

EC121A Series

The EC121A Series Brushless DC Motor is a high torque model brushless motor designed in a NEMA 48 package. It is offered in 4 motor lengths with continuous torque from 3.0 – 6.5 Nm.

EC Instrument Grade Motors

For applications that require uniform motion control at all speeds. Capable of high acceleration.

■ Benefits

- Speeds up to 4,000 RPM possible
- DC bus voltage up to 325 VDC
- Capable of 48 VDC bus systems
- NEMA 48 package
- 8 pole neodymium design

■ Optional Assemblies

- Encoder: C Type
- Programmable Drive: BGE6060A

■ Motor Characteristics

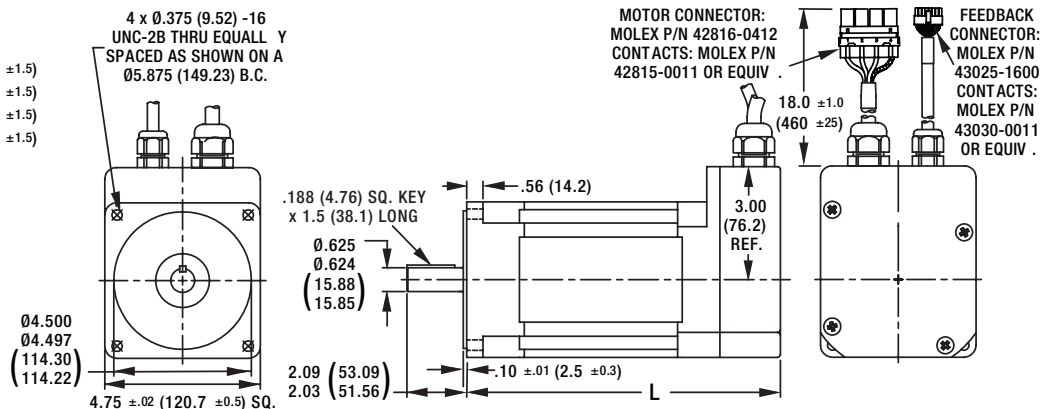
Motor Data	Units	Part No.				
		EC121A-1	EC121A-2	EC121A-3	EC121A-4	
Max DC Terminal Voltage	V_T	325				
Max Speed (Mechanical)	ω_{MAX}	4000				
Continuous Stall Torque ¹	T_{CS}	Nm	3.0	3.6	4.2	6.5
		oz-in	430	510	590	930
Peak Torque (Maximum) ¹	T_{pk}	Nm	9.4	12	14	20
		oz-in	1300	1700	2000	2800
Coulomb Friction Torque	T_f	Nm	0.051	0.065	0.086	0.10
		oz-in	7.3	9.3	12	14
Viscous Damping Factor	D	Nm/(rad/s)	1.3E-04	2.0E-04	1.3E-04	3.2E-04
		oz-in/krpm	1.9	3.0	2.0	4.7
Thermal Time Constant	τ_{th}	min	15	15	15	15
Thermal Resistance	R_{th}	°C/W	0.96	0.81	0.86	0.65
Max. Winding Temperature	Θ_{MAX}	°C	125	125	125	125
Rotor Inertia	J_r	kg-m ²	7.9E-04	1.2E-03	1.7E-03	2.1E-03
		oz-in-s ²	0.11	0.18	0.24	0.30
Motor Weight	W_m	g	7100	9900	12000	15000
		oz	250	350	440	530

¹Recorded at maximum winding temperature at 25°C ambient and without heatsink.

