Torque Motors

Megaflux Frameless Brushless Torque Motors–MF0060

Brushless thin-ring component (rotor and stator) torque motor

Allied Motion's Megaflux family of brushless torque motors includes 12 series of high performance frameless component torque motors, ranging in outside diameter from 60 mm up to 792 mm (2.36 in. up to 31.2 in.). Each motor consists of a matched rotor and stator pair. The stator is wound WYE with the three phase terminals made available.

This datasheet provides a specification overview of the MF family and specific data for the MF0060 series motors.

Megaflux frameless brushless torque motors are computer-designed and -optimized to provide the highest torque density brushless torque motors available. Special attention has been given to cogging torque minimization to enhance their performance in precision applications.

Frameless Megaflux motors are thin annular ring motors with large diameter-to-length ratios, and are intended to be integrated directly into mechanisms, effectively eliminating problems of torsional resonances due to couplings and backlash associated with gear trains. They are typically mounted directly to the driven axis, and their large open bore enables passing system electrical cabling, fluid piping or light beams through the motor center.

Features & Benefits

- 12 standard frame sizes from 60 mm up to 792 mm outside diameter
- Continuous stall torque as high as 1875 Nm (1383 lb-ft) covers a very wide range of applications
- Computer-optimized design maximizes torque density and performance
- Large, clear through bore—allows passage of air, water, or vacuum lines, optical beams, and/or electrical/signal wiring
- Three winding voltage designs for each size of 48, 150, and 300 VDC
- Hall sensor assembly standard on MF0060 through MF0127 series

Options & Accessories

- Custom winding designs to accommodate special voltage requirements
- Thin lamination MFS version for improved efficiency in applications requiring high speeds
- Hall-effect sensor array for commutation signals on larger series
- Special-engineered mechanical configurations to meet specific application needs
- Application-matched brushless servo drives

- High torque density, thin-ring frameless brushless torque motors
- 12 stator diameters, each with five stack heights, mean a wide selection of performances from which to choose
- High rated continuous stall torque of up to 1875 Nm (1383 lb-ft)
- Three winding designs: 48, 150, and 300 VDC

SPECIFICATION SUMMARY

Model	Units	MF0060	MF0076	MF0095	MF0127	MF0150	MF0210
Continuous Stall Torque	lb-ft	0.22 - 0.76	0.38 - 1.62	0.68 - 3.24	1.2 - 6.2	2.3 - 18.2	5.9 - 55.3
	Nm	0.29 - 1.04	0.51 - 2.20	0.92 - 4.39	1.6 - 8.4	3.1 - 24.7	8.0 - 75.0
No Load Speed	RPM	2076 - 7098	1640 - 6447	1300 - 5436	939 - 5097	416 - 2500	338 - 1894
Diameter (Outer)	in	2.38	2.99	3.73	5.00	6.69	9.06
	mm	60.4	76.0	94.7	127.0	170.0	230.0
Model	**Units**	**MF0255**	**MF0310**	**MF0410**	**MF0510**	**MF0610**	**MF0760**
Continuous Stall Torque	lb-ft	7.2 - 75.9	12.8 - 133.7	50.6 - 280	81 - 504	127 - 762	225 - 1383
	Nm	9.7 - 102.9	17.3 - 181.3	68.6 - 380	110 - 684	172 - 1034	304 - 1875
No Load Speed	RPM	280 - 1591	100 - 1260	71 - 926	42 -771	25 - 595	17.1 - 422
Diameter (Outer)	in	10.83	13.0	16.9	21.1	25.2	31.18
	mm	275.0	330	430	535	640	792

Issued: May 6, 2016

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SPECIFICATIONS (all data measured at 20 °C ambient)

