

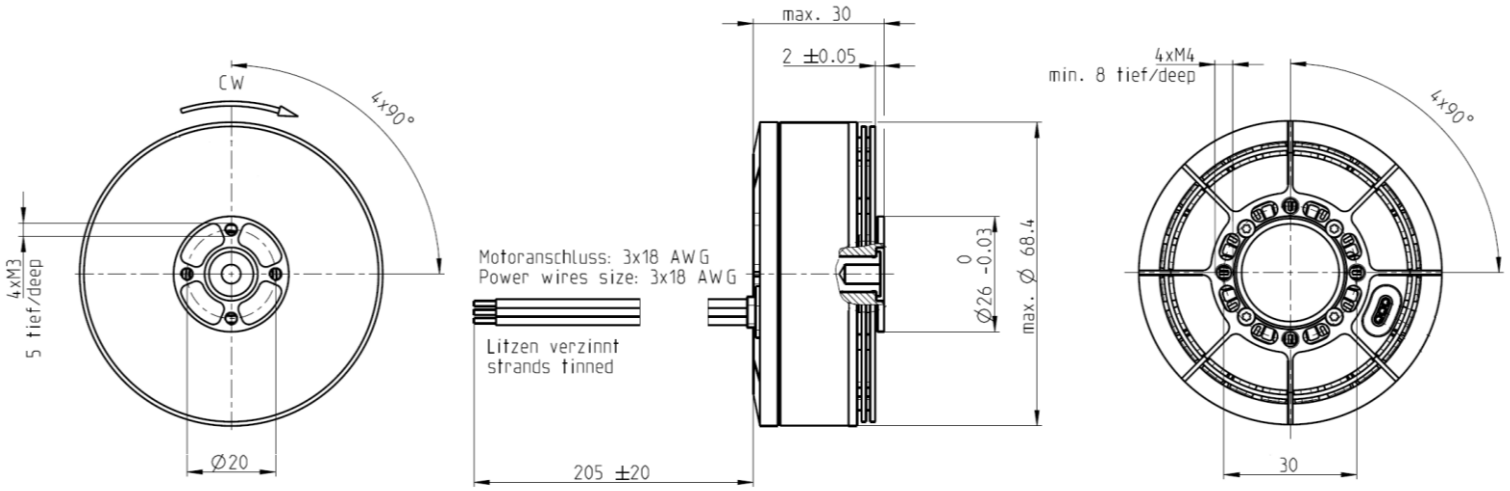
EC 69 flat UAV

designed for professional UAV applications

Ø69 mm, brushless



NEW

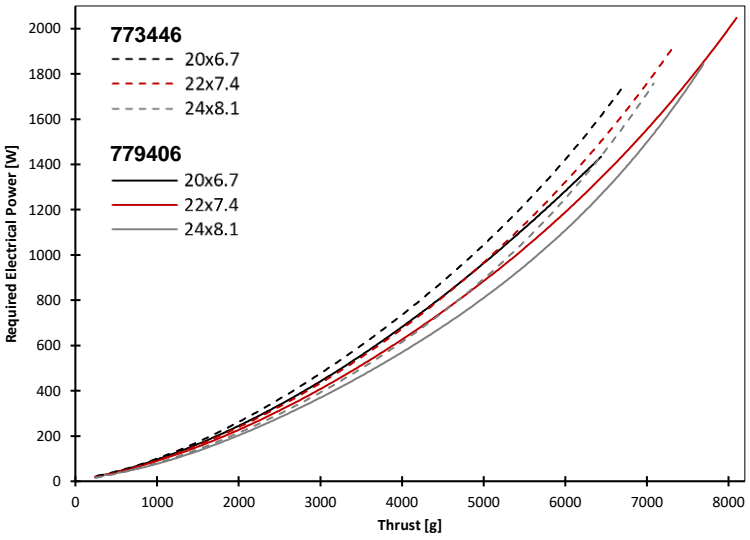


Part Number

Sensorless 688848 725770

| Motor Data | | | |
|--|------------------|--------|--------|
| Values at nominal voltage | | | |
| 1 Nominal voltage | V | 24 | 24 |
| 2 No load speed | rpm | 8110 | 3800 |
| 3 No load current | mA | 1950 | 551 |
| 4 Nominal speed | rpm | 6650 | 2870 |
| 5 Nominal torque (max. continuous torque) | mNm | 1030 | 1210 |
| 6 Nominal current (max. continuous current) | A | 34.1 | 18.1 |
| 7 Stall torque | mNm | 3470 | 2990 |
| 8 Stall current | A | 537 | 166 |
| 9 Max. efficiency | % | 88.4 | 88.8 |
| Characteristics | | | |
| 12 Terminal resistance phase to phase | Ω | 0.0447 | 0.145 |
| 13 Terminal inductance phase to phase | mH | 0.0174 | 0.0799 |
| 14 Torque constant | mNm/A | 28 | 59.9 |
| 15 Speed constant | rpm/V | 342 | 159 |
| 16 Speed/torque gradient | rpm/mNm | 0.546 | 0.385 |
| 17 Mechanical time constant | ms | 4.23 | 2.98 |
| 18 Rotor inertia | gcm ² | 740 | 740 |
| 19 Thermal resistance housing-ambient ¹ | K/W | 0.159 | 0.347 |
| 20 Thermal resistance winding-housing ¹ | K/W | 1.01 | 0.853 |
| 21 Thermal time constant winding | s | 12.9 | 12.3 |
| 22 Thermal time constant motor | s | 21.4 | 46.7 |

Propeller Selection



Motor Specifications

