EC033A Series

The EC033A Series Brushless DC Motor is a high torque density model brushless motor in a 33mm diameter housing. It is offered in 3 motor lengths with continuous torque from 0.025 – 0.06 Nm.

EC Instrument Grade Motors For applications that require uniform motion control at all speeds. Capable of high acceleration.

Benefits

- Speeds up to 12,000 RPM possible
- DC bus voltage up to 60 VDC
- 33mm diameter housing
- Eight standard windings, Special windings available
- 4 pole rare earth design

Optional Assemblies

- Encoder: E30C/D
- Gearboxes: G30A, G35A
- Programmable Drives: PBL4850E, BGE3004A, BGE6015A

Motor Characteristics

Motor Data		Units	Part No.		
			EC033A-1	EC033A-2	EC033A-3
Max DC Terminal Voltage	V_T	V	60		
Max Speed (Mechanical)	ω_{MAX}	rpm	12000		
Continuous Stall Torque[1]	T_{CS}	Nm	0.025	0.049	0.060
		oz-in	3.5	7.0	8.5
Peak Torque (Maximum)[1]	T_{pk}	Nm	0.081	0.16	0.19
		oz-in	12	22	27
Coulomb Friction Torque	T_f	Nm	0.0028	0.0042	0.0056
		oz-in	0.40	0.60	0.80
Viscous Damping Factor	D	Nm/(rad/s)	9.4E-07	1.6E-06	2.2E-06
		oz-in/krpm	0.014	0.023	0.032
Thermal Time Constant	τ_{th}	min	7.8	9.0	11
Thermal Resistance	R_{th}	°C/W	15	13	11
Max. Winding Temperature	Θ_{MAX}	°C	130	130	130
Rotor Inertia	J_r	kg-m^2	1.2E-06	1.9E-06	2.7E-06
		oz-in-s^2	1.7E-04	2.8E-04	3.9E-04
Motor Weight	W_m	g	130	180	240
		oz	4.5	6.5	8.5

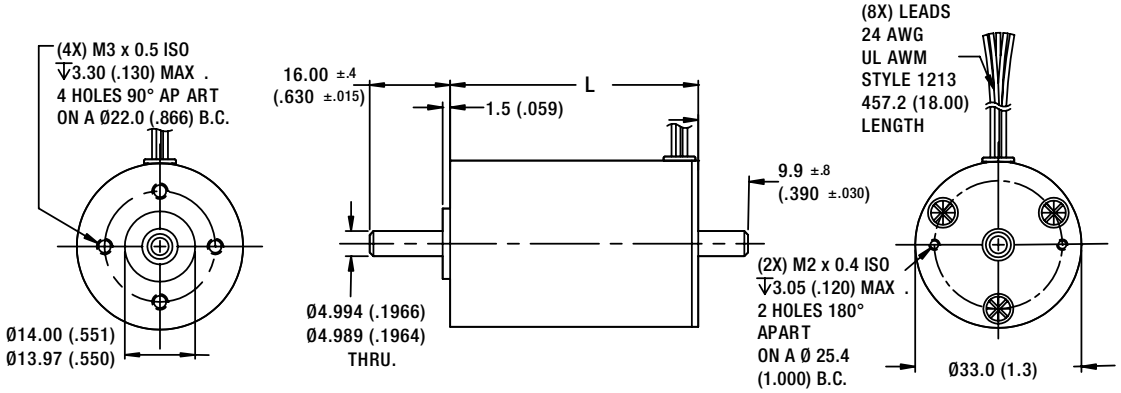
[1]Recorded at maximum winding temperature at 25°C ambient and without heatsink. **For PBL4850E to operate a brush motor, an encoder is required.

Dimensional Drawings: EC033A-1 • EC033A-2 • EC033A-3

Dimensions = mm (inches)

L = Lengths Available

EC033A-1 = 38.1 (1.500) Max.
EC033A-2 = 50.8 (2.000) Max.
EC033A-3 = 63.5 (2.500) Max.