Model No.		MF0060008			MF0060020			MF0060032		
Winding Voltage	V	48	150	300	48	150	300	48	150	300
Stall Torque (continuous) (1)	lb-ft	0.22	0.204	0.26	0.40	0.44	0.45	0.58	0.59	0.58
	Nm	0.29	0.33	0.36	0.54	0.59	0.61	0.78	0.79	0.79
Peak Torque (±25%)	lb-ft	1.7	2.8	2.9	3.9	4.7	4.7	5.6	7.7	7.7
	Nm	2.3	3.8	3.9	5.3	6.4	6.4	7.5	10.5	10.5
Peak Current	A	24	16.5	10.3	41	21	13.4	45	32	21
No Load Speed	RPM	4465	5891	7098	3382	4579	5724	2566	4010	5347
	rad/s	468	617	743	354	480	599	269	420	560
Cogging Torque (max.)	lb-ft	0.014			0.016			0.023		
	Nm	0.019			0.021			0.032		
Torque Constant (±10%)	lb-ft/A	0.071	0.17	0.28	0.09	0.22	0..35	0.12	0.25	0.37
	Nm/A	0.097	0.23	0.38	0.13	0.30	0.48	0.17	0.33	0.50
Voltage Constant (±10%)	V/kRPM	10	24	40	13	31	50	17	35	52
	V/rad/s	0.097	0.23	0.38	0.13	0.30	0.48	0.17	0.33	0.50
Motor Constant	lb-ft/√W	0.05	0.06	0.06	0.09	0.10	0.10	0.12	0.12	0.12
	Nm/√W	0.07	0.08	0.08	0.12	0.13	0.13	0.16	0.16	0.16
Elect. Time Constant	ms	0.25	0.31	0.35	0.30	0.36	0.38	0.37	0.38	0.38
Mech. Time Constant	ms	4.32	3.48	3.09	2.87	2.41	2.28	2.28	2.21	2.25
Terminal Resistance (±12%)	Ohm	1.99	9.10	22.25	1.17	5.26	12.71	1.06	4.11	9.42
Terminal Inductance (±30%)	mH	0.49	2.80	7.71	0.36	1.90	4.87	0.40	1.58	3.56
Thermal Resistance (1)	°C/W	3.60			3.10			2.75		
Motor Inertia	lb-ft-s²	1.6E-5			3.1E-5			4.7E-5		
	kg-m²	2.1E-5			4.3E-5			6.4E-5		
Motor Weight	lb	0.28	0.29	0.28	0.60	0.60	0.60	0.92	0.92	0.92
	kg	0.13	0.13	0.13	0.27	0.27	0.27	0.42	0.42	0.41
Ambient Storage Temperature	°C	-55 to 150								
Poles	-	16								

(1) Housed version of motor mounted to 102 mm sq. x 6.35 mm (4 in. sq x 0.25 in.) aluminum plate in still air; maximum operating temperature (ambient + rise) is 130 °C

Model No.		MF0060044			MF0060056		
Winding Voltage	V	48	150	300	48	150	300
Stall Torque (continuous) (1)	lb-ft	0.74	0.75	0.74	0.77	0.78	0.76
	Nm	1.00	1.01	1.00	1.05	1.05	1.04
Peak Torque (±25%)	lb-ft	7.6	10.6	10.6	7.3	12	12
	Nm	10.3	14.3	14.3	9.9	16	17
Peak Current	A	56	39	47	37	27	40
No Load Speed	RPM	2383	3724	4965	2076	3244	4325
	rad/s	250	390	520	217	340	453
Cogging Torque (max.)	lb-ft	0.031			0.036		
	Nm	0.042			0.049		
Torque Constant (±10%)	lb-ft/A	0.13	0.27	0.40	0.15	0.31	0.46
	Nm/A	0.18	0.37	0.55	0.21	0.42	0.63
Voltage Constant (±10%)	V/kRPM	19	38	57	22	44	66
	V/rad/s	0.18	0.37	0.55	0.21	0.42	0.63
Motor Constant	lb-ft/√W	0.146	0.148	0.146	0.153	0.154	0.152
	Nm/√W	0.198	0.200	0.198	0.207	0.209	0.206
Elect. Time Constant	ms	0.41	0.42	0.41	0.44	0.45	0.45
Mech. Time Constant	ms	2.07	2.02	2.08	2.35	2.31	2.39
Terminal Resistance (±12%)	Ohm	0.85	3.34	7.70	1.02	4.01	9.33
Terminal Inductance (±30%)	mH	0.35	1.42	3.19	0.45	1.79	4.03
Thermal Resistance (1)	°C/W	2.50			2.35		
Motor Inertia	lb-ft-s²	6.3E-5			7.9E-5		
	kg-m²	8.5E-5			1.1E-4		
Motor Weight	lb	1.2	1.2	1.2	1.5	1.5	1.5
	kg	0.56	0.56	0.56	0.70	0.70	0.70
Ambient Storage Temperature	°C	-55 to 150					
Poles	-	16					

