

# Himax Brushless

## HC 4220-770 Power Pack

Himax Brushless Power Packs make setting up a model a simple project. Just choose the appropriate power system to match the model or replace an engine. The packs listed below will fly 3D models weighing 24oz to leisurely models weighing 90oz. The packages are chosen towards sport models to provide lively performance.

The power systems as shipped will be suitable for light 3D models, sport, and leisurely models. Please use caution when experimenting with other propellers and/or battery packs. Be sure to measure current draw to prevent failure of the speed control and or motor due to excessive current. Better 3D performance can be obtained by using larger props and operating motors in the intermittent operating range. Please read the motor manual for more information.



	Combo-19A	Combo-25A	Combo-30A	Combo-40Pro
Motor	HC3510-1100	HC3516-1130	HC3522-990	HC4220-770
Glow Equiv.	.19	.25	.30	.40-.60
Weight Max, oz.				
3D	24	32	40	50
Aerobatic	40	56	64	72
Leisure	50	70	80	90
Prop	9x6E	10x7E	11x7E	12x8E
ESC	35-50A	60A	60A	60-75A
Current, Amps	21	32	38	30-45
Watts, Approx.	200	300	400	700
Thrust, oz.	36	48	59	65
Pitch Speed	61	65	62	50
System				
Weight, oz.	9	12	18	20
Suggested Battery	3S2200	3S2500	3S4400	4S4400

### Minimum Battery Size, mAh

Amps	C rating				
	8C	10C	12C	15C	20C
5A	630	500	420	330	250
10A	1250	1000	830	670	500
15A	1880	1500	1250	1000	750
20A	2500	2000	1670	1330	1000
25A	3130	2500	2080	1670	1250
30A	3750	3000	2500	2000	1500
40A	5000	4000	3330	2670	2000
50A	6250	5000	4170	3330	2500
60A	7500	6000	5000	4000	3000

REV: 06, 04/15/19

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HC 3510 / 3516/ 3522 / 4220  
Combo Power Pack



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## EZ Electric Conversion

### Electric motors for Glow people

by Greg Kamysz

Electric motors provide a clean and reliable power source for models. Selecting a motor is not much different than selecting an engine when you look at the fundamental requirements. The basic principles that make aircraft fly should be used to select a power plant for the performance desired. Power to weight ratio and flight speed envelope make up the aircraft's performance. This translates to thrust to weight ratio and pitch speed. Considering power and propeller choosing an electric motor doesn't have to be a challenge.

The power loading is the first parameter to consider. Power to weight ratio for electric models is generally quoted in watts per pound (W/Lb). This is basically a performance gauge. More power available per pound results better the aircraft performance. Power loading holds true for models all the way up to full scale. Some examples are listed below. 1 Horsepower (HP) = 746 Watts (W)

Piper Cub	65HP	1220Lb	40W/Lb
B-17	4800HP	65000Lb	55W/Lb
Pitts Special	260HP	1626Lb	120W/Lb
Spitfire IV	1440HP	5000Lb	215W/Lb

The chart shows that high performance requires a high power loading. The Cub flies sedately at 40W/Lb and so will a model with this power loading. Follow the chart below for model aircraft.

Mild ROG Performance	50W/Lb
Mild Aerobatics	75W/Lb
Aggressive Aerobatics	100W/Lb
3D or High speed	125-150W/Lb
Competition	300+W/Lb

There are many aircraft designed for internal combustion or glow engines. We can also approximate the required power based on engine displacement. A survey of available engines resulted in the chart below in terms of watt per cubic inch displacement(W/ci)

Sport 2 or 4 Cycle	1250W/ci
BB 2 Cycle	1500W/ci
High Perf. 2C/4C	1800W/ci
Racing, Ducted Fan	4000W/ci

Multiply the displacement of the recommended engine by the W/ci rating to find the amount of power required of the electric motor system. For example; a .40 plain bearing engine will make .40ci x 1250W/ci = 500W of power. Consider that many .40 size trainer models weigh 6Lb, the power loading works out to 83W/Lb.

Once the required power is known we can look at the motor and battery. Look at the motor specifications for power rating. Choosing a motor with a power rating equal to the requirement is safe. Erring on the safe side one would choose a motor capable of slightly more than is required. The motor must be able to handle the required power and the torque to turn a propeller appropriate for the model. A high-speed model will work best with a small prop at high RPM, while a slower model will work better with a larger prop at lower RPM. Power is a product of RPM and torque. For a given amount of power one can have a lot of torque and low RPM, or high RPM and low torque. Getting a lot of both requires more power. RPM and torque is related to the flight speed of the model. Take a look at the list of Himax motors. Find the ones that meet the power requirements. Now look again at the prop size. Choose a motor that uses a prop size suitable for the model. Assume that the smaller props work best with models designed to fly fast. On test flights it is best to try several props in the suggested range which draws an acceptable amount of current to see what works best. A difference of an inch in diameter or a couple inches in pitch can change the way a model flies drastically. If prop size doesn't narrow the selection to one motor consider gearboxes or the simplicity of an outrunner motor direct drive. Also consider the voltage required to see what kind of battery is needed. The battery must be able to support the current requirement of the motor with the chosen prop. Check the current rating of the battery to make sure it will not be over-worked. The ESC must also be sized to handle the voltage and current requirements.

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