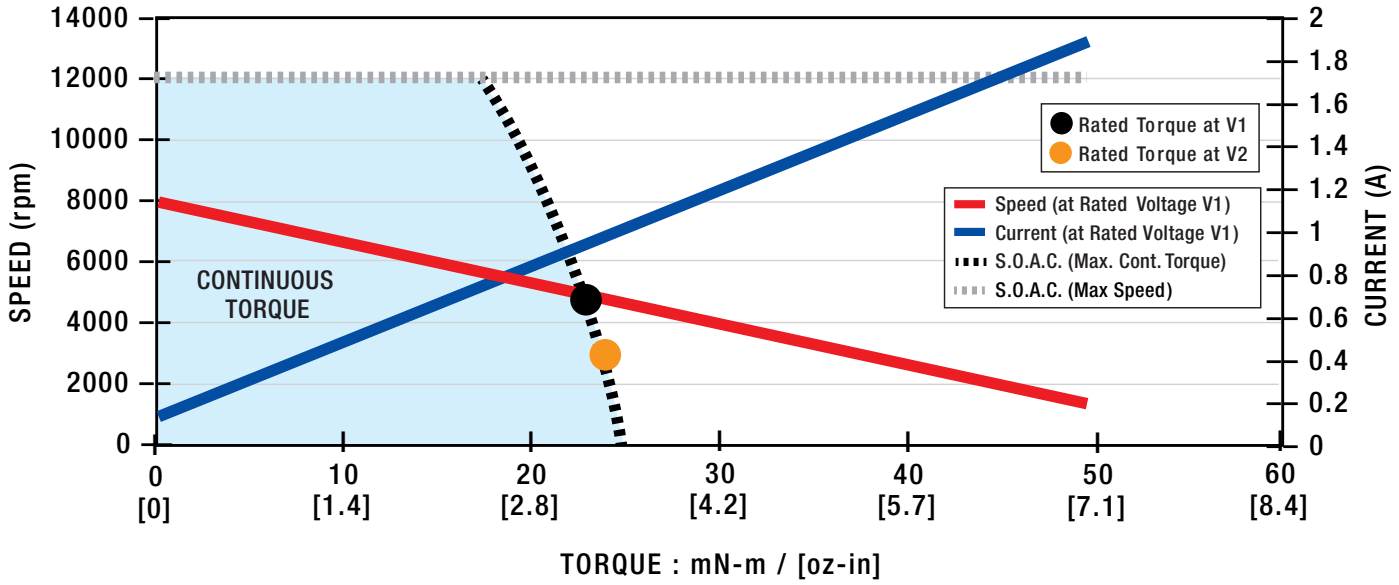


NOTE: All values specified at 25°C ambient temperature. Peak values are theoretical and for reference only.

Performance Data & Graph: **EC033A–1**

Motor Data		Units								
Rated Voltage **V1**	V_r	V	4.78	6.00	7.58	9.55	12.0	15.2	19.1	24.0
Rated Torque[1] •	T_r	Nm	0.024	0.024	0.023	0.023	0.023	0.023	0.023	0.023
		oz-in	3.4	3.4	3.3	3.3	3.3	3.3	3.3	3.2
Rated Speed[1]	ω_r	rpm	3430	3850	4090	4340	4540	4490	4620	4750
Rated Current[1]	I_r	A	4.9	3.9	2.9	2.4	1.9	1.4	1.2	0.93
Rated Power[1]	P_r	W	8.6	9.5	10	11	11	11	11	11
No Load Speed	ω_{nl}	rpm	6960	7020	6830	7020	7050	6900	7040	7080
No Load Current	I_{nl}	A	0.57	0.46	0.35	0.29	0.23	0.18	0.15	0.12
Rated Voltage **V2**	V_r	V	3.79	4.78	6.00	7.58	9.55	12.0	15.2	19.1
Rated Torque[1] •	T_r	Nm	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024
		oz-in	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Rated Speed[1]	ω_r	rpm	1680	2120	2370	2590	2800	2730	2890	3000
Rated Current[1]	I_r	A	5.0	4.0	3.0	2.4	1.9	1.5	1.2	0.97
Rated Power[1]	P_r	W	4.3	5.4	6.0	6.5	7.0	6.9	7.2	7.5
No Load Speed	ω_{nl}	rpm	5460	5540	5360	5530	5570	5410	5560	5600
No Load Current	I_{nl}	A	0.55	0.44	0.34	0.28	0.22	0.17	0.14	0.11
Motor Constant	K_M	Nm/√W	0.0099	0.010	0.011	0.011	0.011	0.011	0.011	0.011
		oz-in/√W	1.4	1.5	1.5	1.5	1.6	1.6	1.6	1.6
Torque Constant	K_T	Nm/A	0.00622	0.00776	0.0101	0.0124	0.0156	0.0201	0.0248	0.0310
		oz-in/A	0.880	1.10	1.43	1.76	2.20	2.85	3.52	4.39
Voltage Constant	K_E	V/(rad/s)	0.00622	0.00776	0.0101	0.0124	0.0156	0.0201	0.0248	0.0310
		V/krpm	0.651	0.813	1.06	1.30	1.63	2.11	2.60	3.25
Terminal Resistance	R_{mt}	Ω	0.395	0.569	0.863	1.29	1.94	3.14	4.81	7.36
Inductance	L	mH	0.14	0.22	0.38	0.57	0.90	1.5	2.3	3.6
Peak Current	I_{pk}	A	12	11	8.8	7.4	6.0	4.8	3.9	3.0
Electrical Time Constant	τ_e	ms	0.36	0.39	0.44	0.44	0.46	0.48	0.48	0.49
Mechanical Time Constant	τ_m	ms	12	11	9.9	9.8	9.3	9.0	9.1	8.9