| Thermal data | |
|---|----------------|
| 23 Ambient temperature | -20 ... +100°C |
| 24 Max. continuous winding temperature | +155°C |
| Absolute winding temperature | +180°C |
| Mechanical data (preloaded ball bearings) | |
| 25 Max. speed | 8000 rpm |
| Other specifications | |
| 26 Number of pole pairs | 14 |
| 27 Number of phases | 3 |
| 28 Weight of motor (incl. 210 mm cable) | 269 g |
| 29 Recommended propeller sizes | 20" ... 24" |

Values listed in the tables are nominal.

Connection

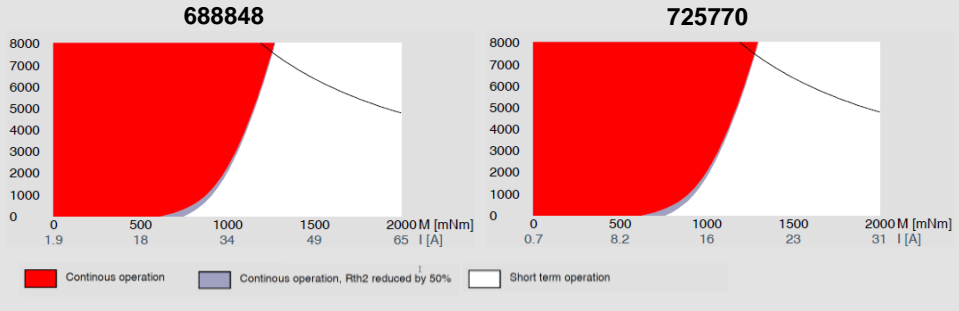
- Pin 1 Motor winding 1
- Pin 2 Motor winding 2
- Pin 3 Motor winding 3

Cable

Insulated winding wires, L = 210 mm

¹At nominal working point

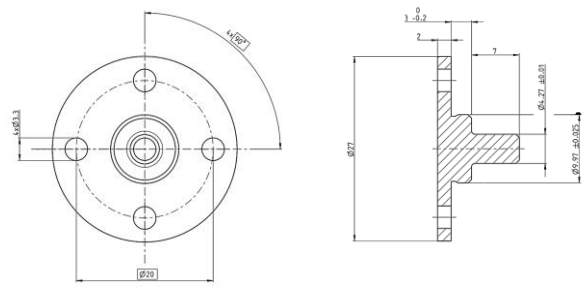
Operating Range



maxon Accessories

propeller adapter: 718087

The adapter is designed for mounting the maxon recommended propellers.



Notes

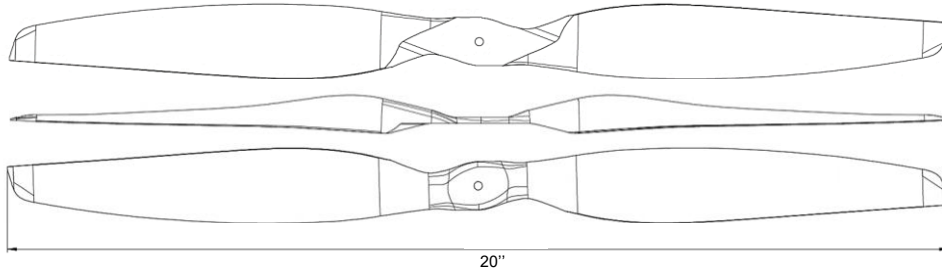
Please contact aerospace@maxongroup.com

Propeller 20x6.7

propeller recommendation



maxon recommended propeller for EC 69 flat



Supplier Propeller Specification

| | | |
|---|------------------------|--------------------|
| 1 | Diameter | 20" (508.0 mm) |
| 2 | Pitch | 6.7" (170.2 mm) |
| 3 | Interface thickness | tbd |
| 4 | Drill pattern | maxon specific |
| 5 | Weight of Propeller | 30g |
| 6 | Max. recommended speed | 9000 rpm |
| 7 | Material | carbon/glass fiber |