(1) Housed version of motor mounted to 102 mm sq. x 6.35 mm (4 in. sq x 0.25 in.) aluminum plate in still air; maximum operating temperature (ambient + rise) is 130 °C

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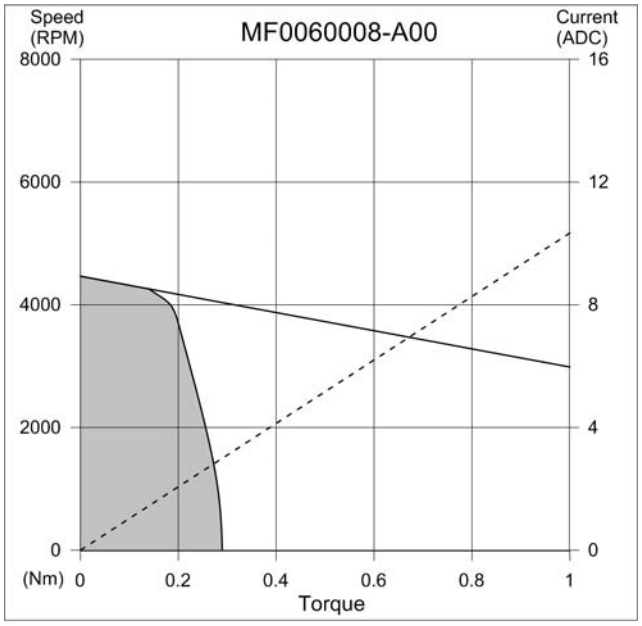
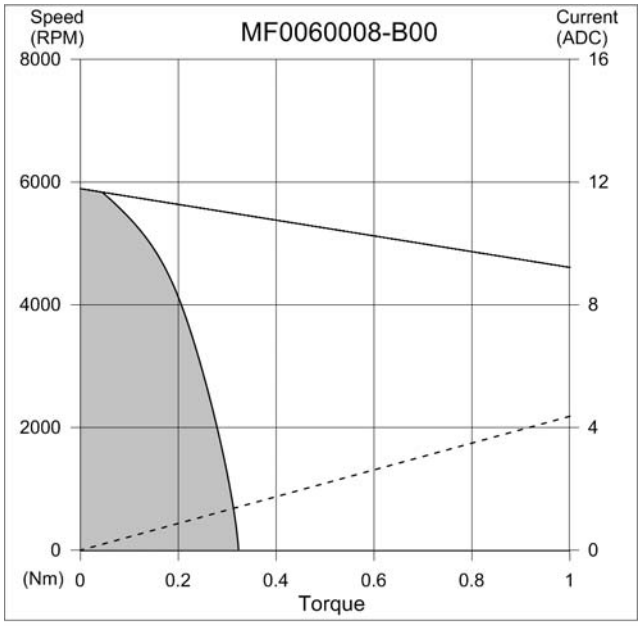
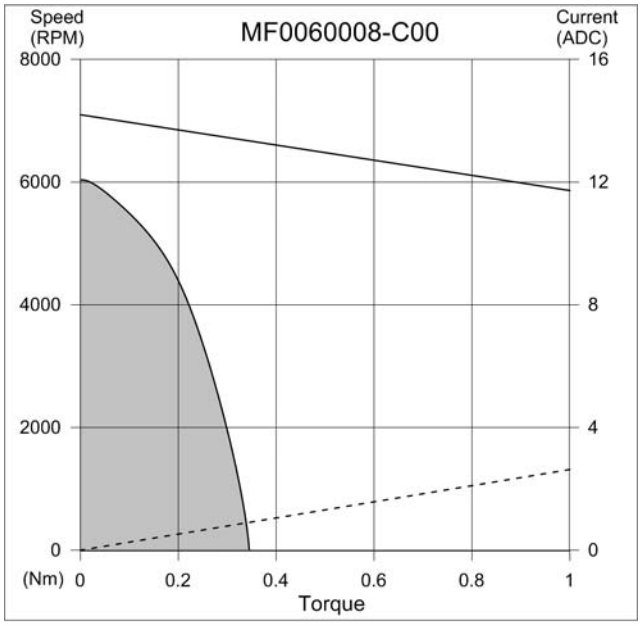
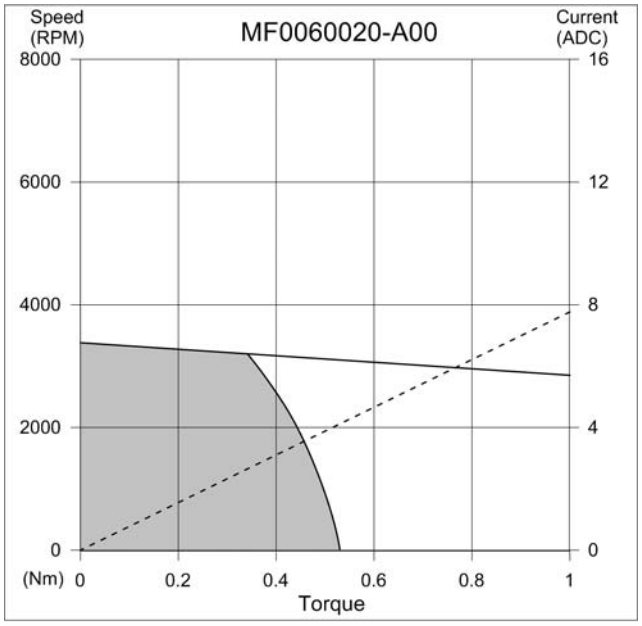
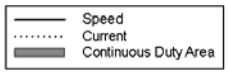
PERFORMANCE











