

# Torque Motors

## Megaflux Frameless Brushless Torque Motors—MF0510

*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 MF0510 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

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## MF0510 Series Frameless Brushless Torque Motors

### SPECIFICATIONS (all data measured at 20 °C ambient)

Model No.		MF0510015			MF0510025			MF051050		
Winding Voltage	V	48	150	300	48	150	300	48	150	300
Stall Torque (continuous) <sup>(1)</sup>	lb-ft	82	82	81	122	120	122	256	256	250
	Nm	111	111	110	166	163	166	347	347	339
Peak Torque (±25%)	lb-ft	598	598	598	974	974	974	1840	1910	1910
	Nm	811	811	811	1320	1320	1320	2494	2590	2590
Peak Current	A	420	359	228	446	384	241	400	356	249
No Load Speed	RPM	223	606	771	147	395	495	71	189	265
	rad/s	23.4	63.5	80.7	15.4	41.4	51.8	7.41	19.8	27.8
Cogging Torque (max.)	lb-ft	0.34			0.61			1.16		
	Nm	0.46			0.83			1.57		
Torque Constant (±10%)	lb-ft/A	1.427	1.667	2.620	2.185	2.533	4.044	4.599	5.365	7.664
	Nm/A	1.935	2.260	3.552	2.962	3.434	5.483	6.235	7.274	10.391
Voltage Constant (±10%)	V/kRPM	203	237	372	310	360	574	653	762	1088
	V/rad/s	1.935	2.260	3.552	2.962	3.434	5.483	6.235	7.274	10.391
Motor Constant	lb-ft/√W	5.82	5.82	5.77	7.87	7.74	7.87	13.28	13.25	12.97
	Nm/√W	7.88	7.89	7.83	10.66	10.50	10.67	18.00	17.96	17.59
Elect. Time Constant	ms	8.32	8.31	8.17	10.17	9.98	9.99	12.43	12.38	11.87
Mech. Time Constant	ms	0.85	0.87	0.88	0.75	0.76	0.75	0.54	0.54	0.56
Terminal Resistance (±12%)	Ohm	0.060	0.682	0.206	0.077	0.107	0.264	0.120	0.164	0.349
Terminal Inductance (±30%)	mH	0.501	0.681	1.682	0.785	1.068	2.638	1.492	2.031	4.144
Thermal Resistance <sup>(1)</sup>	°C/W	0.337			0.267			0.180		
Motor Inertia	lb-ft-s <sup>2</sup>	4.2E-2			6.7E-2			1.3E-1		
	kg-m <sup>2</sup>	5.7E-2			9.0E-2			1.8E-1		
Motor Weight	lb	23.4	23.6	25.9	38.6	37.6	37.2	68.4	68.4	67.8
	kg	10.59	10.69	11.77	17.49	17.06	16.86	31.01	31.01	30.74
Ambient Storage Temperature	°C	-55 to 150								
Poles	-	80								

(1) Housed version of motor mounted to 762 mm sq. x 12.7 mm (30 in. sq x 1.0 in.) aluminum plate in still air; maximum operating temperature (ambient + rise) is 130 °C