Motor Propeller Combination

Motor Operational Data

Adjusted motor data for use with specified propeller (active cooling)

688848

| | | | |
|----|---|-----|-----------|
| 8 | Nominal speed | rpm | 5700 |
| 9 | Nominal torque (max. continuous torque) | mNm | 1290 |
| 10 | Nominal current (max. continuous current) | A | 52.5 |
| 11 | Max. continuous power output | W | 1100 |
| 12 | Max. peak power output | W | 1905 <15s |
| 13 | Thermal time constant winding | s | 30.5 |

725770

| | | |
|---|-----|-----------|
| Nominal speed | rpm | 4930 |
| Nominal torque (max. continuous torque) | mNm | 1575 |
| Nominal current (max. continuous current) | A | 30.5 |
| Max. continuous power output | W | 1145 |
| Max. peak power output | W | 2150 <15s |
| Thermal time constant winding | s | 28.5 |

Propulsion System Performance Table

ESC supply voltage: **52.2V**
 Ambient temperature: **21.5°C**
 Elevation (AMSL): **475m**

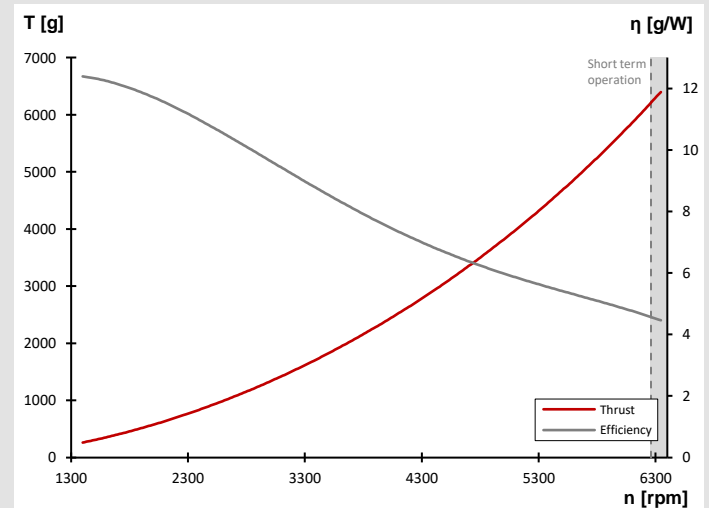
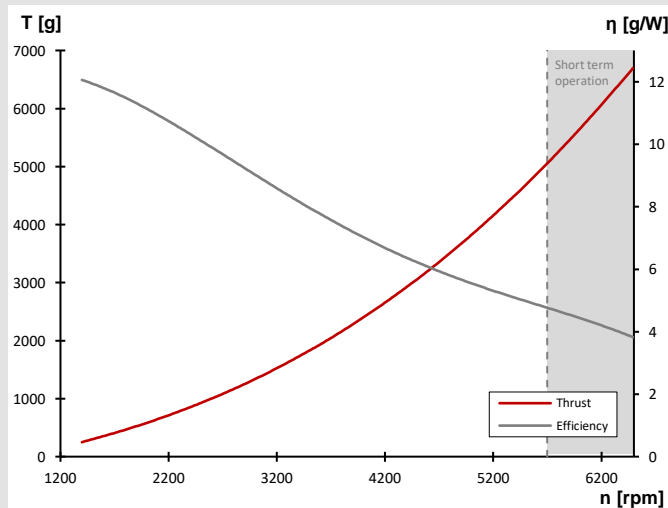
Bench test data for reference only. Direct comparison with datasheets from other manufacturers can be misleading.

