

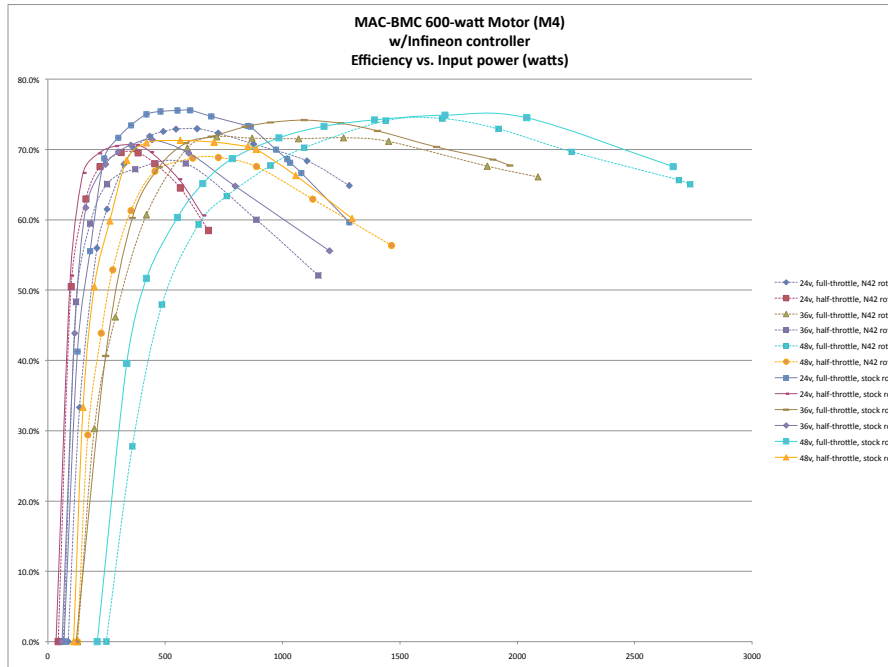
MAC-BMC 600-watt Motor

Motor: M4
 Hall sensors tuned for CW rotation
 Winding: Delta (stock)
 Infineon controller (operating range: 20-60 Volts)

Stock rotor with composite magnet ring, 16-pole

Rotor with N42 Neodymium magnets, 16-pole

24-volt supply			24-volt supply				
Full Throttle	Power (CycleAnalyst)	Power (PowerTap)	Efficiency	Full Throttle	Power (CycleAnalyst)	Power (PowerTap)	Efficiency
69	0	0.0%	87	0	0.0%		
126	52	41.3%	135	45	33.3%		
180	100	55.6%	209	117	56.0%		
240	165	68.8%	252	155	61.5%		
300	215	71.7%	324	220	67.9%		
354	260	73.4%	368	258	70.1%		
420	315	75.0%	434	312	71.9%		
480	362	75.4%	492	357	72.6%		
552	417	75.5%	546	398	72.9%		
606	458	75.6%	636	464	73.0%		
696	520	74.7%	726	525	72.3%		
852	625	73.4%	876	620	70.8%		
964	633	73.3%	1104	755	68.4%		
972	680	70.0%	1284	833	64.9%		
1020	700	68.6%					
1032	703	68.1%					
1080	720	66.7%					
1284	766	59.7%					
24-volt supply			24-volt supply				
Half Throttle	Power (CycleAnalyst)	Power (PowerTap)	Efficiency	Half Throttle	Power (CycleAnalyst)	Power (PowerTap)	Efficiency
35	0	0.0%	44	0	0.0%		
96	50	52.1%	99	50	50.5%		
150	100	66.7%	162	102	63.0%		
216	150	69.4%	222	150	67.6%		
288	203	70.5%	312	217	69.6%		
378	267	70.6%	384	267	69.5%		
438	305	69.6%	456	310	68.0%		
558	367	65.8%	564	364	64.5%		
660	400	60.6%	684	400	58.5%		
36-volt supply			36-volt supply				
Full Throttle	Power (CycleAnalyst)	Power (PowerTap)	Efficiency	Full Throttle	Power (CycleAnalyst)	Power (PowerTap)	Efficiency
120	0	0.0%	126	0	0.0%		
246	100	40.7%	198	60	30.3%		
360	217	60.3%	288	133	46.2%		
474	320	67.5%	420	255	60.7%		
588	417	70.9%	594	417	70.2%		
696	500	71.8%	720	517	71.8%		
840	615	73.2%	870	623	71.6%		
948	700	73.8%	1068	764	71.5%		
1092	810	74.2%	1260	903	71.7%		
1248	920	73.7%	1452	1033	71.1%		
1404	1020	72.6%	1872	1266	67.6%		
1656	1165	70.4%	2088	1380	66.1%		
1896	1300	68.6%					
1968	1333	67.7%					
36-volt supply			36-volt supply				
Half Throttle	Power (CycleAnalyst)	Power (PowerTap)	Efficiency	Half Throttle	Power (CycleAnalyst)	Power (PowerTap)	Efficiency
60	0	0.0%	66	0	0.0%		
114	50	43.9%	120	58	48.3%		
162	100	61.7%	180	107	59.4%		
246	167	67.9%	252	164	65.1%		
300	209	69.7%	372	250	67.2%		
354	250	70.6%	588	400	68.0%		
444	317	71.4%	888	533	60.0%		
600	417	69.5%	1152	600	52.1%		
798	517	64.8%					
1200	667	55.6%					
48-volt supply			48-volt supply				
Full Throttle	Power (CycleAnalyst)	Power (PowerTap)	Efficiency	Full Throttle	Power (CycleAnalyst)	Power (PowerTap)	Efficiency
210	0	0.0%	249	0	0.0%		
336	133	39.6%	360	100	27.8%		
420	217	51.7%	486	233	47.9%		
552	333	60.3%	642	381	59.3%		
660	430	65.2%	762	483	63.4%		
786	540	68.7%	948	642	67.7%		
984	705	71.6%	1092	767	70.2%		
1176	862	73.3%	1440	1067	74.1%		
1392	1033	74.2%	1680	1250	74.4%		
1692	1267	74.9%	1920	1400	72.9%		
2040	1520	74.5%	2232	1555	69.7%		
2664	1800	67.6%	2688	1765	65.7%		
			2736	1780	65.1%		
48-volt supply			48-volt supply				
Half Throttle	Power (CycleAnalyst)	Power (PowerTap)	Efficiency	Half Throttle	Power (CycleAnalyst)	Power (PowerTap)	Efficiency
110	0	0.0%	126	0	0.0%		
150	50	33.3%	170	50	29.4%		
198	100	50.5%	228	100	43.9%		
264	158	59.8%	276	146	52.9%		
336	230	68.5%	354	217	61.3%		
420	298	71.0%	456	305	66.9%		
564	402	71.3%	726	425	68.8%		
708	503	71.0%	888	500	68.9%		
852	600	70.4%	1128	710	62.9%		
888	622	70.0%	1464	825	56.4%		
1056	700	66.3%					
1296	780	60.2%					



Notes: Efficiency was measured by comparing energy drawn from the battery according to a Cycle Analyst and comparing that to energy sent to the rear wheel of the bicycle as read from a PowerTap hub. Motor power passes through a chain and sprocket (#25 chain; 11t - 90t) to a mid-drive, which is then passed to the rear wheel using normal bicycle chain (15t - 34t). Efficiency of the two-stage chain and sprocket drive is probably around 93%-95%, so actual motor/controller efficiency is about 6.5% greater. The right-most markers indicate the maximum usable power.