



Shown with optional assembly.

ES040A Series

The ES040A Series Brushless DC Motor is a high torque density model brushless motor with a slotless design in a NEMA 17 configuration. It is offered in 3 motor lengths with continuous torque from 0.085 – 0.134 Nm.

ES Slotless, Brushless Motors For applications that require high acceleration and precision control at all speeds. Torque production is predictable and very controllable.

Motor Characteristics

Motor Data	Units	Part No.		
		ES040A-1	ES040A-2	ES040A-3
Max DC Terminal Voltage V_T	V	120		
Max Speed (Mechanical) ω_{MAX}	rpm	8000		
Continuous Stall Torque ¹ T_{CS}	Nm	0.084	0.10	0.13
	oz-in	12	14	19
Peak Torque (Maximum) ¹ T_{pk}	Nm	0.26	0.31	0.41
	oz-in	36	43	59
Coulomb Friction Torque T_f	Nm	0.0011	0.0011	0.0011
	oz-in	0.15	0.15	0.15
Viscous Damping Factor D	Nm/(rad/s)	1.6E-06	1.8E-06	2.2E-06
	oz-in/krpm	0.024	0.027	0.033
Thermal Time Constant τ_{th}	min	23	26	27
Thermal Resistance R_{th}	°C/W	6.7	6.4	5.4
Max. Winding Temperature θ_{MAX}	°C	130	130	130
Rotor Inertia J_r	kg-m ²	4.5E-06	5.7E-06	6.1E-06
	oz-in-s ²	6.4E-04	8.0E-04	8.6E-04
Motor Weight W_m	g	400	450	510
	oz	14	16	18

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

Benefits

- Speeds up to 8,000 RPM possible
- DC bus voltage up to 120 VDC
- NEMA 17 configuration
- Eight standard windings, special windings available
- 4 pole rare earth design

Optional Assemblies

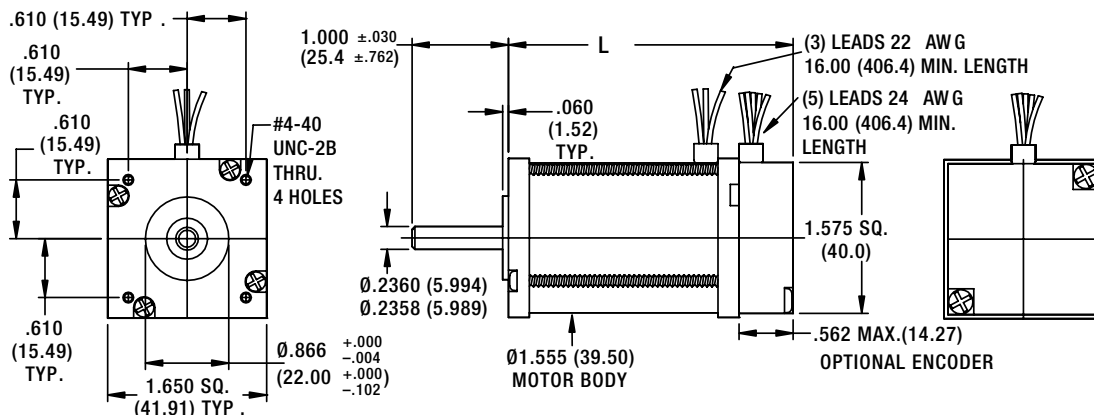
- Encoder: E30C/D
- Gearboxes: G40A, PLG42S, G51A, PLG52
- Brakes: B30A, B49A
- Programmable Drives: PBL4850E, BGE6015A

Dimensional Drawings: ES040A-1 • ES040A-2 • ES040A-3

Dimensions = inches (mm)