ESC supply voltage: **52.2V**
 Ambient temperature: **21.5°C**
 Elevation (AMSL): **475m**

| Achievable speed with battery level | Speed [rpm] | Current [A] | Torque [mNm] | Thrust [g] | el. Power [W] | Efficiency [g/W] |
|---|-------------|-------------|--------------|------------|---------------|------------------|
| continuous operation ($T_w < 155^\circ\text{C}$) | | | | | | |
| | 1400 | 0.4 | 82 | 267 | 22 | 12.0 |
| | 1600 | 0.6 | 104 | 354 | 30 | 11.9 |
| | 1800 | 0.8 | 129 | 458 | 40 | 11.5 |
| | 2100 | 1.1 | 175 | 639 | 58 | 11.0 |
| | 2300 | 1.4 | 207 | 771 | 73 | 10.5 |
| | 2500 | 1.8 | 246 | 922 | 91 | 10.1 |
| | 2700 | 2.1 | 282 | 1065 | 111 | 9.6 |
| | 2900 | 2.6 | 330 | 1256 | 136 | 9.2 |
| | 3200 | 3.5 | 403 | 1559 | 180 | 8.6 |
| | 3400 | 4.1 | 458 | 1757 | 215 | 8.2 |
| | 3600 | 4.8 | 502 | 1932 | 249 | 7.8 |
| | 3800 | 5.6 | 564 | 2184 | 295 | 7.4 |
| | 4100 | 7.1 | 652 | 2519 | 369 | 6.8 |
| | 4300 | 8.2 | 717 | 2780 | 426 | 6.5 |
| | 4500 | 9.3 | 780 | 3010 | 485 | 6.2 |
| | 4700 | 10.8 | 869 | 3357 | 563 | 6.0 |
| | 4900 | 12.3 | 945 | 3646 | 640 | 5.7 |
| | 5200 | 14.9 | 1071 | 4170 | 779 | 5.3 |
| 6S (22.2V) | 5400 | 16.9 | 1164 | 4516 | 884 | 5.1 |
| 5540 rpm | 5600 | 19.3 | 1266 | 4887 | 1007 | 4.9 |
| short term operation | | | | | | |
| 8S (29.6V) | 5800 | 21.8 | 1363 | 5246 | 1136 | 4.6 |
| 5900 rpm | 6000 | 24.7 | 1480 | 5677 | 1288 | 4.4 |
| 10S (37.0V) | 6300 | 29.4 | 1642 | 6264 | 1537 | 4.1 |
| 6335 rpm | 6490 | 33.2 | 1758 | 6689 | 1733 | 3.9 |
| 12S (44.4V) | | | | | | |
| 6490 rpm | | | | | | |

| Achievable speed with battery level | Speed [rpm] | Current [A] | Torque [mNm] | Thrust [g] | el. Power [W] | Efficiency [g/W] |
|---|-------------|-------------|--------------|------------|---------------|------------------|
| continuous operation ($T_w < 155^\circ\text{C}$) | | | | | | |
| | 1400 | 0.4 | 82 | 262 | 21 | 12.4 |
| | 1600 | 0.6 | 105 | 351 | 29 | 12.2 |
| | 1800 | 0.7 | 130 | 455 | 38 | 12.0 |
| | 2000 | 0.9 | 160 | 574 | 49 | 11.8 |
| | 2300 | 1.3 | 209 | 768 | 69 | 11.2 |
| | 2500 | 1.6 | 244 | 905 | 85 | 10.7 |
| | 2700 | 2.0 | 283 | 1070 | 105 | 10.2 |
| | 2900 | 2.4 | 331 | 1249 | 123 | 10.1 |
| 6S (22.2V) | 3100 | 2.9 | 376 | 1439 | 154 | 9.4 |
| 3225 rpm | 3300 | 3.4 | 422 | 1612 | 180 | 8.9 |
| | 3500 | 4.1 | 476 | 1833 | 215 | 8.5 |
| | 3800 | 5.2 | 556 | 2160 | 270 | 8.0 |
| 8S (29.6V) | 4000 | 6.1 | 617 | 2371 | 319 | 7.4 |
| 4150 rpm | 4200 | 7.1 | 682 | 2612 | 369 | 7.1 |
| | 4400 | 8.1 | 754 | 2902 | 425 | 6.8 |
| | 4600 | 9.4 | 838 | 3234 | 490 | 6.6 |
| 10S (37.0V) | 4800 | 10.7 | 907 | 3490 | 557 | 6.3 |
| 4980 rpm | 5100 | 13.1 | 1049 | 4067 | 685 | 5.9 |
| | 5300 | 14.6 | 1115 | 4315 | 763 | 5.7 |
| | 5500 | 16.6 | 1209 | 4660 | 867 | 5.4 |
| 12S (44.4V) | 5700 | 18.7 | 1306 | 5054 | 976 | 5.2 |
| 5700 rpm | 5900 | 21.0 | 1409 | 5420 | 1094 | 5.0 |
| | 6100 | 23.6 | 1517 | 5813 | 1230 | 4.7 |
| short term operation | | | | | | |
| | 6344 | 27.4 | 1684 | 6441 | 1429 | 4.5 |

