



Test DUALSKY EG500 / EG700 motors

Introduction:

Dualsky XM30xx EG motors are well known by glider pilots and widely used by F5J competitors (42% at the last World Championships).

Based on this strong experience, Dualsky decided to go one step further and develop a new and optimized motor line, focusing on competition gliders.

2 sizes and 3 different KV for each size will be available.

As test pilot for Dualsky factory, I received some months ago some preproduction motors of new EG line to evaluate on F5J FAI competition models.

I performed an extensive test campaign to validate correct behavior of the motors and measure the performances with different batteries and propellers.

The motors tested were EG500.16, EG700.10 and EG700.14.



Visual inspection:

The EG500/700 motors are capsulated outrunner brushless motors with weight and size optimization compared to the XM EG30xx series. It's a completely new design.

A combination of satin black and golden parts gives a high-quality finish.

Mounting screws pattern remains the now standard "M3 16/19mm".

The front part is designed to fit in the slimmer fuselages and allows an easy mounting on 30mm spinner F5j models.

The openwork capsule reduces the weight and improves the ventilation. The design is great.

The 5mm shaft is 3mm hollowed (vs 2.1mm on XM 30xx EG) and now splined (anti-slip grooves).

Data of the motors tested:

| | EG500.16 | EG700.10 | EG700.14 |
|-------------------------------|--|----------|----------|
| Weight (including connectors) | 72g | 87g | |
| Max peak current (Dualsky) | 40A | 54A | 44A |
| Max peak power (Dualsky) | 480W | 648W | 704W |
| Max diameter (rear flange) | 29,5mm | | |
| Length | 36,8 mm | 41,8 mm | |
| Stator size | 2212 | 2217 | |
| Number of poles | 14 | | |
| KV | 1300 | 1460 | 1050 |
| Fixing points | 2 x M3 at 16mm + 2 x M3 at 19mm | | |
| Shaft type | 5mm hollowed (2mm) and splined + 1 flat area | | |
| Shaft length | 17mm | | |

Motor/ESC combo weight:

| | ESC directly soldered to motor | Motor/ESC with original cable and plugs |
|-----------------------|--------------------------------|---|
| EG500 + Summit 30X | 87g | |
| EG500 + Summit 60Slim | 97g | 106g |
| EG700 + Summit 30X | 102g | |
| EG700 + Summit 60Slim | 112g | 121g |
| EG700 + Summit 60X | 119g | 128g |

Test equipment:

For the measurements in flight, I used a Dualsky telemetry adapter (Telelink), linked to a Futaba T18SG transmitter (1Hz logging) and altimeter Altis Nano (10Hz logging). A temperature sensor connected to the Telelink has been installed at the rear part of the capsule.



Temperature sensor

The motors were controlled by a Dualsky Summit 60Slim or 60X U8 ESC, with automatic timing.

As the target of EG500.16 motor is Light or Superlight F5J models, I used my trusty Volo Light (1.150g AUW).

For the EG700.10 and EG700.14 motors, I used a Berkut Standard (1400g AUW), closer to the worst case in terms of weight.

| | VOLO Light | BERKUT Standard |
|----------------|--------------------------|------------------------|
| Wing span | 3975mm | 3990mm |
| FAI surface | 88,78dm ² | 94,8 dm ² |
| FAI Wing load | 12,9 g/dm ² | 14,8 g/dm ² |
| Testing weight | 1150g | 1400g |
| ESC | Dualsky Summit 60Slim U8 | Dualsky Summit 60X U8 |

The propeller of each manufacturer was mounted on a spinner/hub from the same brand:

| Propeller | DFP | CN Models | GM propellers |
|----------------------------|------------------|-----------|-----------------|
| Spinner / hub | Dualsky FPS 32mm | CN-U 32mm | GM 32mm |
| Hub type | Z | Z | <i>Straight</i> |
| Distance between pins (mm) | 27 | 28,5 | 28 |

Important note: Dualsky DFP propellers' nominal size is for a 42mm hub size. Remember that using it on a 27mm hub reduces both real diameter and pitch.