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

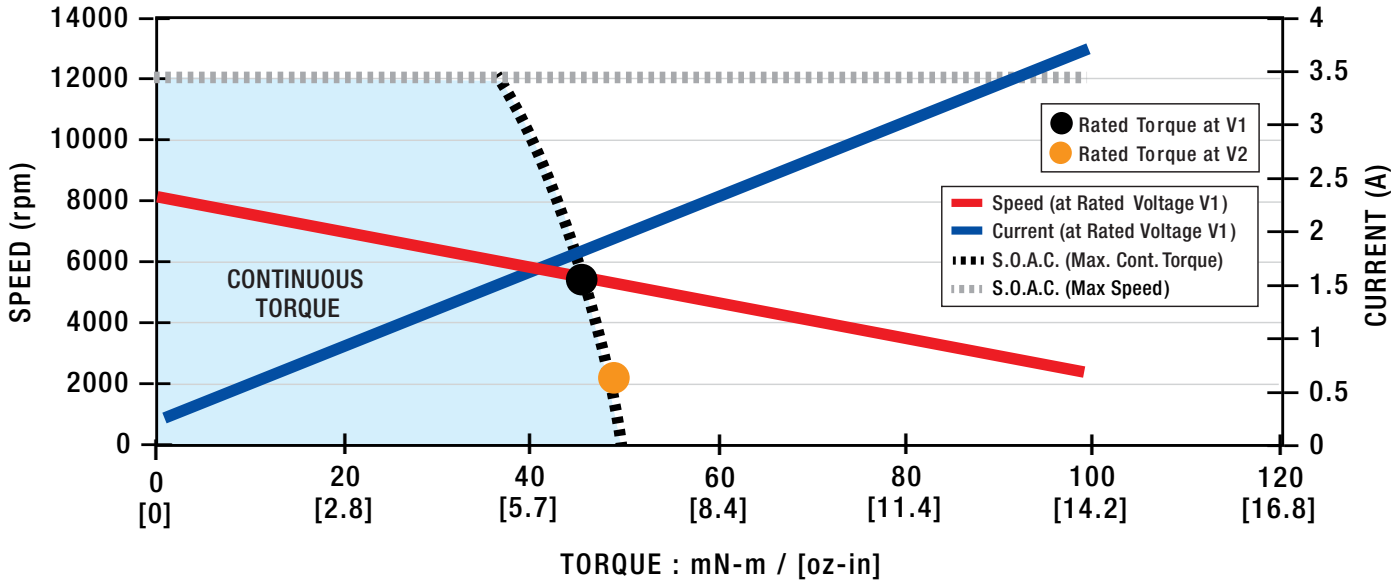


NOTE: All values specified at 25°C ambient temperature. Peak values are theoretical and for reference only. S.O.A.C. = Safe Operating Area for Continuous duty.