Efficiency Propulsion System

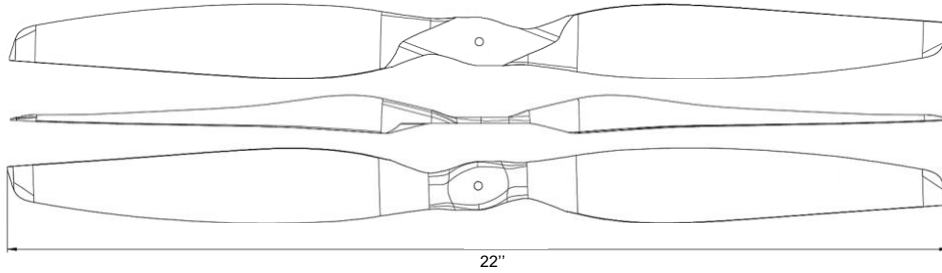


Propeller 22x7.4

propeller recommendation



maxon recommended propeller for EC 69 flat



Supplier Propeller Specification

| | | |
|---|------------------------|--------------------|
| 1 | Diameter | 22" (558.8 mm) |
| 2 | Pitch | 7.4" (188.0 mm) |
| 3 | Interface thickness | tbd |
| 4 | Drill pattern | maxon specific |
| 5 | Weight of Propeller | 44g |
| 6 | Max. recommended speed | 8200 rpm |
| 7 | Material | carbon/glass fiber |

Motor Propeller Combination

Motor Operational Data

Adjusted motor data for use with specified propeller (active cooling)

688848

| | | | |
|----|---|-----|-------|
| 8 | Nominal speed | rpm | 4450 |
| 9 | Nominal torque (max. continuous torque) | mNm | 1260 |
| 10 | Nominal current (max. continuous current) | A | 50.25 |
| 11 | Max. continuous power output | W | 890 |
| 12 | Max. peak power output | W | 1810 |
| 13 | Thermal time constant winding | s | 30.5 |

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| | | | |
|--|---|-----|------|
| | Nominal speed | rpm | 4930 |
| | Nominal torque (max. continuous torque) | mNm | 1575 |
| | Nominal current (max. continuous current) | A | 30.5 |
| | Max. continuous power output | W | 1145 |
| | Max. peak power output | W | 2150 |
| | Thermal time constant winding | s | 28.5 |

Propulsion System Performance Table

ESC supply voltage: **52.2V**
 Ambient temperature: **21.5°C**
 Elevation (AMSL): **475m**

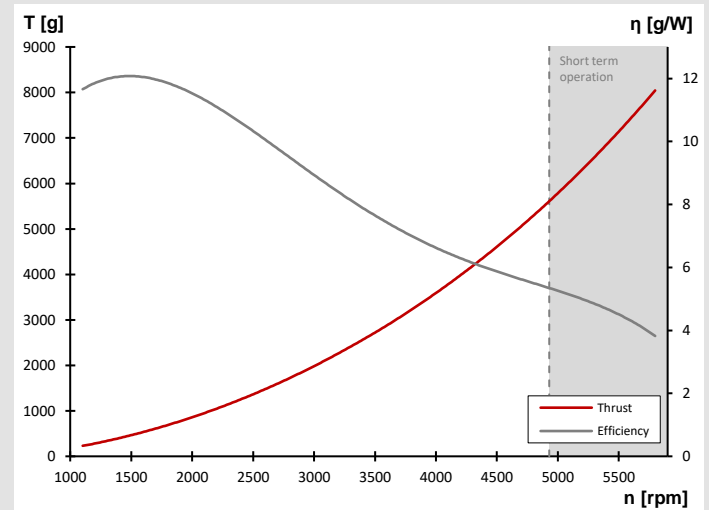
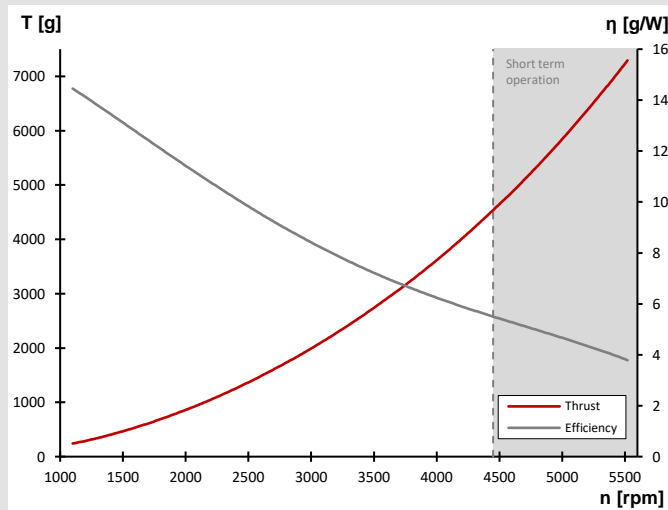
Bench test data for reference only. Direct comparison with datasheets from other manufacturers can be misleading.