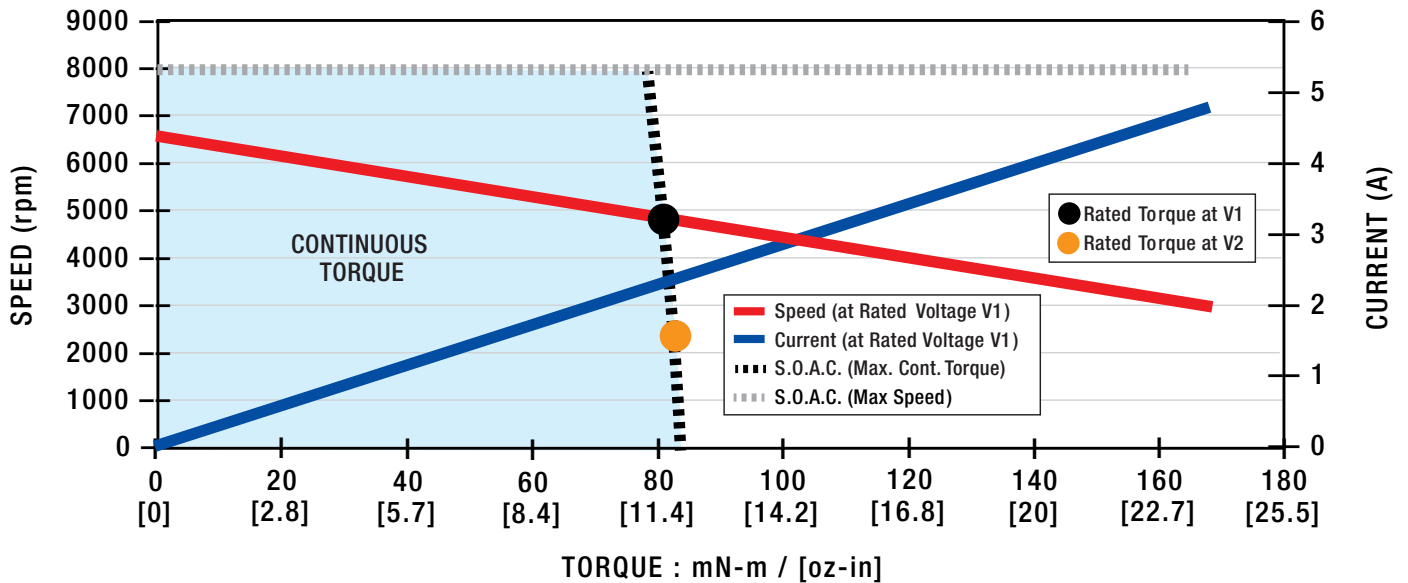
L = Lengths Available

ES040A-1 = 2.655 (67.44) Max.
 ES040A-2 = 2.955 (75.06) Max.
 ES040A-3 = 3.255 (82.68) Max.