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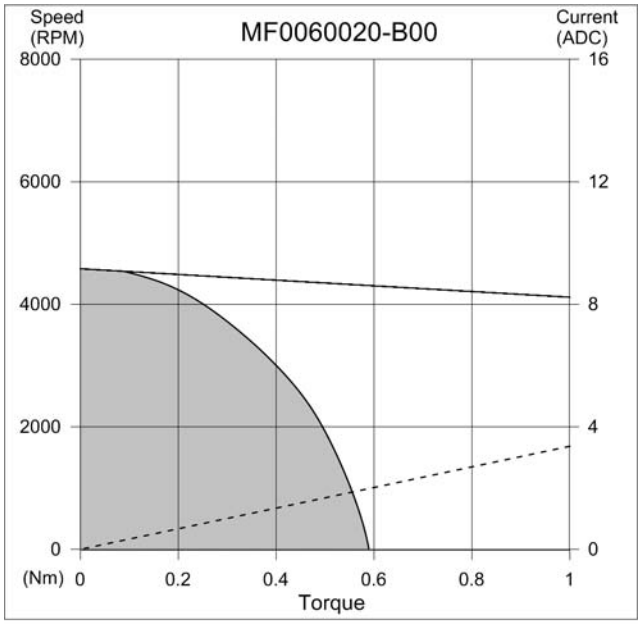