ESC supply voltage: **52.2V**
 Ambient temperature: **21.5°C**
 Elevation (AMSL): **475m**

| Achievable speed with battery level | Speed [rpm] | Current [A] | Torque [mNm] | Thrust [g] | el. Power [W] | Efficiency [g/W] |
|---|-------------|-------------|--------------|------------|---------------|------------------|
| continuous operation ($T_w < 155^\circ\text{C}$) | | | | | | |
| | 1100 | 0.3 | 86 | 243 | 17 | 14.4 |
| | 1300 | 0.5 | 114 | 342 | 25 | 13.8 |
| | 1500 | 0.7 | 148 | 465 | 35 | 13.2 |
| | 1700 | 0.9 | 187 | 609 | 49 | 12.5 |
| | 1900 | 1.3 | 232 | 771 | 66 | 11.8 |
| | 2100 | 1.6 | 280 | 950 | 86 | 11.0 |
| | 2300 | 2.1 | 337 | 1148 | 111 | 10.4 |
| | 2400 | 2.4 | 368 | 1267 | 125 | 10.1 |
| | 2600 | 3.0 | 428 | 1479 | 156 | 9.5 |
| | 2800 | 3.7 | 497 | 1746 | 195 | 9.0 |
| | 3000 | 4.5 | 569 | 1994 | 236 | 8.4 |
| | 3200 | 5.5 | 650 | 2280 | 288 | 7.9 |
| | 3400 | 6.5 | 719 | 2548 | 341 | 7.5 |
| | 3600 | 7.9 | 819 | 2907 | 414 | 7.0 |
| | 3800 | 9.4 | 914 | 3238 | 488 | 6.6 |
| | 4000 | 11.0 | 1013 | 3587 | 574 | 6.2 |
| | 4200 | 13.1 | 1134 | 4058 | 684 | 5.9 |
| 6S (22.2V) 4420 rpm | 4400 | 15.1 | 1243 | 4414 | 790 | 5.6 |
| short term operation | | | | | | |
| | 4600 | 17.8 | 1370 | 4872 | 929 | 5.2 |
| | 4800 | 20.8 | 1514 | 5391 | 1086 | 5.0 |
| 8S (29.6V) 5000 rpm | 4900 | 22.5 | 1590 | 5610 | 1172 | 4.8 |
| 10S (37.0V) 5350 rpm | 5100 | 25.7 | 1708 | 6050 | 1343 | 4.5 |
| 12S (44.4V) 5520 rpm | 5300 | 30.4 | 1875 | 6611 | 1587 | 4.2 |
| | 5520 | 36.7 | 2056 | 7329 | 1917 | 3.8 |