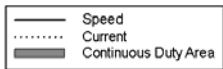
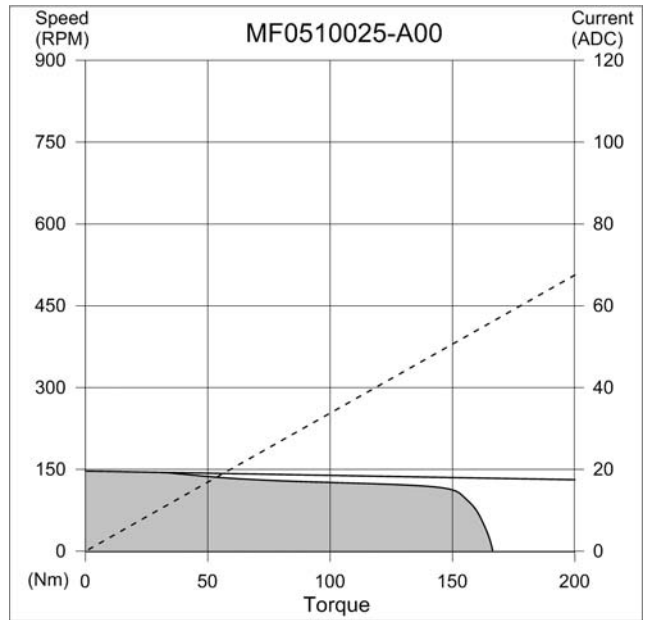
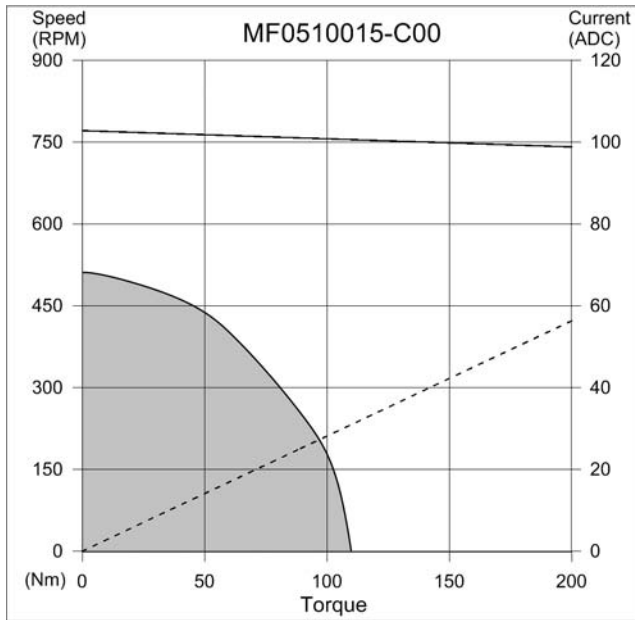
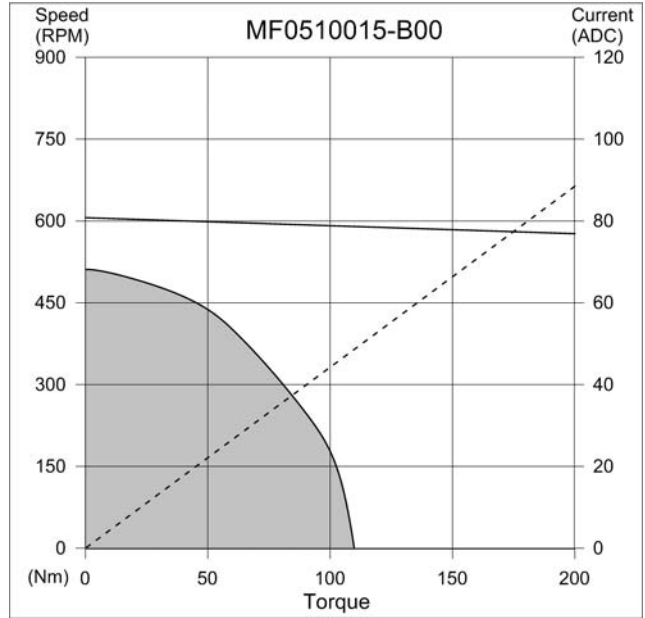
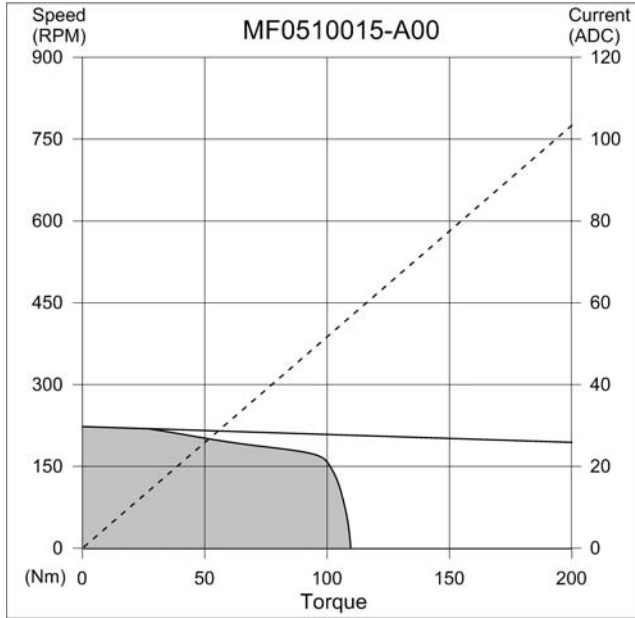
Model No.		MF0510075			MF0510100		
Winding Voltage	V	48	150	300	48	150	300
Stall Torque (continuous) <sup>(1)</sup>	lb-ft	389	387	387	504	501	501
	Nm	528	524	525	684	680	680
Peak Torque (±25%)	lb-ft	2427	2855	2855	2612	3790	3790
	Nm	3291	3870	3870	3542	5139	5139
Peak Current	A	429	421	315	340	412	309
No Load Speed	RPM	57	146	223	42	110	165
	rad/s	6.0	15.3	23.4	4.4	11.5	17.3
Cogging Torque (max.)	lb-ft	1.55			2.27		
	Nm	2.10			3.07		
Torque Constant (±10%)	lb-ft/A	5.663	6.786	9.061	7.673	9.208	12.277
	Nm/A	7.678	9.201	12.285	10.403	12.484	16.645
Voltage Constant (±10%)	V/kRPM	804	963	1286	1089	1307	1743
	V/rad/s	7.678	9.201	12.285	10.403	12.484	16.645
Motor Constant	lb-ft/√W	16.92	16.81	16.83	20.43	20.29	20.29
	Nm/√W	22.94	22.79	22.81	27.70	27.51	27.51
Elect. Time Constant	ms	13.68	13.53	13.52	14.35	14.14	14.15
Mech. Time Constant	ms	0.48	0.49	0.50	0.45	0.46	0.46
Terminal Resistance (±12%)	Ohm	0.112	0.163	0.290	0.141	0.206	0.366
Terminal Inductance (±30%)	mH	1.532	2.206	3.922	2.023	2.913	5.179
Thermal Resistance <sup>(1)</sup>	°C/W	0.125			0.110		
Motor Inertia	lb-ft-s <sup>2</sup>	2.0E-1			2.7E-1		
	kg-m <sup>2</sup>	2.6E-1			3.6E-1		
Motor Weight	lb	100.4	99.7	100.7	133.0	132.7	132.7
	kg	45.54	45.21	45.67	60.32	60.21	60.21
Ambient Storage Temperature	°C	-55 to 150					
Poles	-	80					