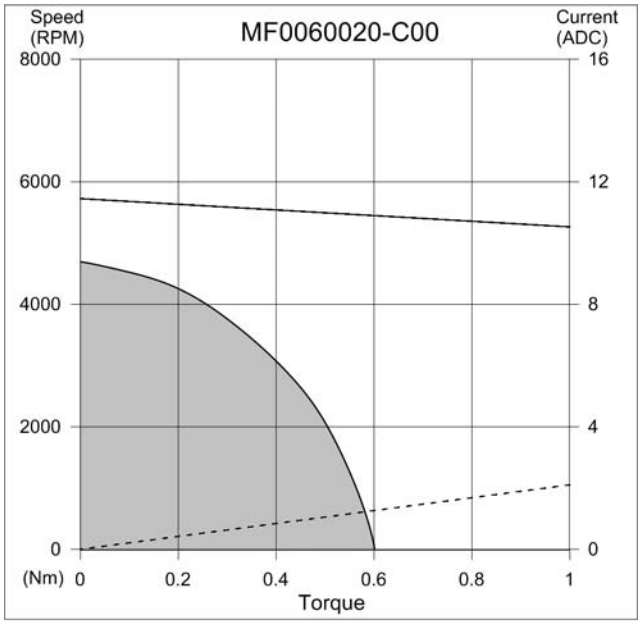

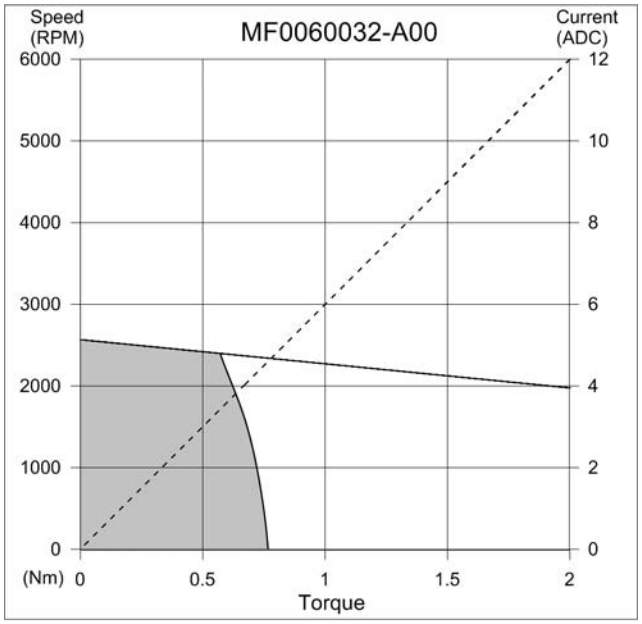

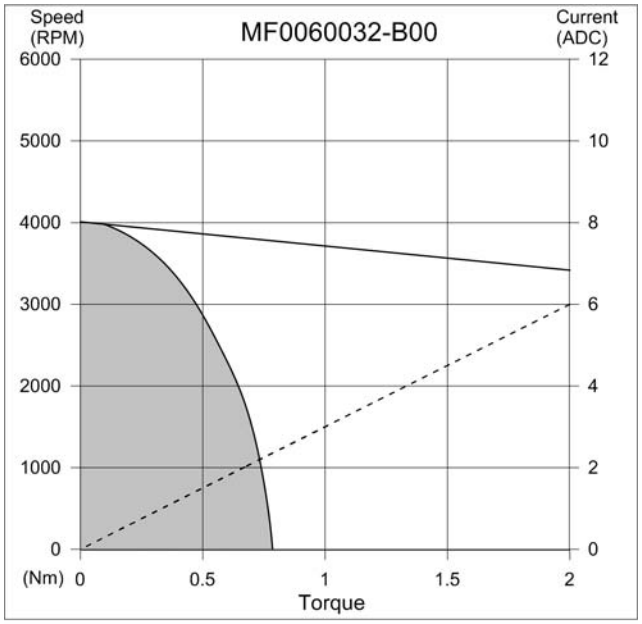

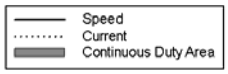

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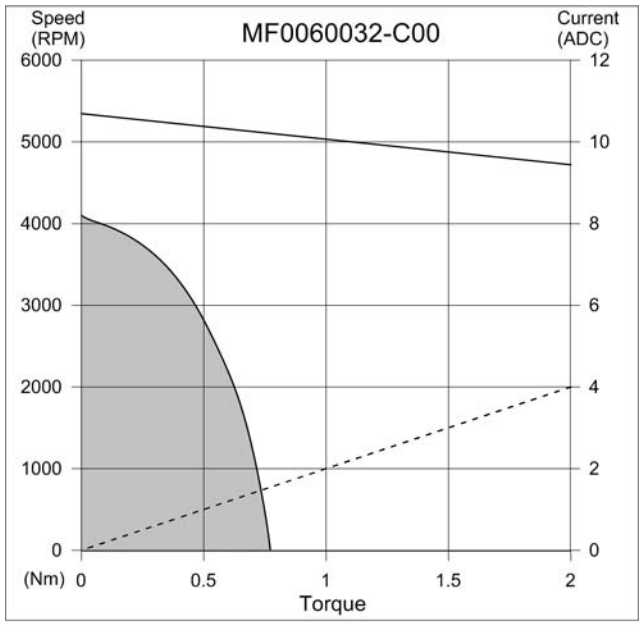