The following propellers were available for the test campaign:

- Dualsky: DFP8560, DFP 9065 and DFP1070
- CN Models: 9x7 and 10x6
- GM propellers: 10x6, 11x6 and 11x8



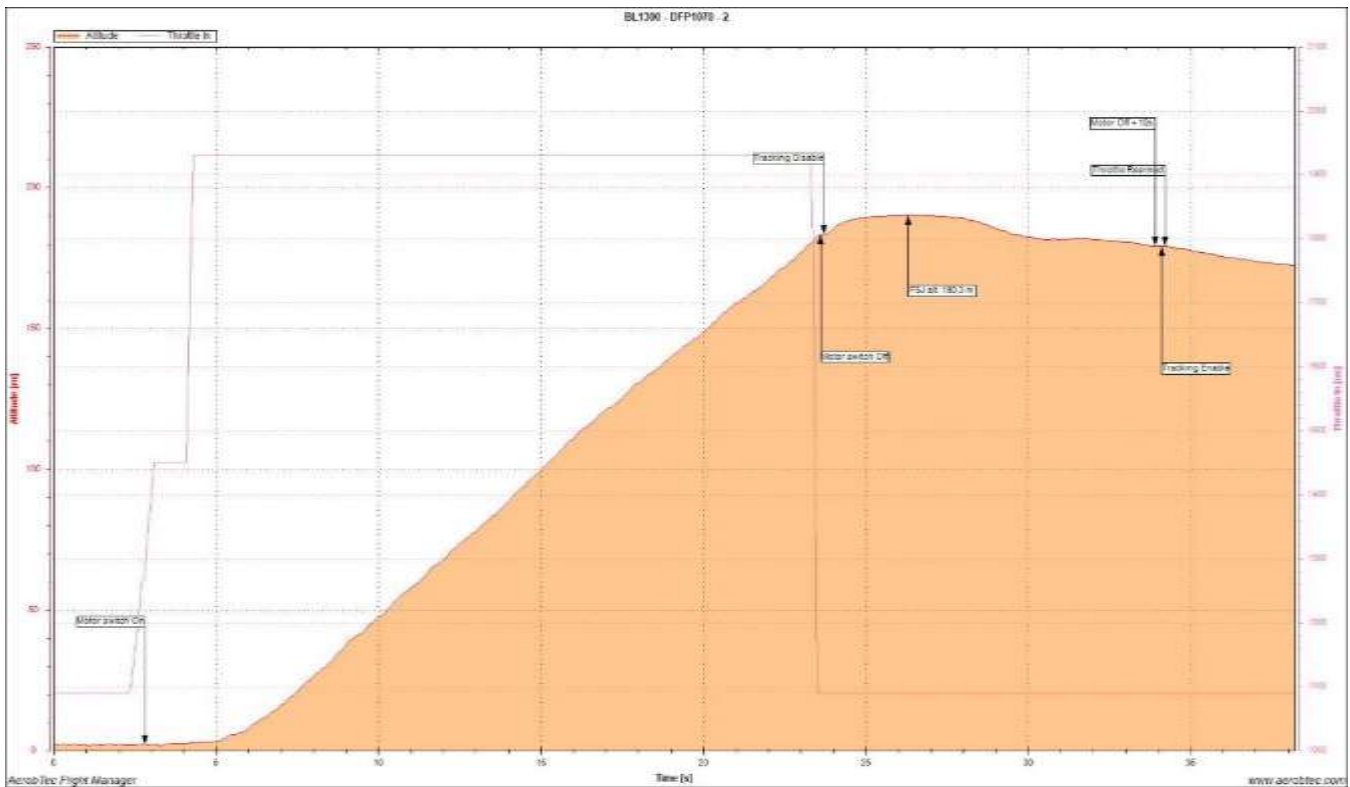
Test procedure:

Tests were performed in calm weather, with ambient temperature between 8 and 18°C, at 200m A.S.L.

To maximize the data accuracy, I performed between 2 and 6 ascents per configuration, always with a fresh battery warmed at 20-25°C.

The flight test sequence is:

- Launch from standstill with soft arm impulse at half throttle
- 2 seconds at 50% throttle without gaining altitude
- 20 seconds at full throttle on the best climb gradient, as constant as possible. Zoom after motor off is not included in the measurements.



With every configuration, some additional flights were performed to subjectively evaluate the grip and behavior at throttle changes, and simulating competition flights.

