



## **Building Instruction & Manual**



**KH -283 Outrunner Motor Kit Version 2  
(Back Mount Style)**



## Introduction

Congratulations on your purchase of KH-283 Outrunner Motor Kit Version 2. KH-283 V.2 is a modified motor kit designed for powering 3D and Aerobatics RC airplanes. Modelers can choose either back mount style or stick style to meet the airplane requirement.

KH-283 V.2 powered with 2mm thickness curved NdFeB magnets. It delivers excellent acceleration for hovering and performing aggressive 3D aerobetic maneuvers. By the latest design of 9 degrees magnet gap, the motor can be started-up and run smoothly.

KH-283 V.2 motor kit includes high quality hardened steel main shaft and pre-assembled precision end-bell and flux ring. Those parts are produced by advanced technology. It allows the motor running at high rpm without vibration. Motor builders can utilize three-screw lock system to install and change main shaft without gluing. If you are a serious motor builders or modelers, Komodo Outrunner Motor kit is the only choice for you.

## Warning

Radio Control Model and Outrunner Motor Kit are not toy!!! It contains sophisticated small parts and is designed for hobby use only. All parts of this outrunner motor kit have to be assembled and operated with great care. Outrunner motor can produce very high power to turn gear or spindle propeller. It is capable of causing property damage and all bodily harm to operator or spectators. If you are a beginner of motor builder, please seek assemble and operational help from experienced motor builder.

## Be caution!!!

If this outrunner motor kit is not assembled and operated properly, it can destroy your electronic speed control, receiver, batteries and relevant equipment completely.

## Parts List

(QTY)	Items
(1)	Pre-pressed End-Bell and Flux Ring
(2)	23.8mm Stator
(1)	CNC Aluminum Back Mount Bearing Carrier
(2)	Ball Bearings
(1)	3.17mm Hardened Steel Shaft
(1)	40feets, AWG 23 Enameled Magnet Wire
(12)	NdFeB Curved Magnets
(1)	Propeller Saver
(2)	Propeller Saver Replacement Rings
(1)	O'ring
(3)	Connector Pairs (Male and Female)
(7)	Shrinking Tubes
(3)	M3 x 4 Screws
(2)	M3 x 8 Screws
(2)	M3 x 6 Screws
(2)	M2.5 x 6 Screws
(1)	C-Clip



## 1. Marks color to magnets



Use marker to mark different color to North Pole and South Pole.

## 2. Place magnets inside the bell



Place 12pcs magnets inside the motor bell in NSNSNSNSNSNS magnetic pattern. Then, use drops of CA to secure the position of magnets.



Second, place six North Pole magnets in between South Pole magnets. Use a small clip to adjust the magnets until all magnets placed evenly. Then, use a drop of CA to secure the position of magnet.

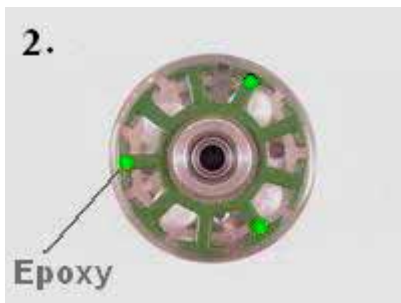


### 3. Glue Two Single Stators Together

There are total three steps to glue two single stators together. Be Caution!!! Because you need to take out the glued stator from bearing tube for winding, in the Step Two, do not put too much Epoxy to the stator. Otherwise, the excessive Epoxy will glue the double stator and bearing tube together. Then, you cannot take out the glued stator for winding afterward.



Put a stator to halfway of bearing tube.



Put another stator to the bearing tube, align it and wait until the Epoxy dry.



Place very little Epoxy to stator as it shown in the picture.