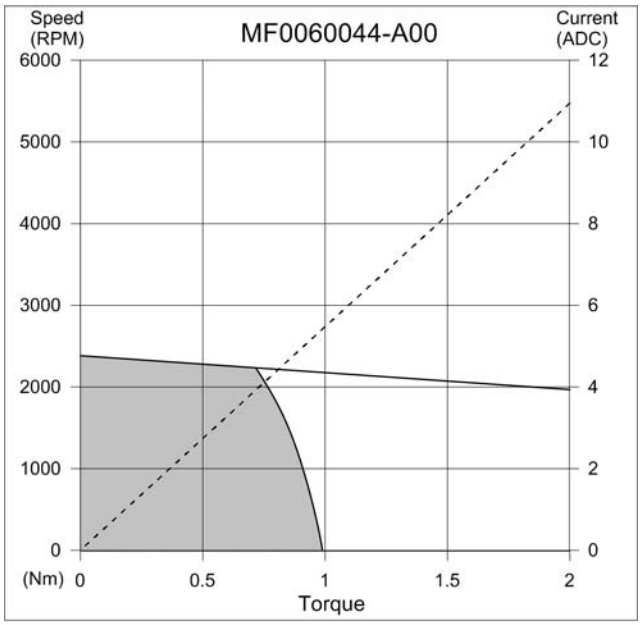

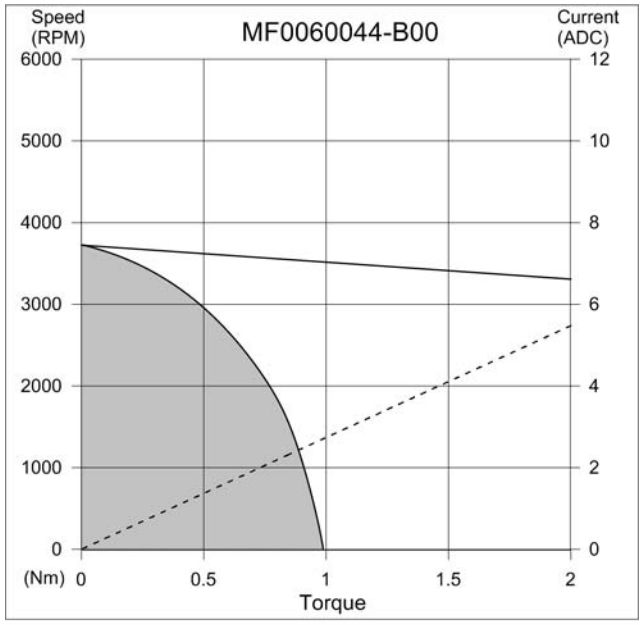

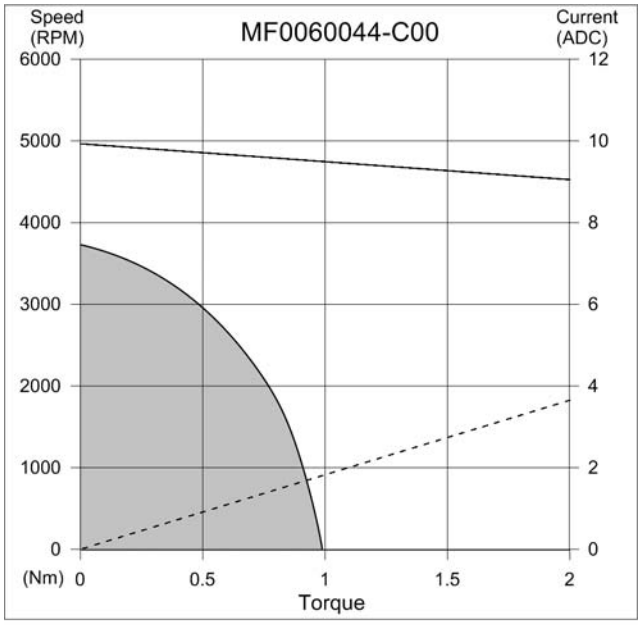

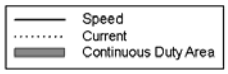

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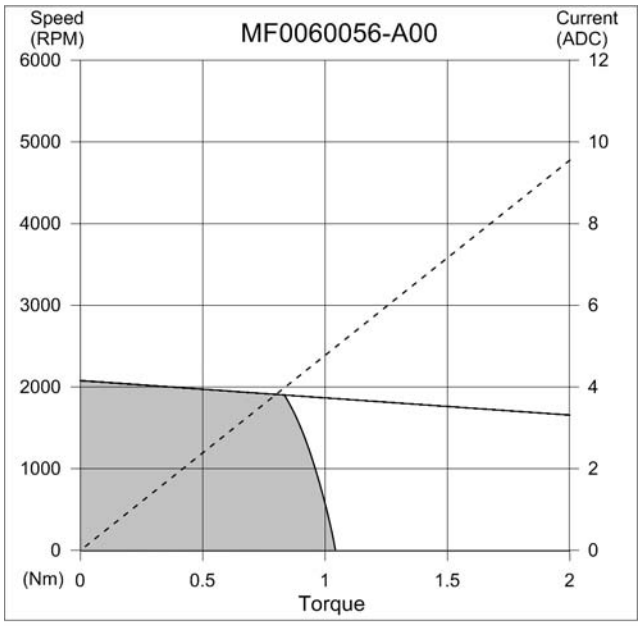