Performance Data & Graph: **EC033A–2**

Motor Data		Units								
Rated Voltage **V1**	V_r	V	9.55	12.0	15.2	19.1	24.0	30.3	38.2	48.0
Rated Torque[1] •	T_r	Nm	0.047	0.046	0.046	0.046	0.046	0.046	0.045	0.045
		oz-in	6.6	6.6	6.5	6.5	6.5	6.5	6.4	6.4
Rated Speed[1]	ω_r	rpm	4780	4990	5060	5220	5350	5200	5350	5450
Rated Current[1]	I_r	A	4.6	3.7	2.8	2.3	1.8	1.4	1.1	0.90
Rated Power[1]	P_r	W	23	24	24	25	26	25	25	26
No Load Speed	ω_{nl}	rpm	7120	7140	7000	7140	7180	6970	7140	7180
No Load Current	I_{nl}	A	0.44	0.35	0.27	0.22	0.18	0.14	0.11	0.087
Rated Voltage **V2**	V_r	V	6.00	7.58	9.55	12.0	15.2	19.1	24.0	30.3
Rated Torque[1] •	T_r	Nm	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.048
		oz-in	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Rated Speed[1]	ω_r	rpm	1660	1890	1990	2090	2240	2160	2220	2330
Rated Current[1]	I_r	A	4.8	3.9	3.0	2.4	1.9	1.5	1.2	0.95
Rated Power[1]	P_r	W	8.5	9.7	10	11	11	11	11	12
No Load Speed	ω_{nl}	rpm	4420	4460	4350	4440	4500	4350	4440	4490
No Load Current	I_{nl}	A	0.40	0.32	0.25	0.20	0.17	0.13	0.10	0.080
Motor Constant	K_M	Nm/√W	0.016	0.017	0.017	0.017	0.018	0.018	0.018	0.018
		oz-in/√W	2.3	2.4	2.5	2.5	2.5	2.5	2.5	2.5
Torque Constant	K_T	Nm/A	0.0124	0.0156	0.0201	0.0248	0.0310	0.0404	0.0498	0.0622
		oz-in/A	1.76	2.20	2.85	3.52	4.39	5.72	7.05	8.80
Voltage Constant	K_E	V/(rad/s)	0.0124	0.0156	0.0201	0.0248	0.0310	0.0404	0.0498	0.0622
		V/krpm	1.30	1.63	2.11	2.60	3.25	4.23	5.21	6.51
Terminal Resistance	R_{mt}	Ω	0.584	0.870	1.35	2.06	3.13	5.12	7.88	12.1
Inductance	L	mH	0.27	0.42	0.71	1.1	1.7	2.9	4.3	6.8
Peak Current	I_{pk}	A	15	12	9.0	7.5	6.0	4.5	3.6	3.0
Electrical Time Constant	τ_e	ms	0.46	0.49	0.53	0.53	0.54	0.56	0.55	0.56
Mechanical Time Constant	τ_m	ms	7.4	7.0	6.5	6.5	6.3	6.1	6.2	6.1