| Achievable speed with battery level | Speed [rpm] | Current [A] | Torque [mNm] | Thrust [g] | el. Power [W] | Efficiency [g/W] |
|---|-------------|-------------|--------------|------------|---------------|------------------|
| continuous operation ($T_w < 155^\circ\text{C}$) | | | | | | |
| | 1100 | 0.4 | 84 | 237 | 21 | 11.5 |
| | 1300 | 0.5 | 113 | 336 | 28 | 11.9 |
| | 1500 | 0.7 | 147 | 461 | 37 | 12.3 |
| | 1700 | 1.0 | 186 | 608 | 50 | 12.2 |
| | 1900 | 1.2 | 231 | 767 | 65 | 11.8 |
| | 2100 | 1.6 | 282 | 959 | 84 | 11.4 |
| | 2300 | 2.1 | 337 | 1152 | 108 | 10.6 |
| | 2500 | 2.6 | 401 | 1386 | 136 | 10.2 |
| | 2700 | 3.2 | 463 | 1623 | 167 | 9.7 |
| | 2900 | 3.9 | 529 | 1860 | 203 | 9.2 |
| 6S (22.2V) 3110 rpm | 3100 | 4.7 | 594 | 2091 | 243 | 8.6 |
| | 3300 | 5.7 | 682 | 2393 | 295 | 8.1 |
| | 3600 | 7.3 | 814 | 2873 | 382 | 7.5 |
| 8S (29.6V) 3950 rpm | 3800 | 8.7 | 899 | 3215 | 452 | 7.1 |
| | 4000 | 10.2 | 1001 | 3559 | 531 | 6.7 |
| | 4200 | 12.1 | 1134 | 4046 | 632 | 6.4 |
| | 4400 | 13.9 | 1234 | 4398 | 724 | 6.1 |
| 10S (37.0V) 4700 rpm | 4600 | 16.1 | 1359 | 4824 | 838 | 5.8 |
| | 4800 | 18.7 | 1500 | 5316 | 974 | 5.5 |
| short term operation | | | | | | |
| | 5000 | 21.5 | 1635 | 5787 | 1122 | 5.2 |
| 12S (44.4V) 5330 rpm | 5200 | 24.8 | 1797 | 6365 | 1296 | 4.9 |
| | 5400 | 28.2 | 1916 | 6762 | 1470 | 4.6 |
| | 5600 | 33.1 | 2093 | 7389 | 1727 | 4.3 |
| | 5800 | 39.1 | 2299 | 8099 | 2042 | 4.0 |

Efficiency Propulsion System

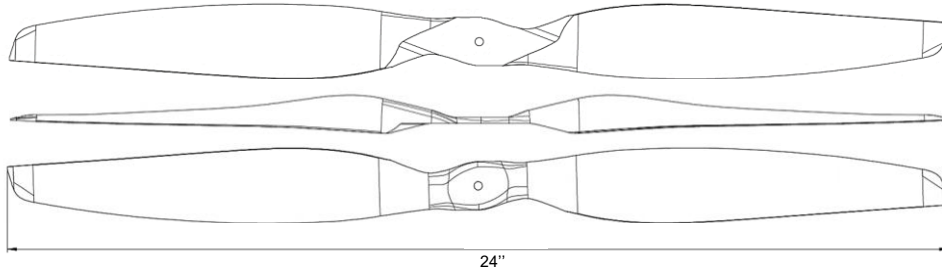


Propeller 24x8.1

propeller recommendation



maxon recommended propeller for EC 69 flat



Supplier Propeller Specification

| | | |
|---|------------------------|--------------------|
| 1 | Diameter | 24" (609.6 mm) |
| 2 | Pitch | 8.1" (205.7 mm) |
| 3 | Interface thickness | tbd |
| 4 | Drill pattern | maxon specific |
| 5 | Weight of Propeller | 55g |
| 6 | Max. recommended speed | 7500 rpm |
| 7 | Material | carbon/glass fiber |

Motor Propeller Combination

Motor Operational Data

Adjusted motor data for use with specified propeller (active cooling)

688848

| | | | |
|----|---|-----|-----------|
| 8 | Nominal speed | rpm | 3540 |
| 9 | Nominal torque (max. continuous torque) | mNm | 1305 |
| 10 | Nominal current (max. continuous current) | A | 50.5 |
| 11 | Max. continuous power output | W | 760 |
| 12 | Max. peak power output | W | 1750 <15s |
| 13 | Thermal time constant winding | s | 30.5 |

725770

| | | | |
|--|---|-----|-----------|
| | Nominal speed | rpm | 6260 |
| | Nominal torque (max. continuous torque) | mNm | 1620 |
| | Nominal current (max. continuous current) | A | 32.75 |
| | Max. continuous power output | W | 1450 |
| | Max. peak power output | W | 1750 <15s |
| | Thermal time constant winding | s | 28.5 |

Propulsion System Performance Table

ESC supply voltage: **52.2V**
 Ambient temperature: **21.5°C**
 Elevation (AMSL): **475m**

Bench test data for reference only. Direct comparison with datasheets from other manufacturers can be misleading.