Dimensional Drawings: EC121A-1 • EC121A-2 • EC121A-3 • EC121A-4

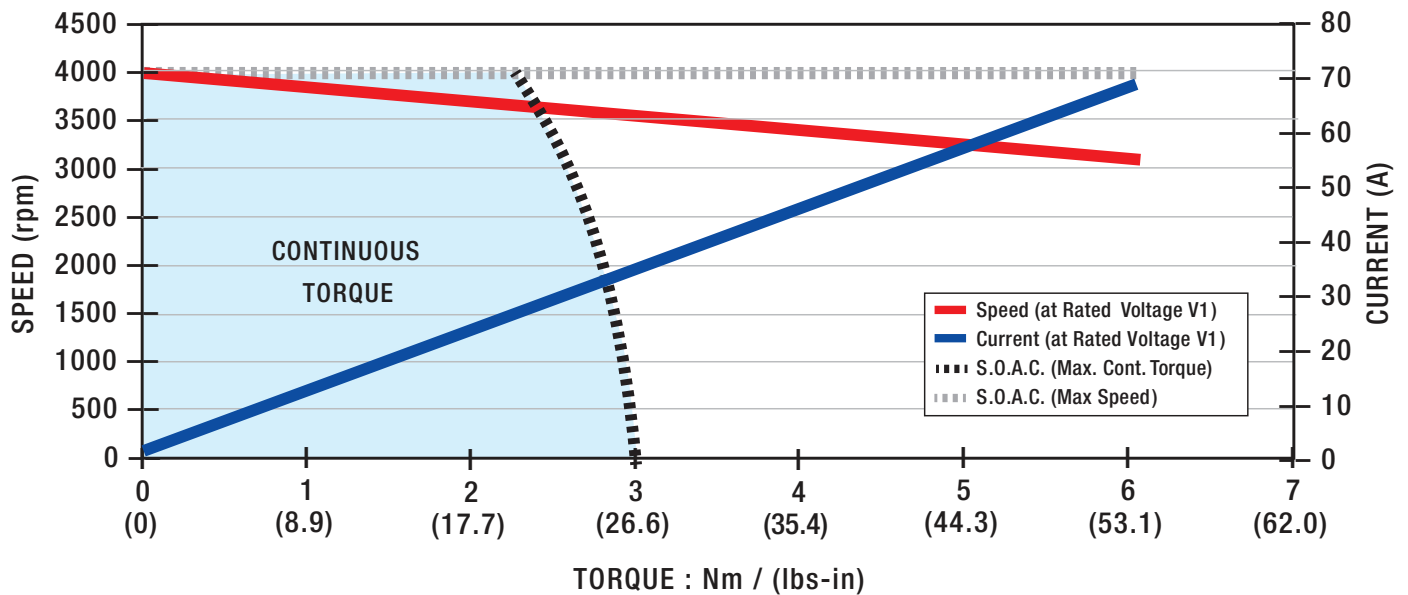
Dimensions = inches (mm)

- EC121A-1 = 6.91 ±.06 (175.5 ±1.5)
- EC121A-2 = 8.31 ±.06 (211.1 ±1.5)
- EC121A-3 = 9.71 ±.06 (246.6 ±1.5)
- EC121A-4 = 11.1 ±.06 (281.9 ±1.5)