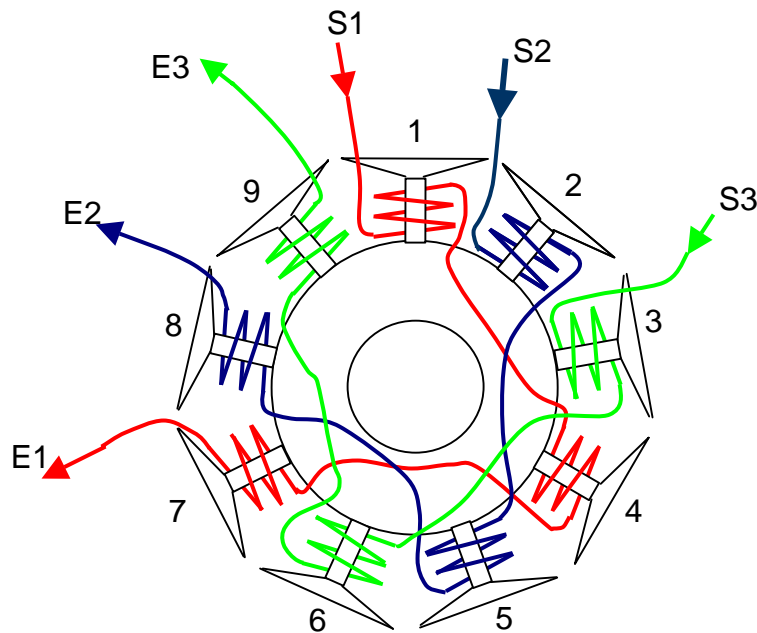
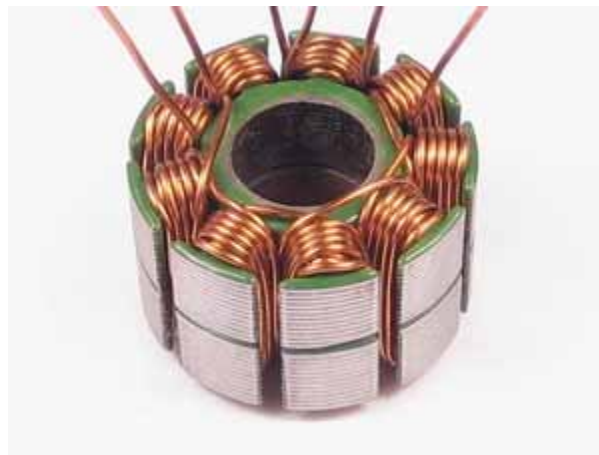


After the Epoxy dried, you can take out the glued double stator from the bearing tube. Now, you can go to the following step for winding.



## 4. Winding

It is an example of using three individual magnet wires to complete a 3-phases system. We recommend beginners to wind 10 turns for their first motor. For experienced motor builders, they can wind more or less turns to get different potential power. Note: Since the last turn is not a complete circle, you need to wind 11 times to get 10 turns' power. Make sure that every coil has same number of windings.



*Diagram of winding system of 9-pole stator*



## Phase 1



**Step (1):** Remain 7-8cm long magnet wire for connection use afterward.  
Use magnet wire “S1” to start to wind 11times in clockwise direction at tooth No.1. Wind from the hub to the outer edge of hammerhead then back to the hub.

**Step (2):** Jump to tooth No. 4 and start to wind 11times in clockwise direction as step (1).

**Step (3):** Jump to tooth No. 7 and start to wind 11times in clockwise direction as step (2).

**Step (4):** Cut the magnet wire “S1”. This ending of wire will be called “E1” in the following steps. Note: Remain 7-8cm long magnet wire for connection use.

## Phase 2



**Step (5):** Remain 7-8cm long magnet wire for connection use afterward.  
Use magnet wire “S2” to start to wind 11times in clockwise direction at tooth No.2. Wind from the hub to the outer edge of hammerhead then back to the hub.

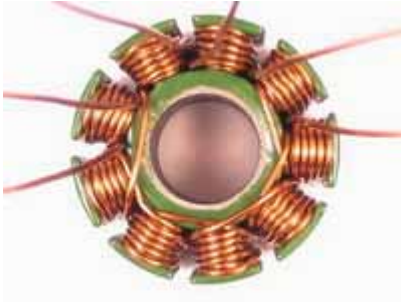
**Step (6):** Jump to tooth No. 5 and start to wind 11times in clockwise direction as step (5).

**Step (7):** Jump to tooth No. 8 and start to wind 11times in clockwise direction as step (6).

**Step (8):** Cut the magnet wire “S2”. This ending of wire will be called “E2” in the following steps. Note: Remain 7-8cm long magnet wire for connection use.



## Phase 3



**Step (9):** Remain 7-8cm long magnet wire for connection use afterward.  
Use magnet wire “S3” to start to wind 11times in clockwise direction at tooth No.3. Wind from the hub to the outer edge of hammerhead then back to the hub.