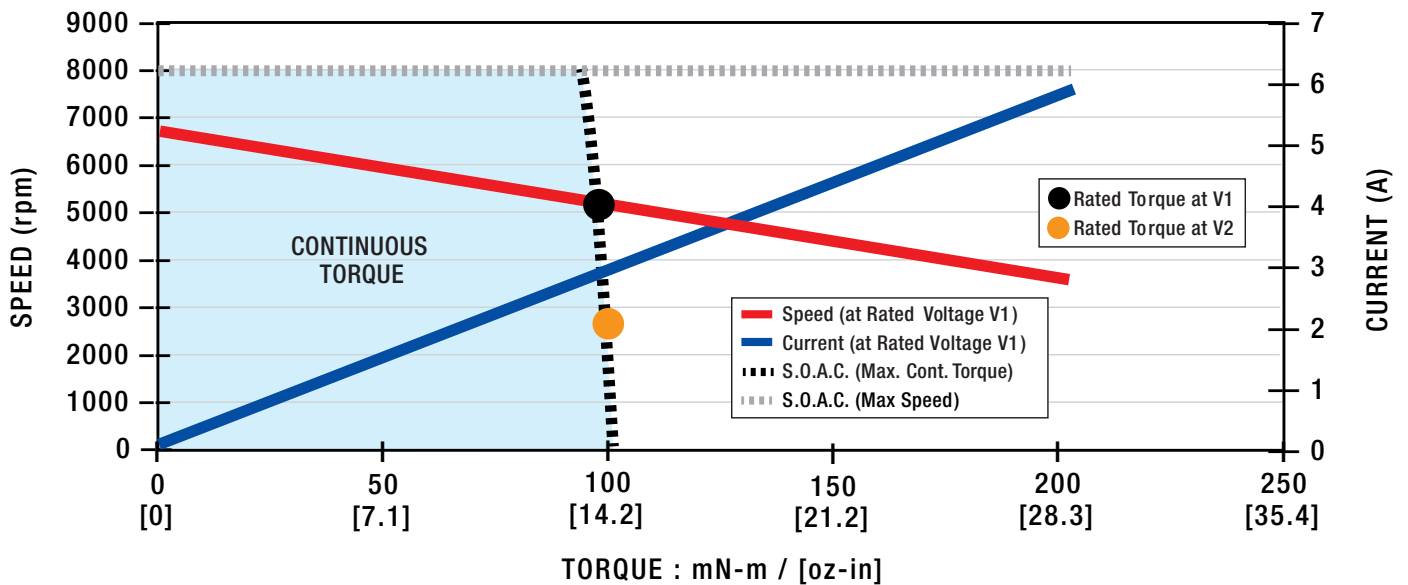
Motor Data		Units								
Rated Voltage V1	V_r	V	15.2	19.1	24.0	30.3	38.2	48.0	60.6	76.4
Rated Torque ¹ •	T_r	Nm	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081
		oz-in	12	12	12	12	12	12	12	12
Rated Speed ¹	ω_r	rpm	4810	4790	4790	4800	4790	4790	4800	4790
Rated Current ¹	I_r	A	3.7	3.0	2.4	1.9	1.5	1.2	0.94	0.74
Rated Power ¹	P_r	W	41	41	41	41	41	41	41	41
No Load Speed	ω_{nl}	rpm	5800	5760	5790	5790	5760	5790	5800	5760
No Load Current	I_{nl}	A	0.082	0.065	0.052	0.041	0.033	0.026	0.021	0.017
Rated Voltage V2	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	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
		oz-in	12	12	12	12	12	12	12	12
Rated Speed ¹	ω_r	rpm	2360	2350	2370	2360	2350	2360	2360	2350
Rated Current ¹	I_r	A	3.8	3.0	2.4	1.9	1.5	1.2	0.96	0.76
Rated Power ¹	P_r	W	21	20	21	21	20	21	21	20
No Load Speed	ω_{nl}	rpm	3640	3620	3660	3650	3620	3650	3650	3620
No Load Current	I_{nl}	A	0.068	0.054	0.043	0.034	0.027	0.022	0.017	0.014
Motor Constant	K_M	Nm/ \sqrt{W}	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
		oz-in/ \sqrt{W}	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Torque Constant	K_T	Nm/A	0.0249	0.0315	0.0394	0.0498	0.0630	0.0788	0.0993	0.126
		oz-in/A	3.53	4.46	5.58	7.05	8.93	11.2	14.1	17.9
Voltage Constant	K_E	V/(rad/s)	0.0249	0.0315	0.0394	0.0498	0.0630	0.0788	0.0993	0.126
		V/krpm	2.61	3.30	4.13	5.21	6.60	8.25	10.4	13.2
Terminal Resistance	R_{mt}	Ω	0.750	1.19	1.89	3.00	4.76	7.56	12.0	19.0
Inductance	L	mH	0.14	0.21	0.34	0.54	0.84	1.3	2.2	3.4
Peak Current	I_{pk}	A	12	9.3	7.2	5.7	4.5	3.6	2.9	2.3
Electrical Time Constant	τ_e	ms	0.19	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Mechanical Time Constant	τ_m	ms	5.5	5.5	5.5	5.5	5.4	5.5	5.5	5.4