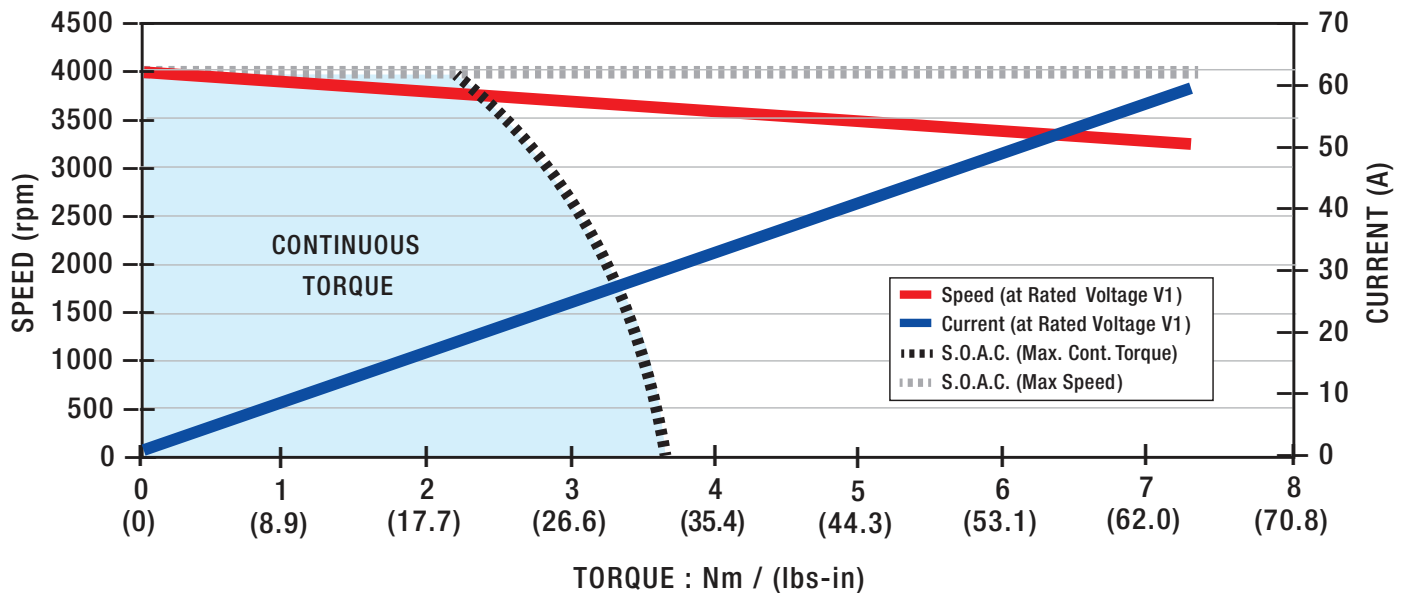
Motor Data		Units							
Rated Voltage V1	V_r	V	60.0	76.0	76.0	121	152	152	305
Rated Torque ¹ •	T_r	Nm	2.2	2.3	2.4	2.3	2.3	2.3	2.3
		oz-in	320	320	330	330	330	330	320
Rated Speed ¹	ω_r	rpm	4000	4000	4000	4000	4000	4000	4000
Rated Current ¹	I_r	A	28	25	21	18	14	11	8.5
Rated Power ¹	P_r	W	930	950	990	960	970	960	960
No Load Speed	ω_{nl}	rpm	4000	4000	4000	4000	4000	4000	4000
No Load Current	I_{nl}	A	1.2	1.0	0.82	0.70	0.57	0.45	0.34
Rated Voltage V2	V_r	V	30.0	38.0	48.0	170	76.0	76.0	152
Rated Torque ¹ •	T_r	Nm	2.6	2.5	2.5	2.3	2.4	2.6	2.3
		oz-in	370	350	360	320	330	370	330
Rated Speed ¹	ω_r	rpm	3080	3490	3610	4000	3970	3090	4000
Rated Current ¹	I_r	A	31	27	22	18	14	13	8.5
Rated Power ¹	P_r	W	830	910	950	960	980	850	970
No Load Speed	ω_{nl}	rpm	3050	3440	3540	4000	3870	3090	4000
No Load Current	I_{nl}	A	0.99	0.93	0.77	0.70	0.56	0.40	0.34
Motor Constant	K_M	Nm/ \sqrt{W}	0.42	0.40	0.41	0.41	0.40	0.40	0.40
		oz-in/ \sqrt{W}	59	56	58	57	56	57	57
Torque Constant	K_T	Nm/A	0.0936	0.105	0.129	0.152	0.187	0.234	0.315
		oz-in/A	13.3	14.9	18.3	21.5	26.5	33.1	44.6
Voltage Constant	K_E	V/(rad/s)	0.0936	0.105	0.129	0.152	0.187	0.234	0.315
		V/krpm	9.80	11.0	13.5	15.9	19.6	24.5	33.0
Terminal Resistance	R_{mt}	Ω	0.0500	0.0700	0.100	0.140	0.220	0.340	0.610
Inductance	L	mH	0.27	0.34	0.51	0.72	1.1	1.7	3.1
Peak Current	I_{pk}	A	110	99	84	69	57	45	33
Electrical Time Constant	τ_e	ms	5.4	4.9	5.1	5.1	5.0	5.0	5.1
Mechanical Time Constant	τ_m	ms	4.5	5.0	4.7	4.8	5.0	4.9	4.9

¹Recorded at maximum winding temperature at 25°C ambient and without heatsink.