ESC supply voltage: **52.2V**
 Ambient temperature: **21.5°C**
 Elevation (AMSL): **475m**

Achievable speed with battery level

| Speed [rpm] | Current [A] | Torque [mNm] | Thrust [g] | el. Power [W] | Efficiency [g/W] | |
|---|-------------|--------------|------------|---------------|------------------|-----|
| continuous operation ($T_w < 155^\circ\text{C}$) | | | | | | |
| 900 | 0.3 | 95 | 245 | 15 | 16.5 | |
| 1100 | 0.5 | 135 | 376 | 24 | 15.8 | |
| 1200 | 0.6 | 159 | 451 | 30 | 15.2 | |
| 1400 | 0.8 | 211 | 619 | 44 | 14.1 | |
| 1500 | 1.0 | 237 | 708 | 53 | 13.5 | |
| 1700 | 1.4 | 305 | 939 | 75 | 12.6 | |
| 1800 | 1.7 | 342 | 1065 | 88 | 12.1 | |
| 2000 | 2.3 | 417 | 1316 | 118 | 11.2 | |
| 2100 | 2.6 | 460 | 1455 | 136 | 10.7 | |
| 2300 | 3.4 | 544 | 1743 | 176 | 9.9 | |
| 2500 | 4.3 | 646 | 2080 | 226 | 9.2 | |
| 2600 | 4.9 | 697 | 2264 | 255 | 8.9 | |
| 2800 | 6.1 | 804 | 2633 | 319 | 8.2 | |
| 2900 | 6.9 | 865 | 2837 | 357 | 7.9 | |
| 3100 | 8.5 | 988 | 3238 | 441 | 7.3 | |
| 3200 | 9.3 | 1043 | 3429 | 485 | 7.1 | |
| 3400 | 11.5 | 1204 | 3931 | 600 | 6.6 | |
| short term operation | | | | | | |
| 3600 | 13.9 | 1346 | 4419 | 726 | 6.1 | |
| 6S (22.2V) 3705 rpm | 3700 | 15.4 | 1429 | 4698 | 801 | 5.9 |
| 8S (29.6V) 4145 rpm | 4000 | 20.6 | 1703 | 5542 | 1076 | 5.2 |
| 10S (37.0V) 4450 rpm | 4200 | 25.0 | 1885 | 6142 | 1305 | 4.7 |
| 12S (44.4V) 4490 rpm | 4300 | 27.1 | 1952 | 6384 | 1413 | 4.5 |
| | 4490 | 33.7 | 2183 | 7085 | 1758 | 4.0 |

Achievable speed with battery level

| Speed [rpm] | Current [A] | Torque [mNm] | Thrust [g] | el. Power [W] | Efficiency [g/W] | |
|---|-------------|--------------|------------|---------------|------------------|-----|
| continuous operation ($T_w < 155^\circ\text{C}$) | | | | | | |
| 900 | 0.3 | 94 | 242 | 18 | 13.8 | |
| 1100 | 0.5 | 135 | 372 | 26 | 14.4 | |
| 1200 | 0.6 | 158 | 447 | 31 | 14.3 | |
| 1400 | 0.8 | 208 | 613 | 44 | 13.8 | |
| 1600 | 1.2 | 269 | 814 | 62 | 13.1 | |
| 1700 | 1.4 | 303 | 925 | 73 | 12.8 | |
| 1900 | 1.9 | 376 | 1178 | 98 | 12.0 | |
| 2100 | 2.5 | 454 | 1434 | 129 | 11.1 | |
| 2200 | 2.8 | 501 | 1591 | 147 | 10.8 | |
| 2400 | 3.6 | 593 | 1905 | 188 | 10.1 | |
| 2600 | 4.5 | 691 | 2235 | 237 | 9.4 | |
| 2700 | 5.1 | 739 | 2402 | 265 | 9.1 | |
| 6S (22.2V) 2950 rpm | 2900 | 6.3 | 850 | 2773 | 327 | 8.5 |
| | 3100 | 7.9 | 999 | 3255 | 411 | 7.9 |
| | 3200 | 8.6 | 1046 | 3440 | 449 | 7.7 |
| | 3400 | 10.4 | 1182 | 3866 | 543 | 7.1 |
| | 3600 | 12.7 | 1351 | 4420 | 661 | 6.7 |
| 8S (29.6V) 3700 rpm | 3700 | 13.7 | 1402 | 4603 | 716 | 6.4 |
| short term operation | | | | | | |
| | 3900 | 16.6 | 1596 | 5205 | 866 | 6.0 |
| | 4100 | 19.7 | 1762 | 5772 | 1030 | 5.6 |
| 10S (37.0V) 4270 rpm | 4200 | 21.3 | 1823 | 5954 | 1110 | 5.4 |
| | 4400 | 25.9 | 2053 | 6667 | 1352 | 4.9 |
| | 4600 | 31.8 | 2287 | 7405 | 1663 | 4.5 |
| 12S (44.4V) 4750 rpm | 4750 | 35.7 | 2397 | 7697 | 1865 | 4.1 |

Efficiency Propulsion System