(1) Housed version of motor mounted to 762 mm sq. x 12.7 mm (30 in. sq x 1.0 in.) aluminum plate in still air; maximum operating temperature (ambient + rise) is 130 °C

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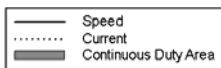
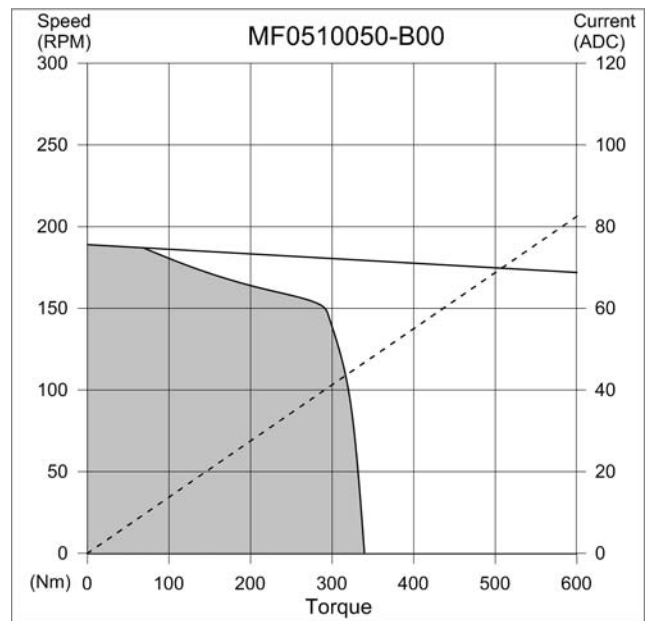
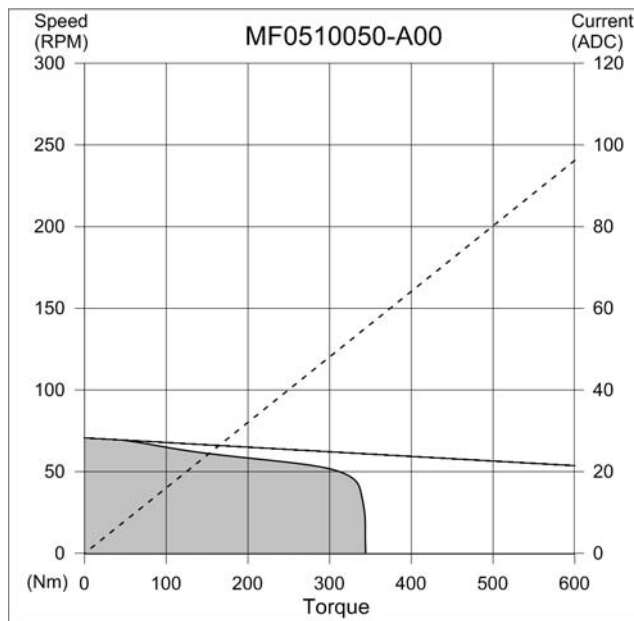
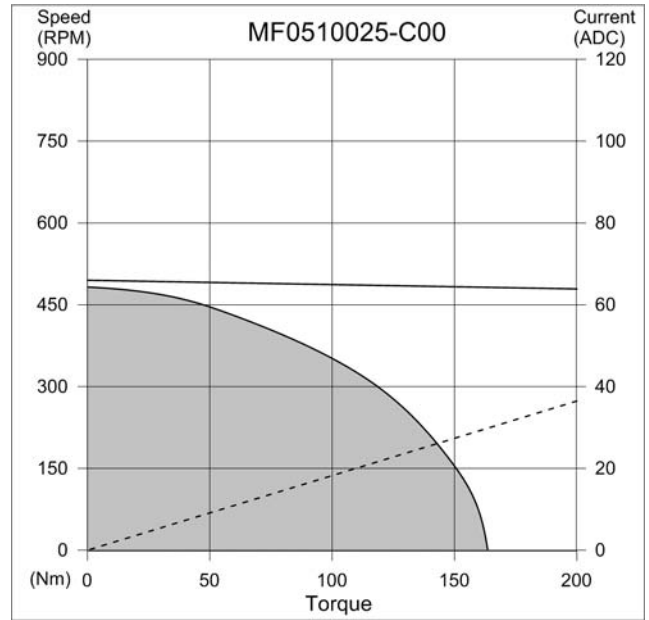
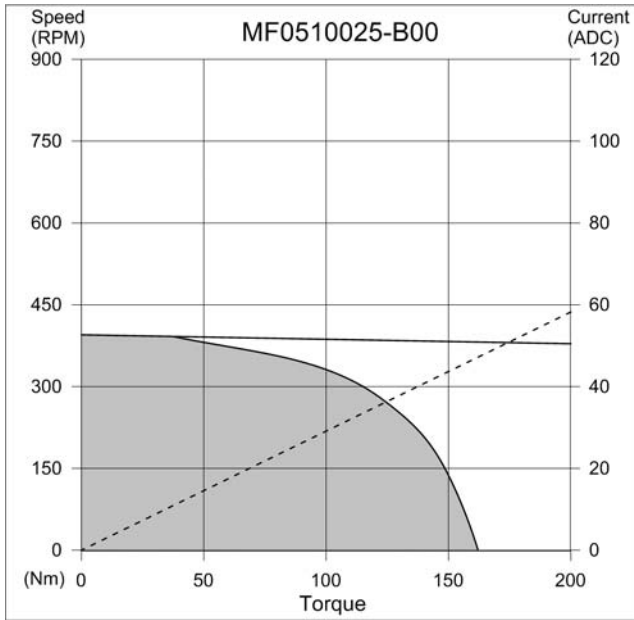
### PERFORMANCE