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

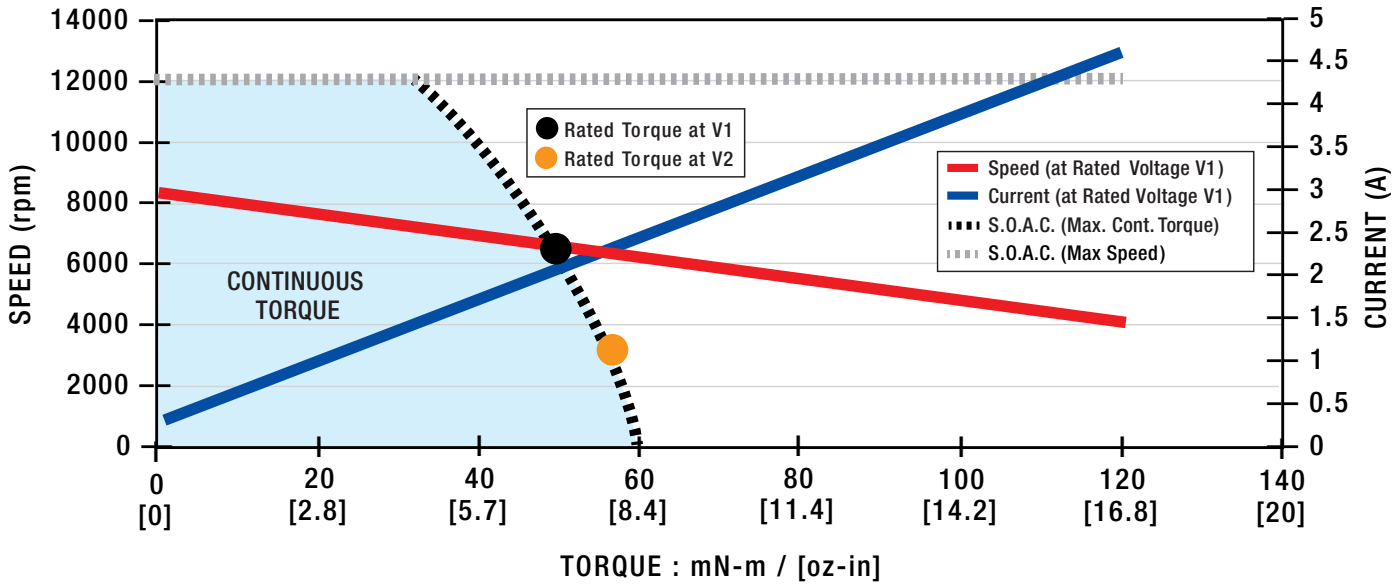


NOTE: All values specified at 25°C ambient temperature. Peak values are theoretical and for reference only. S.O.A.C. = Safe Operating Area for Continuous duty.

Performance Data & Graph: **EC033A–3**

Motor Data		Units								
Rated Voltage **V1**	V_r	V	12.0	15.2	19.1	24.0	30.3	38.2	48.0	60.0
Rated Torque[1] •	T_r	Nm	0.052	0.051	0.050	0.049	0.049	0.048	0.049	0.049
		oz-in	7.3	7.2	7.1	7.0	6.9	6.9	6.9	6.9
Rated Speed[1]	ω_r	rpm	6060	6450	6590	6460	6670	6790	6550	6650
Rated Current[1]	I_r	A	4.3	3.4	2.7	2.1	1.7	1.3	1.0	0.83
Rated Power[1]	P_r	W	33	34	34	33	34	34	33	34
No Load Speed	ω_{nl}	rpm	7360	7610	7650	7400	7600	7660	7410	7520
No Load Current	I_{nl}	A	0.49	0.40	0.32	0.25	0.20	0.16	0.13	0.099
Rated Voltage **V2**	V_r	V	7.58	9.55	12.0	15.2	19.1	24.0	30.3	38.2
Rated Torque[1] •	T_r	Nm	0.057	0.057	0.057	0.056	0.056	0.056	0.056	0.056
		oz-in	8.1	8.1	8.0	8.0	8.0	7.9	7.9	7.9
Rated Speed[1]	ω_r	rpm	2790	3030	3150	3170	3270	3340	3250	3340
Rated Current[1]	I_r	A	4.7	3.8	3.0	2.3	1.9	1.5	1.2	0.93
Rated Power[1]	P_r	W	17	18	19	19	19	20	19	20
No Load Speed	ω_{nl}	rpm	4600	4740	4760	4650	4750	4770	4640	4750
No Load Current	I_{nl}	A	0.45	0.37	0.29	0.23	0.19	0.15	0.12	0.090
Motor Constant	K_M	Nm/√W	0.021	0.021	0.022	0.022	0.022	0.022	0.023	0.023
		oz-in/√W	2.9	3.0	3.1	3.2	3.1	3.2	3.2	3.2
Torque Constant	K_T	Nm/A	0.0152	0.0186	0.0233	0.0303	0.0372	0.0466	0.0605	0.0746
		oz-in/A	2.15	2.64	3.30	4.29	5.27	6.60	8.57	10.6
Voltage Constant	K_E	V/(rad/s)	0.0152	0.0186	0.0233	0.0303	0.0372	0.0466	0.0605	0.0746
		V/krpm	1.59	1.95	2.44	3.17	3.90	4.88	6.34	7.81
Terminal Resistance	R_{mt}	Ω	0.532	0.774	1.17	1.84	2.82	4.32	7.10	11.0
Inductance	L	mH	0.26	0.39	0.62	1.0	1.6	2.5	4.2	6.3
Peak Current	I_{pk}	A	15	12	9.6	7.5	6.0	4.8	3.6	3.0
Electrical Time Constant	τ_e	ms	0.49	0.51	0.53	0.56	0.56	0.57	0.59	0.58
Mechanical Time Constant	τ_m	ms	6.3	6.1	5.9	5.5	5.5	5.4	5.3	5.3

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



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