**Step (10):** Jump to tooth No. 6 and start to winds 11times in clockwise direction as step (9).

**Step (11):** Jump to tooth No. 9 and start to wind 11times in clockwise direction as step (10).

**Step (12):** Cut the magnet wire “S3”. This ending of wire will be called “E3” in the following steps. Note: Remain 7-8cm long magnet wire for connection use.

## 5. Remove the coating of magnet wires



When you finish the winding steps above, you have 6 endings of magnet wire attached to coils. Use a shape model knife to scrape off the coating of these six magnet wires.

Then, it is necessary to check any short between magnet wire and stator metal, and need to check any short between magnet wires, S1, S2 and S3. If you find any short between them, please be patience to rewind them again.

Note: your Electronic Speed Controller, Receiver and Battery can be destroyed by part defect of windings.



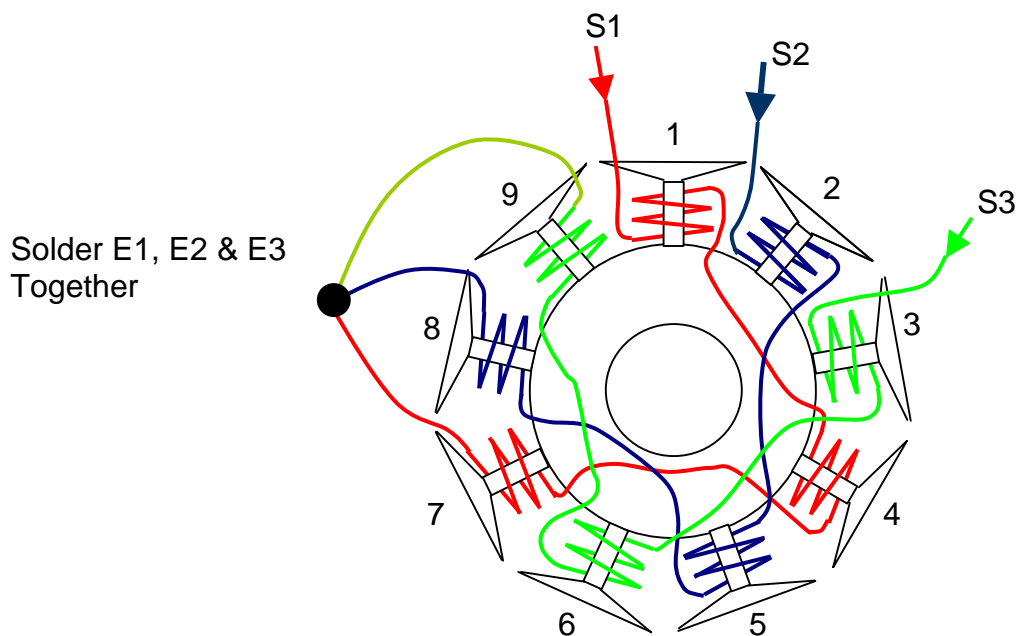
## 6. Solder magnet wires to Delta or Wye system

Now, you can make your own decision to solder the magnet wires to either Star (wye) or Delta system.

### Star vs Delta

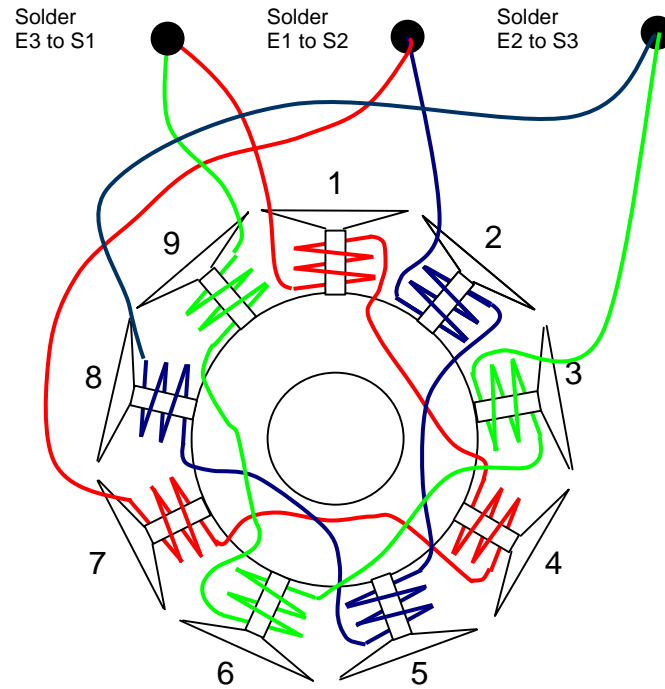
- ✓ Star (wye) system gives more torque and uses fewer amps.  
In Star system, 1.73 less turns need to be wound to get the same power and Kv as DELTA system does.
- ✓ Delta system gives 1.73 higher power and amps draw compare to STAR system.  
In Delta system, the Kv is 1.73 higher than Star system while the Kt (Torque) is 1.73 lower

### Star (wye) system





## Delta System



### 7. Insert three soldered wires to Shrinking Tubes



Now, you have three soldered wires attached to coils. Insert those soldered wires into shrinking tubes for insulating.