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



Motor Data		Units								
Rated Voltage V1	V_r	V	19.1	24.0	30.3	38.2	48.0	60.6	76.4	96.0
Rated Torque ¹ •	T_r	Nm	0.097	0.097	0.097	0.097	0.097	0.097	0.097	0.097
		oz-in	14	14	14	14	14	14	14	14
Rated Speed ¹	ω_r	rpm	5200	5160	5200	5190	5160	5210	5190	5160
Rated Current ¹	I_r	A	3.7	2.9	2.3	1.8	1.4	1.2	0.91	0.72
Rated Power ¹	P_r	W	53	53	53	53	53	53	53	53
No Load Speed	ω_{nl}	rpm	5950	5920	5970	5940	5910	5980	5950	5910
No Load Current	I_{nl}	A	0.072	0.057	0.046	0.036	0.029	0.023	0.018	0.015
Rated Voltage V2	V_r	V	12.0	15.2	19.1	24.0	30.3	38.2	48.0	60.6
Rated Torque ¹ •	T_r	Nm	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
		oz-in	14	14	14	14	14	14	14	14
Rated Speed ¹	ω_r	rpm	2680	2690	2690	2670	2680	2690	2680	2680
Rated Current ¹	I_r	A	3.7	3.0	2.4	1.9	1.5	1.2	0.93	0.74
Rated Power ¹	P_r	W	28	28	28	28	28	28	28	28
No Load Speed	ω_{nl}	rpm	3730	3750	3760	3730	3730	3770	3730	3730
No Load Current	I_{nl}	A	0.058	0.047	0.037	0.029	0.024	0.019	0.015	0.012
Motor Constant	K_M	Nm/ \sqrt{W}	0.034	0.034	0.033	0.034	0.034	0.034	0.034	0.034
		oz-in/ \sqrt{W}	4.8	4.8	4.7	4.8	4.8	4.7	4.8	4.8
Torque Constant	K_T	Nm/A	0.0306	0.0386	0.0483	0.0612	0.0773	0.0964	0.122	0.155
		oz-in/A	4.33	5.46	6.84	8.67	10.9	13.7	17.3	21.9
Voltage Constant	K_E	V/(rad/s)	0.0306	0.0386	0.0483	0.0612	0.0773	0.0964	0.122	0.155
		V/krpm	3.20	4.04	5.06	6.41	8.09	10.1	12.8	16.2
Terminal Resistance	R_{mt}	Ω	0.820	1.31	2.08	3.30	5.24	8.32	13.2	21.0
Inductance	L	mH	0.16	0.26	0.41	0.64	1.0	1.6	2.6	4.2
Peak Current	I_{pk}	A	11	9.0	7.2	5.7	4.5	3.6	2.9	2.3
Electrical Time Constant	τ_e	ms	0.20	0.20	0.20	0.19	0.20	0.19	0.20	0.20
Mechanical Time Constant	τ_m	ms	5.0	5.0	5.1	5.0	5.0	5.1	5.0	5.0

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



Motor Data		Units								
Rated Voltage V1	V_r	V	24.0	30.3	38.2	48.0	60.6	76.4	96.0	121
Rated Torque ¹ •	T_r	Nm	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
		oz-in	18	18	18	18	18	18	18	18
Rated Speed ¹	ω_r	rpm	5250	5250	5270	5240	5230	5270	5250	5240
Rated Current ¹	I_r	A	3.8	3.0	2.4	1.9	1.5	1.2	0.95	0.75
Rated Power ¹	P_r	W	71	71	72	71	71	72	71	71
No Load Speed	ω_{nl}	rpm	5840	5840	5870	5830	5810	5860	5840	5830
No Load Current	I_{nl}	A	0.062	0.049	0.040	0.031	0.025	0.020	0.016	0.013
Rated Voltage V2	V_r	V	15.2	19.1	24.0	30.3	38.2	48.0	60.6	76.4
Rated Torque ¹ •	T_r	Nm	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
		oz-in	19	19	19	19	19	19	19	19
Rated Speed ¹	ω_r	rpm	2820	2800	2790	2800	2800	2790	2800	2800
Rated Current ¹	I_r	A	3.9	3.1	2.4	1.9	1.5	1.2	0.97	0.77
Rated Power ¹	P_r	W	39	39	39	39	39	39	39	39
No Load Speed	ω_{nl}	rpm	3700	3680	3690	3680	3660	3680	3680	3680
No Load Current	I_{nl}	A	0.050	0.039	0.031	0.025	0.020	0.016	0.013	0.0097
Motor Constant	K_M	Nm/ \sqrt{W}	0.041	0.041	0.041	0.041	0.042	0.041	0.041	0.041
		oz-in/ \sqrt{W}	5.9	5.9	5.8	5.9	5.9	5.9	5.9	5.9
Torque Constant	K_T	Nm/A	0.0392	0.0495	0.0620	0.0784	0.0993	0.124	0.157	0.198
		oz-in/A	5.54	7.00	8.78	11.1	14.1	17.6	22.2	28.0
Voltage Constant	K_E	V/(rad/s)	0.0392	0.0495	0.0620	0.0784	0.0993	0.124	0.157	0.198
		V/krpm	4.10	5.18	6.49	8.21	10.4	13.0	16.4	20.7
Terminal Resistance	R_{mt}	Ω	0.890	1.42	2.26	3.58	5.68	9.04	14.3	22.7
Inductance	L	mH	0.19	0.30	0.47	0.74	1.2	1.9	3.0	4.8
Peak Current	I_{pk}	A	12	9.3	7.5	6.0	4.5	3.6	2.9	2.3
Electrical Time Constant	τ_e	ms	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Mechanical Time Constant	τ_m	ms	3.5	3.5	3.6	3.5	3.5	3.5	3.5	3.5

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