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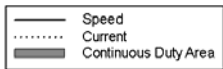
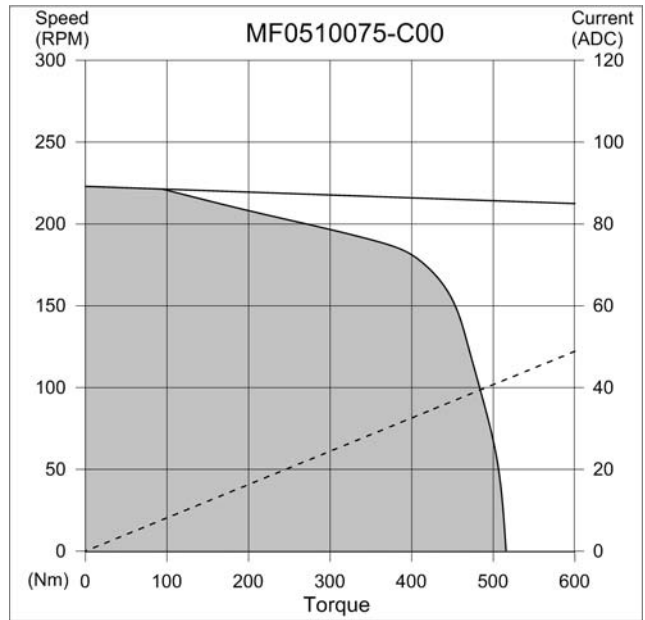
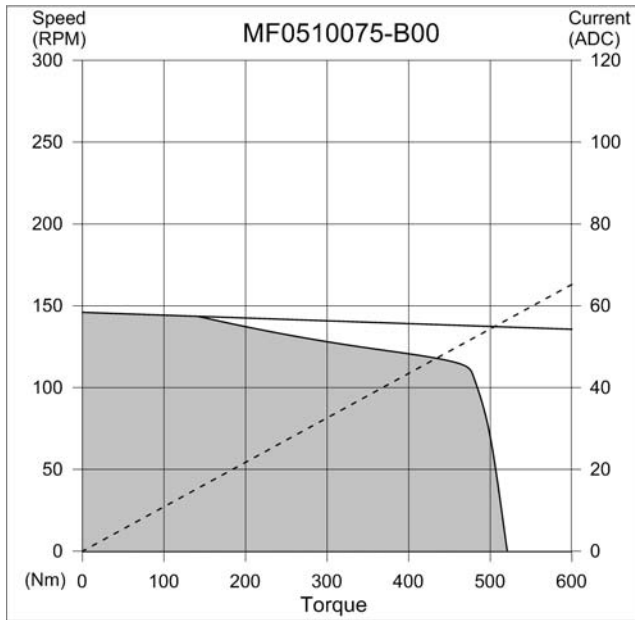