## 9. Install Wound Stator to Bearing Tube



Insert three insulated magnet wires to the side hole. Then, drop few Strong Loctite to the bearing tube and install the wound stator to bearing tube.

Note: If you need to take out the stator later, use 150W soldering iron or put it into oven to loosen the loctite.

## 10. Place ball bearings to back plate and bearing tube.



Place a Ball Bearing to bearing tube.

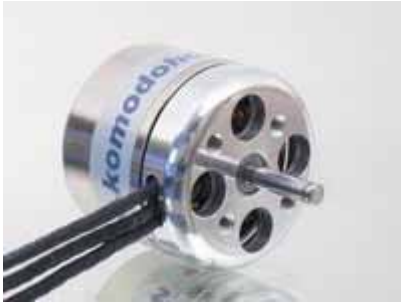


Place a Ball Bearing to the back mount



## 11. Install a main shaft to the motor.

There are two options to install main shaft to the motor.

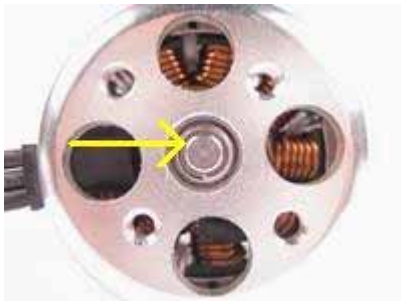


Option A: Insert the main shaft all the way down to the back plate. By this installation method, motor can be mounted behind the firewall.



Option B: Insert the main shaft all the way down to the end-bell. By this installation method, motor can be mounted in front of the firewall.

## 12. Put a c-clip to the slot of main shaft.



Put a C-clip to the slot of main shaft to secure whole motor system.

## 13. Place three screws at the end-bell.

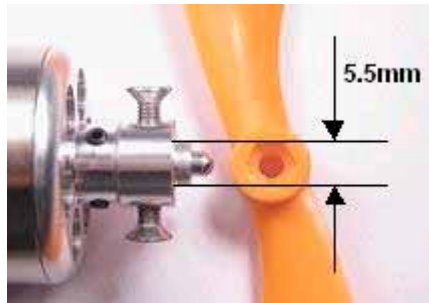


Place three M3 x 4 screws to end bell to secure the position of main shaft. Each screw must be turned a bit by each time until all screws tighten up.

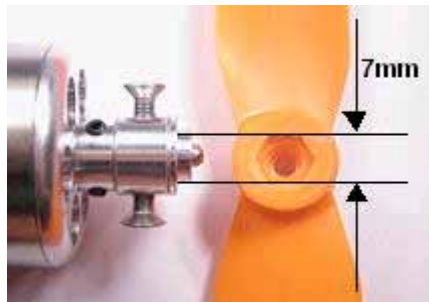


## 14. Propeller saver and Replacement rings

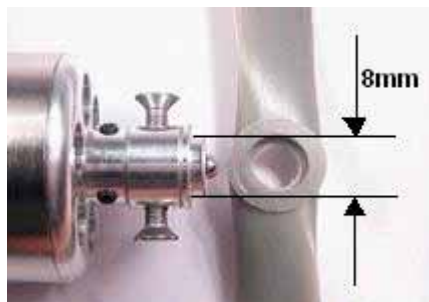
By using the propeller saver and replacement rings, it not only protects your propeller from hitting the ground but also let you install different brand of propeller easily.



**GWS 5.5mm**



**GWS 7mm**



**APC 8mm**



**Congratulation!**

You finished the assemble work of your unique outrunner motor project. We thank you for your purchase. For more other selections of outrunner motor kit, please visit the site at [www.komodohobby.com](http://www.komodohobby.com)

Should you have any comments of this outrunner motor kit, please feel free to contact us at [enquire@komodohobby.com](mailto:enquire@komodohobby.com)