep-"
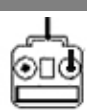
3.Set item value:

You will hear tones in loop. Set the value matching to a tone by moving throttle stick to top after hearing this tone,then you can hear the special tone "i5i5" means the value is set and saved. (Keeping the stick at top, you will go back to step 2 and you can select other items; Moving the stick to bottom within 2 seconds, you will exit the programming mode directly)

Items \ Tones	"beep-" 1 short tone	"beep-beep-" 2 short tones	"beep-beep-beep" 3 short tones
Brake	Off	On	
Battery type	Li-ion / Li-poly	NiMh / Nicd	
Cutoff mode	Reduce power	Shut down	
Cutoff threshold	Low	Midium	High
Startup mode	Normal	Soft	Super soft
Timing	Low	Midium	High
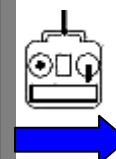
4.Exit prgramming

There are 2 ways to exit programming:

1. In step 3, after special tone "i5i5", move throttle stick to bottom within 2 seconds.

2. In step 2, after tone "beep-----beep-----", move throttle stick to bottom within 3 seconds.

Programming example

Setting startup mode to "super-soft", i.e. value #3 in program item #5

1.Enter Programming Mode
Switch on transmitter, move throttle stick to top, connect battery pack to ESC, wait for 2 seconds, "beep-beep" tone should be emitted. Then wait another 5 seconds, special tone like "56721" should be emitted, means programming mode is entered.

2.Select Items
Now you'll hear 8 tones in a loop. When a long "beep------" tone is emitted, move throttle stick to bottom to select the "Startup Mode" item

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3.Set Item Value
"Beep-", wait for 3 seconds; "Beep-beep-", wait for another 3 seconds; then you'll hear "beep-beep-beep", move throttle stick to top, then a special tone "1515" is emitted, now you have set the "Startup Mode" in "Super-soft Startup"

4.Exit Programming
After the special tone "1515", move throttle stick to bottom within 2 seconds.

Trouble Shooting

Trouble	Possible Reason	Action
After power on, motor can't work, no sound is emitted	The connection between battery pack and ESC is not OK	Check the power connection. Replace the connector.
After power on, motor can't work, such a alert tone is emitted: "beep-beep-, beep-beep-,beep-beep-" (every "beep-beep-" has a time interval about 1 second.)	Input voltage is abnormal, too high or too low	Check the voltage of battery pack
After power on, motor can't work, such a alert tone is emitted: "beep-, beep-,beep- " (every "beep-" has a time interval about 2 seconds.)	Throttle signal is abnormal	Check the receiver and transmitter Check the cable of throttle channel
After power on, motor can't work, such a alert tone is emitted: "beep-, beep-,beep- "(every "beep-" has a time interval about 0.25 second.)	Throttle stick is not in bottom(lowest) position	Move the throttle stick to bottom
After power on, motor can't work, a special tone "56721" is emitted after 2 beep tone (beep-beep-)	The direction of throttle channel is reversed, so the ESC has entered the programming mode	Set the direction of throttle channel correctly
The motor runs in opposite direction	The connection between ESC and the motor need to be changed.	Swap any two wire connections between ESC and motor
The motor stop running while in working state	Throttle signal is lost	Check the receiver and transmitter Check the cable of throttle channel
	ESC has entered Low Voltage Protection mode	Land RC model as soon as possible, and then replace the battery pack
	Some Connections are not reliable	Check all the connections: battery pack connection, throttle signal cable, motor connections, etc.