Data results summary:

EG500.16

| Model | Volo Light (1150g) F5J | | | | | |
|--------------------------------------|--------------------------|---------|--------|---------|---------|---------|
| Motor | Dualsky EG500.16 | | | | | |
| Battery | Dualsky ULT 3S 600mAh | | | | | |
| Propeller | DFP 10x7 | CN 10x6 | CN 9x7 | GM 10x6 | GM 11x6 | GM 11x8 |
| Max. RPM | 9700 | 10050 | 9875 | 9400 | 8830 | 7700 |
| Avg. RPM in 20s climb | 9500 | 9700 | 9625 | 9150 | 8670 | 7450 |
| Max. current (A) | 30 | 27,6 | 28,4 | 33,5 | 34,8 | 41,3 |
| Avg. current (A) in 20s climb | 26,7 | 25,5 | 26,5 | 30 | 31,1 | 38 |
| Max. absorbed power (W) | 300 | 275 | 285 | 330 | 330 | 390 |
| Avg. absorbed power (W) in 20s climb | 275 | 260 | 270 | 300 | 305 | 360 |
| Max. climb rate (m/s) | 10,2 | 9,3 | 9,8 | 10,3 | 11,2 | 12,8 |
| Avg. climb rate (m/s) in 20s climb | 9 | 8,4 | 9 | 9,4 | 10,7 | 11,1 |

With 3S batteries:

Both CN 9x7 and DFP1070 give an excellent “climb rate per absorbed power” ratio. The traction and speed are suitable for a F5J SL or Light model. The grip is also very good.

CN 10x6 is less power consuming and gives logically slightly lower performance. Suitable for Superlight FAI models.

GM 10x6 is still a good option (good grip and climb rate) but with a higher current.

GM 11x6 gives more traction and climb rate but the speed is lower and not optimum for F5J use.

GM 11x8 is slightly too big for this motor. Max peak of current is over the specs. The temperature of the capsule after a 20s run increase 41°C (from 17°C to 58°C). Not recommended.



| | | | | |
|--------------------------------------|--------------------------|-----------|----------|---------|
| Model | Volo Light (1150g) F5J | | | |
| Motor | Dualsky EG500.16 | | | |
| Battery | Dualsky ULT 4S 480mAh | | | |
| Propeller | DFP 8,5x6 | DFP 9x6,5 | DFP 10x7 | CN 10x6 |
| Max. RPM | 13650 | 12500 | 11325 | 11800 |
| Avg. RPM in 20s climb | 13100 | 12000 | 10700 | 11200 |
| Max. current (A) | 27,5 | 31 | 34,3 | 36,9 |
| Avg. current (A) in 20s climb | 24,1 | 28,2 | 32,5 | 31,3 |
| Max. absorbed power (W) | 350 | 380 | 410 | 470 |
| Avg. absorbed power (W) in 20s climb | 315 | 350 | 385 | 390 |
| Max. climb rate (m/s) | 11,2 | 11,4 | 12,4 | 13,1 |
| Avg. climb rate (m/s) in 20s climb | 10,1 | 10,6 | 12,1 | 12,1 |

With 4S batteries:

DFP9065 and DFP1070 give outstanding performance both on climb rate and throttle response.

With DFP8560, the performance is still about 10% higher than the best 3S options but the acceleration of the model is not as immediate.

CN10x6 pulls more current and gives better performances than DFP1070 (contrary to the behavior with 3S). It is close to the max power limit. I observed a relevant battery sag of the small 4S480mAh battery, that drops below 3V/cell.

Performances would be higher using a battery with more capacity (less C, less voltage sag)



EG700.10

| | | | | | |
|--------------------------------------|--------------------------|-----------|--------|-----------|-----------|
| Model | Berkut Standard 1400g | | | | |
| Motor | Dualsky EG700.10 | | | | |
| Battery | Dualsky ULT 3S 900mAh | | | | |
| Propeller | DFP 10 x 7 | CN 10 x 6 | CN 9x7 | GM 10 x 6 | GM 11 x 6 |
| Max. RPM | 10680 | 11175 | 10800 | 10200 | 9840 |
| Avg. RPM in 20s climb | 10270 | 10670 | 10400 | 9785 | 9400 |
| Max. current (A) | 43,4 | 41,2 | 42,6 | 47,5 | 53,5 |
| Avg. current (A) in 20s climb | 39,2 | 37,3 | 38,5 | 43,2 | 47,5 |
| Max. absorbed power (W) | 415 | 405 | 410 | 450 | 500 |
| Avg. absorbed power (W) in 20s climb | 375 | 365 | 370 | 410 | 450 |
| Max. climb rate (m/s) | 11,8 | 10,6 | 10,5 | 12 | 12,9 |
| Avg. climb rate (m/s) in 20s climb | 10,6 | 9,7 | 9,6 | 11,2 | 12 |

With 3S batteries:

GM10x6 and DFP1070 give excellent performance. The grip is very good.