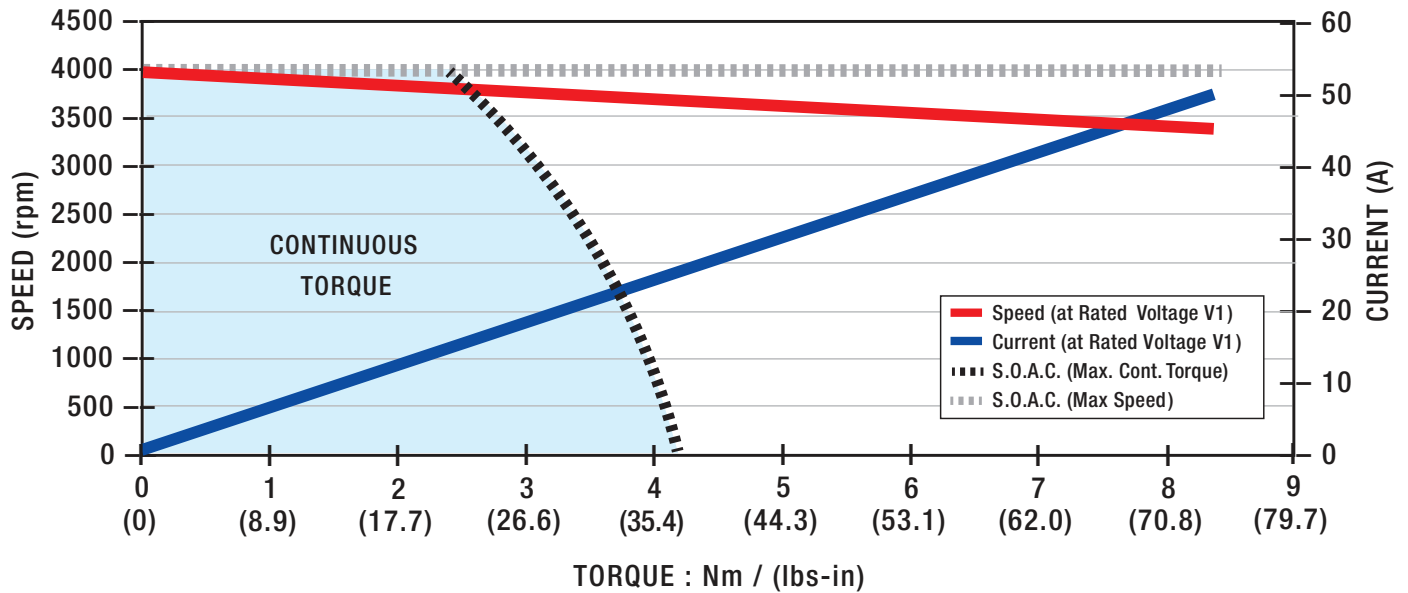
Motor Data		Units						
Rated Voltage V1	V_r	V	76.0	76.0	152	152	305	305
Rated Torque ¹ •	T_r	Nm	2.1	2.3	2.3	2.3	2.3	2.4
		oz-in	300	320	330	330	320	330
Rated Speed ¹	ω_r	rpm	4000	4000	4000	4000	4000	4000
Rated Current ¹	I_r	A	19	18	14	11	7.3	5.3
Rated Power ¹	P_r	W	880	950	980	970	960	990
No Load Speed	ω_{nl}	rpm	4000	4000	4000	4000	4000	4000
No Load Current	I_{nl}	A	1.2	1.1	0.73	0.62	0.41	0.29
Rated Voltage V2	V_r	V	38.0	48.0	76.0	76.0	152	152
Rated Torque ¹ •	T_r	Nm	2.9	2.9	2.6	3.0	2.3	3.2
		oz-in	410	410	370	420	330	450
Rated Speed ¹	ω_r	rpm	2850	3190	3730	3090	4000	2850
Rated Current ¹	I_r	A	25	22	15	14	7.3	6.9
Rated Power ¹	P_r	W	850	960	1000	960	970	950
No Load Speed	ω_{nl}	rpm	2760	3050	3510	2970	3870	2760
No Load Current	I_{nl}	A	0.95	0.87	0.68	0.53	0.40	0.24
Motor Constant	K_M	Nm/ \sqrt{W}	0.50	0.53	0.53	0.53	0.52	0.54
		oz-in/ \sqrt{W}	70	75	75	75	74	76
Torque Constant	K_T	Nm/A	0.131	0.150	0.206	0.244	0.374	0.524
		oz-in/A	18.6	21.2	29.2	34.5	53.0	74.2
Voltage Constant	K_E	V/(rad/s)	0.131	0.150	0.206	0.244	0.374	0.524
		V/krpm	13.7	15.7	21.6	25.5	39.2	54.9
Terminal Resistance	R_{mt}	Ω	0.0700	0.0800	0.150	0.210	0.510	0.950
Inductance	L	mH	0.32	0.42	0.80	1.1	2.7	5.2
Peak Current	I_{pk}	A	96	90	66	57	36	26
Electrical Time Constant	τ_e	ms	4.6	5.3	5.3	5.4	5.2	5.5
Mechanical Time Constant	τ_m	ms	5.1	4.4	4.4	4.4	4.5	4.3

¹Recorded at maximum winding temperature at 25°C ambient and without heatsink.