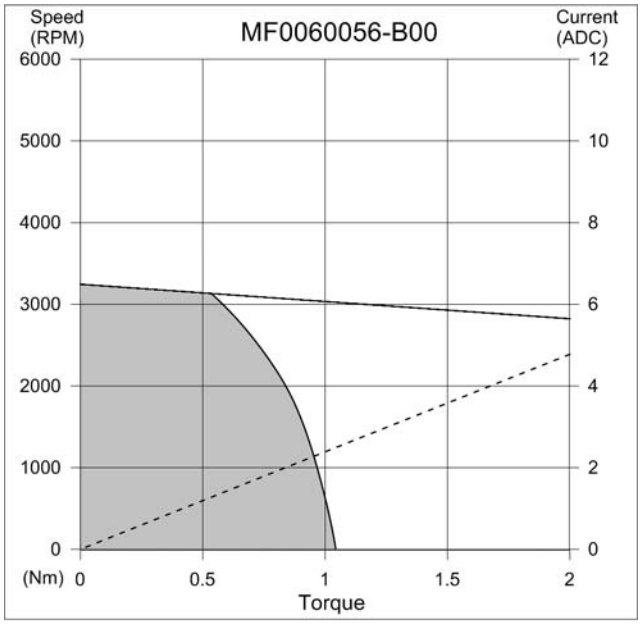

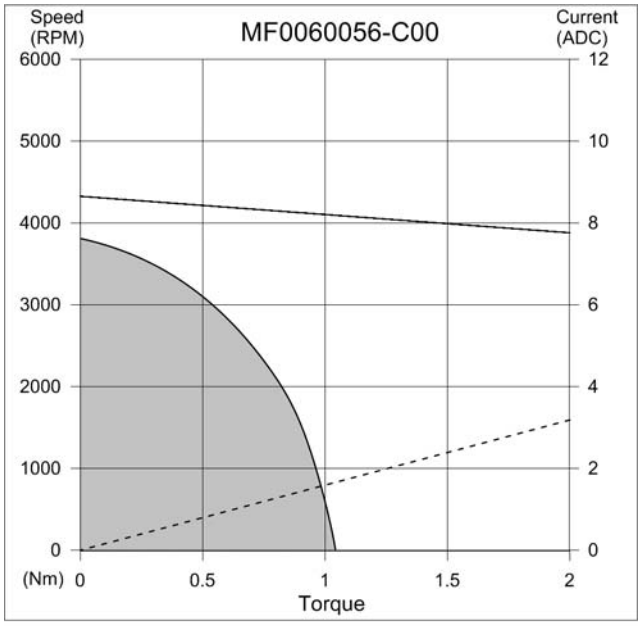

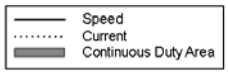

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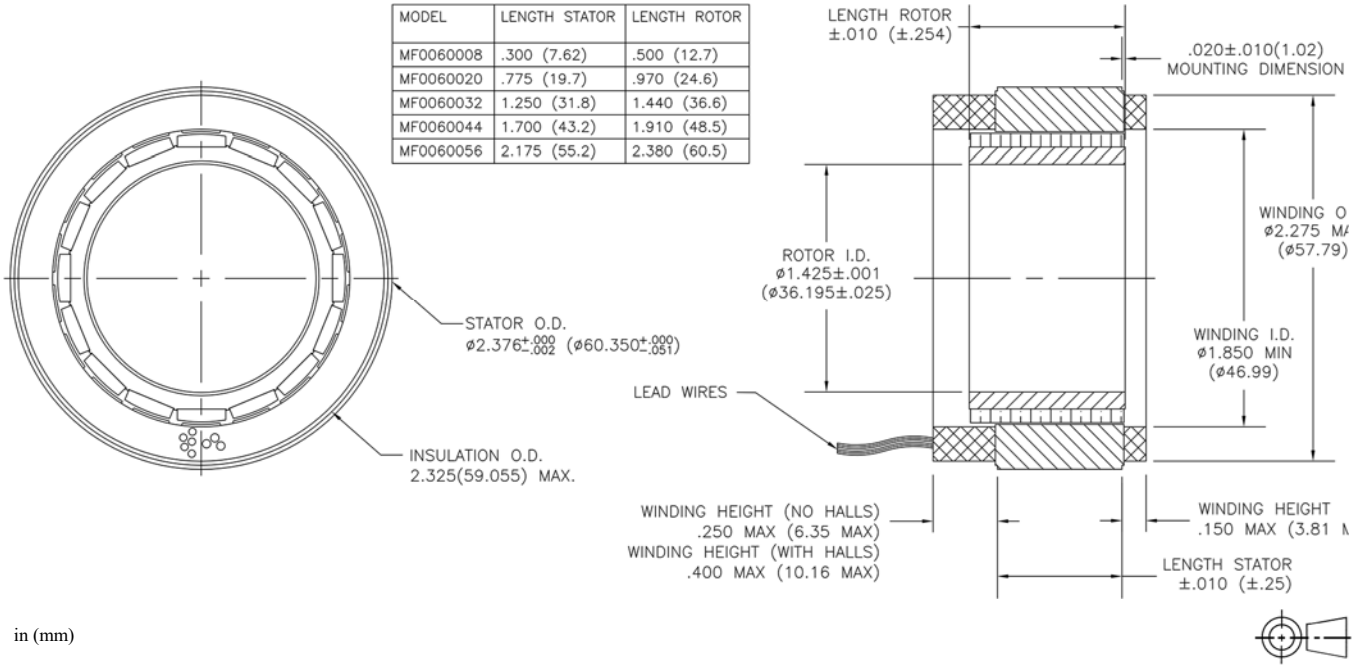
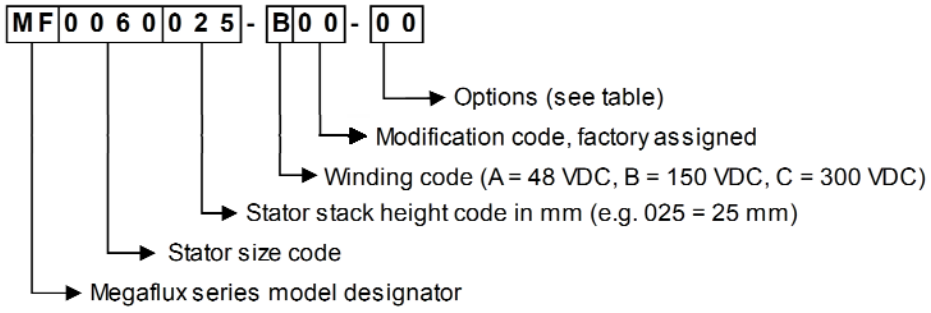
DIMENSIONS

MODEL	LENGTH STATOR	LENGTH ROTOR
MF0060008	.300 (7.62)	.500 (12.7)
MF0060020	.775 (19.7)	.970 (24.6)
MF0060032	1.250 (31.8)	1.440 (36.6)
MF0060044	1.700 (43.2)	1.910 (48.5)
MF0060056	2.175 (55.2)	2.380 (60.5)



in (mm)

MODEL NUMBERING



Options	
C	= Customer–specified connector
Z	= RoHS compliant

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