CN 10x6 and 9x7 give slightly less performance.

GM 11x6 gives more traction but less speed. The maximum peak current is close to the limit and the increase of the temperature after a 20s run is too high (+45°C, from 14°C to 59°C). It may be critical with hotter ambient temperature.



| | | | | | |
|--------------------------------------|--------------------------|-----------|--|--|--|
| Model | Berkut Standard 1400g | | | | |
| Motor | Dualsky EG700.10 | | | | |
| Battery | Dualsky ULT 4S 900mAh | | | | |
| Propeller | DFP 9 x 6,5 | CN 10 x 6 | | | |
| Max. RPM | 13520 | 12640 | | | |
| Avg. RPM in 20s climb | 13100 | 12400 | | | |
| Max. current (A) | 47,5 | 51,9 | | | |
| Avg. current (A) in 20s climb | 43,9 | 46,6 | | | |
| Max. absorbed power (W) | 570 | 610 | | | |
| Avg. absorbed power (W) in 20s climb | 535 | 550 | | | |
| Max. climb rate (m/s) | 14,5 | 14,8 | | | |
| Avg. climb rate (m/s) in 20s climb | 13,2 | 14 | | | |

With 4S batteries:

DFP9065 shows excellent performance both on climb rate and throttle response.

CN10x6 gives also outstanding results but the temperature of the capsule after a 20s run increases very fast to high values (+48°C). Limited for conscious short runs.



EG700.14

| | | | | | | |
|--------------------------------------|--------------------------|-----------|--------|-----------|-----------|-----------|
| Model | Berkut Standard 1400g | | | | | |
| Motor | Dualsky EG700.14 | | | | | |
| Battery | Dualsky ULT 4S 900mAh | | | | | |
| Propeller | DFP 10 x 7 | CN 10 x 6 | CN 9x7 | GM 10 x 6 | GM 11 x 6 | GM 11 x 8 |
| Max. RPM | 11070 | 11100 | 11140 | 10460 | 10030 | 9025 |
| Avg. RPM in 20s climb | 10900 | 10840 | 10980 | 10285 | 9620 | 8760 |
| Max. current (A) | 30 | 26,8 | 28,5 | 33,4 | 34,7 | 48 |
| Avg. current (A) in 20s climb | 26,9 | 24,6 | 26,6 | 29,3 | 30,5 | 40 |
| Max. absorbed power (W) | 420 | 362 | 400 | 430 | 463 | 635 |
| Avg. absorbed power (W) in 20s climb | 370 | 335 | 370 | 395 | 405 | 505 |
| Max. climb rate (m/s) | 11,7 | 10,4 | 11,4 | 12,7 | 12,6 | 15,7 |
| Avg. climb rate (m/s) in 20s climb | 10,9 | 9,7 | 10,7 | 10,4 | 11,9 | 12,7 |

This motor was only tested with 4S batteries.

DFP1070, CN9x7 and GM10x6 give the best performance, ideal for F5J models up to 1500g. CN 10x6 is less power demanding. Probably a good option for lighter models and smaller batteries.

GM11x6 gives more traction and climb rate but the speed is not as good as the first 3 options.

GM11x8 loads the motor over the maximum peak current. The temperature of the cage increases quickly. Not recommended.



Conclusions:

Over 120 flights were performed during this test campaign. No failures nor defects were observed. The new EG motors have an outstanding design and quality. The fitting of the Dualsky and GM collets on the splined shaft is perfect. The CN collet tends to stay stuck (need forcing a bit to disassemble).

The weight of the EG500 (72g) is excellent. In combo with Summit30X, it makes a perfect sub 100g powerset.

EG500.16 has a performance level perfectly adapted for modern F5J models from FAI Limit to Light layout (between 1000 and 1250g), even with a bit of ballast.

With 3S batteries, DFP1070, CN 9x7 and GM10x6 are the best options.

With 4S batteries, DFP9065 is excellent. DFP1070 can also be used if full load climb is limited to a single short time (10-15s).

EG700 (87g) line aims from “Light on steroids” to Standard layout F5J models.

EG700.10 can be used with 3S and 4S batteries.

With 3S and GM10x6 or DFP1070, it's excellent for Light F5J models.

With 4S and DFP9065 it's a good powerset for ballasted Light and empty Standard models.

EG700.14 has a KV for a 4S batteries use. It gives outstanding results with DFP1070, CN9x7 and GM10x6 for overpowered Light and Standard F5J models.

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