

Appendix: Motor Constants for Standard Bodine Motors

Tables 1 and 2 provide all critical data for our standard permanent magnet DC and brushless DC motors and gearmotors, with both the measured motor specifications and the derived motor constants. Typical data, where applicable, corresponds to operating temperature at rated load. This data will allow you to specify a Bodine gearmotor with confidence that the product will meet your design and application performance criteria.

Table 1: Motor Constants for Standard Bodine Permanent Magnet DC Motors

Model Number	0040	0041	0043	0044	6016	6020	6021	6037	4021	4022	4035	4037
Product Type/Item Description	24A0	24A2	24A4	24A4	33A3	33A5	33A5	33A7	42A5	42A7	42A5	42A7
Rated Voltage (VDC)	24	130	130	24	130	130	24	130	24	24	130	130
Rated Torque (oz-in.)	8	14	24	22	34	50	95	134	101	135	101	135
Torque Constant (oz-in/Amp)	8.7	52	53	9.2	54	57	11	53.2	13	12	60	59
Voltage Constant (V/Krpm)	6.4	39	39	6.8	40	42	8.2	38.9	9.4	8.9	44	43
Thermal Resistance (°C/Watts)	4.3	4.0	3.4	3.6	2.0	1.8	1.5	1.6	1.3	1.6	1.5	1.2
No Load Speed (rpm)	3340	3150	3130	3150	3050	2860	3030	3050	2560	2650	2930	2850
No Load Current (Amps)	0.24	0.05	0.04	0.24	0.08	0.12	0.50	0.68	0.70	0.90	0.15	0.18
Stall Torque (oz-in.) ¹	36	68	140	140	240	580	550	360	1170	1250	1200	1480
Circuit Resistance (Ohms)	5.7	84	50	1.7	32	17	0.46	8.8	0.27	0.23	6.4	5.1
Circuit Inductance (mH)	6.7	130	84	2.3	67	41	0.98	20	0.64	0.45	20	17
Armature Inertia (oz-in-sec ²)	0.003	0.005	0.007	0.007	0.031	0.043	0.043	0.075	0.082	0.12	0.082	0.12
Electrical Time Constant (msec)	1.18	1.55	1.68	1.35	2.09	2.41	2.13	2.27	2.37	1.96	3.13	3.33
Mechanical Time Constant (msec)	32.3	22.0	17.6	19.9	48.1	32.0	22.8	33.4	19.4	26.8	20.6	25.1

Table 2: Motor Constants for Standard Bodine Brushless DC Products

Model Number	3302	3502	3304	3314	3306	3500	n3507	3307	n3509	3309	3317	—
Product Type/Item Description	22B2	22B2	22B4	22B4	34B3	34B3	34B4	34B4	34B6	34B6	34B4	48B8
Rated Voltage (VDC)	130	24	130	130	130	24	24	130	24	130	130	260
Rated Torque (oz-in.)	25	25	50	20	81	81	101	101	151	151	33	550
Torque Constant (oz-in/Amp)	56	9.8	61	16	62	9.4	9.6	56	8.6	63	18	124
Voltage Constant (V/Krpm)	35	6.7	40	8.9	42	6.9	6.9	38	6.4	43	10	77
Thermal Resistance (°C/Watts)	3.8	3.7	2.3	2.1	1.9	1.6	1.4	1.6	1.3	1.4	1.5	0.70
No Load Speed (rpm)	3620	3555	3240	14,600	3130	3460	3460	3465	3770	3040	12,700	3365
No Load Current (Amps)	0.028	0.17	0.039	0.14	0.072	0.56	0.97	0.096	0.70	0.099	0.20	0.18
Stall Torque (oz-in.) ¹	82	74	206	64	350	243	342	460	512	840	200	3168
Circuit Resistance @ 23°C (Ohms)	45	1.4	17	5.4	9.2	0.31	0.18	5.8	0.10	3.3	1.7	2.1
Circuit Resistance (Ohms)	56	1.8	20	7.6	12	0.41	0.23	7.7	0.13	4.1	2.1	3.0
Circuit Inductance (mH)	72	2.3	45	13	24	0.60	0.43	15	0.25	13	6.9	12
Rotor Inertia (oz-in-sec ²)	0.0019	0.0019	0.0038	0.0038	0.0131	0.0131	0.0179	0.0179	0.0253	0.0253	0.0145	0.199
Electrical Time Constant (msec)	1.3	1.3	2.2	1.6	2.0	1.5	1.9	2.0	2.0	3.1	3.3	4.1
Mechanical Time Constant (msec)	4.9	4.6	2.9	19.0	5.4	7.4	5.6	5.9	5.2	3.5	14.8	5.5

1. Torque Data is a theoretical value—may exceed demagnetization current.

Permanent Magnet DC Motors



Brushless DC Motors