Motor Data		Units						
Rated Voltage V1	V_r	V	76.0	152	152	305	305	305
Rated Torque ¹ •	T_r	Nm	2.4	2.7	2.7	2.6	2.6	2.7
		oz-in	340	380	390	370	380	390
Rated Speed ¹	ω_r	rpm	4000	4000	4000	4000	4000	4000
Rated Current ¹	I_r	A	16	15	11	9.4	7.6	5.6
Rated Power ¹	P_r	W	1000	1100	1100	1100	1100	1100
No Load Speed	ω_{nl}	rpm	4000	4000	4000	4000	4000	4000
No Load Current	I_{nl}	A	0.79	0.69	0.51	0.44	0.35	0.25
Rated Voltage V2	V_r	V	48.0	76.0	76.0	170	152	152
Rated Torque ¹ •	T_r	Nm	3.3	2.9	3.7	2.6	2.9	3.7
		oz-in	470	410	520	370	410	530
Rated Speed ¹	ω_r	rpm	2640	3760	2660	4000	3770	2640
Rated Current ¹	I_r	A	21	16	15	9.4	8.1	7.4
Rated Power ¹	P_r	W	920	1200	1000	1100	1100	1000
No Load Speed	ω_{nl}	rpm	2530	3500	2550	4000	3500	2530
No Load Current	I_{nl}	A	0.68	0.66	0.43	0.44	0.33	0.22
Motor Constant	K_M	Nm/ \sqrt{W}	0.60	0.62	0.64	0.62	0.63	0.64
		oz-in/ \sqrt{W}	85	88	90	88	89	91
Torque Constant	K_T	Nm/A	0.181	0.207	0.285	0.330	0.413	0.573
		oz-in/A	25.6	29.3	40.3	46.8	58.6	81.1
Voltage Constant	K_E	V/(rad/s)	0.181	0.207	0.285	0.330	0.413	0.573
		V/krpm	19.0	21.7	29.8	34.6	43.3	60.0
Terminal Resistance	R_{mt}	Ω	0.0900	0.110	0.200	0.280	0.430	0.790
Inductance	L	mH	0.46	0.60	1.1	1.1	2.4	4.6
Peak Current	I_{pk}	A	81	75	57	48	39	28
Electrical Time Constant	τ_e	ms	5.1	5.5	5.7	4.0	5.6	5.8
Mechanical Time Constant	τ_m	ms	4.7	4.4	4.2	4.4	4.3	4.1

¹Recorded at maximum winding temperature at 25°C ambient and without heatsink.



Motor Data		Units			
Rated Voltage V1	V_r	V	152	305	305
Rated Torque ¹ •	T_r	Nm	4.7	4.7	4.7
		oz-in	660	660	660
Rated Speed ¹	ω_r	rpm	4000	4000	4000
Rated Current ¹	I_r	A	24	15	12
Rated Power ¹	P_r	W	2000	2000	2000
No Load Speed	ω_{nl}	rpm	4000	4000	4000
No Load Current	I_{nl}	A	1.1	0.65	0.53
Rated Voltage V2	V_r	V	76.0	152	152
Rated Torque ¹ •	T_r	Nm	5.4	4.8	5.4
		oz-in	770	670	770
Rated Speed ¹	ω_r	rpm	3240	4000	3240
Rated Current ¹	I_r	A	27	15	14
Rated Power ¹	P_r	W	1800	2000	1800
No Load Speed	ω_{nl}	rpm	3220	3970	3220
No Load Current	I_{nl}	A	0.93	0.64	0.47
Motor Constant	K_M	Nm/ \sqrt{W}	0.62	0.63	0.62
		oz-in/ \sqrt{W}	88	89	88
Torque Constant	K_T	Nm/A	0.224	0.365	0.449
		oz-in/A	31.8	51.7	63.6
Voltage Constant	K_E	V/(rad/s)	0.224	0.365	0.449
		V/krpm	23.5	38.2	47.0
Terminal Resistance	R_{mt}	Ω	0.130	0.340	0.520
Inductance	L	mH	0.93	1.6	3.7
Peak Current	I_{pk}	A	100	63	51
Electrical Time Constant	τ_e	ms	7.2	4.7	7.2
Mechanical Time Constant	τ_m	ms	5.5	5.5	5.5

¹Recorded at maximum winding temperature at 25°C ambient and without heatsink.