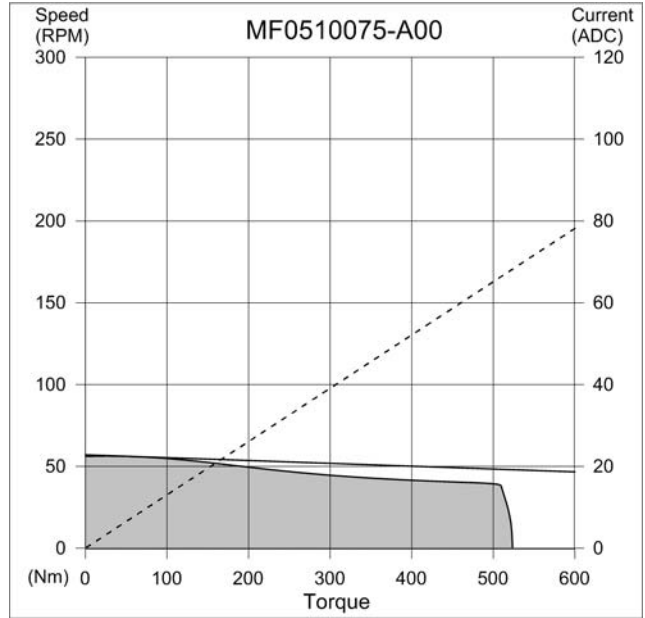
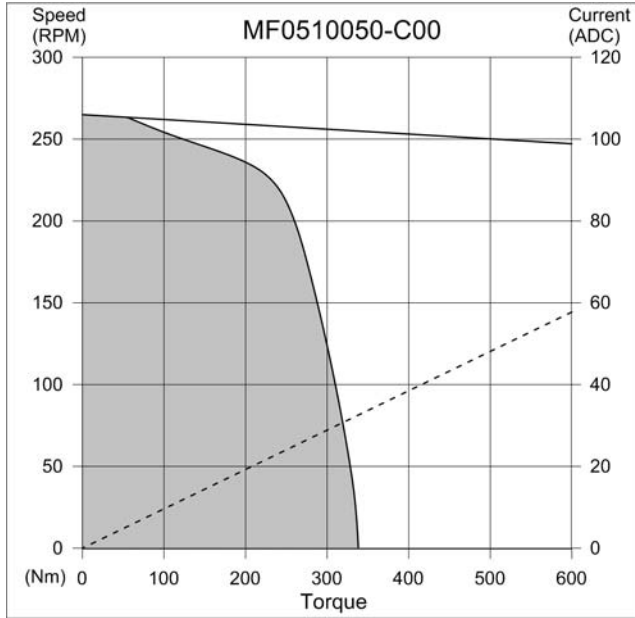
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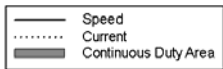
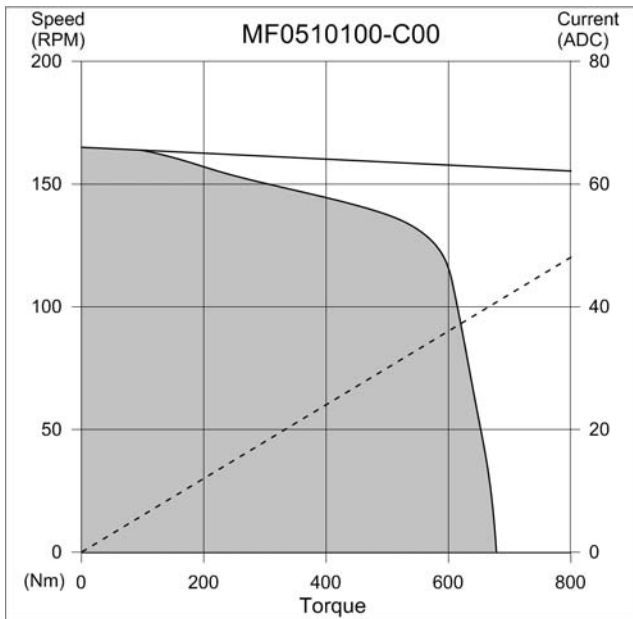
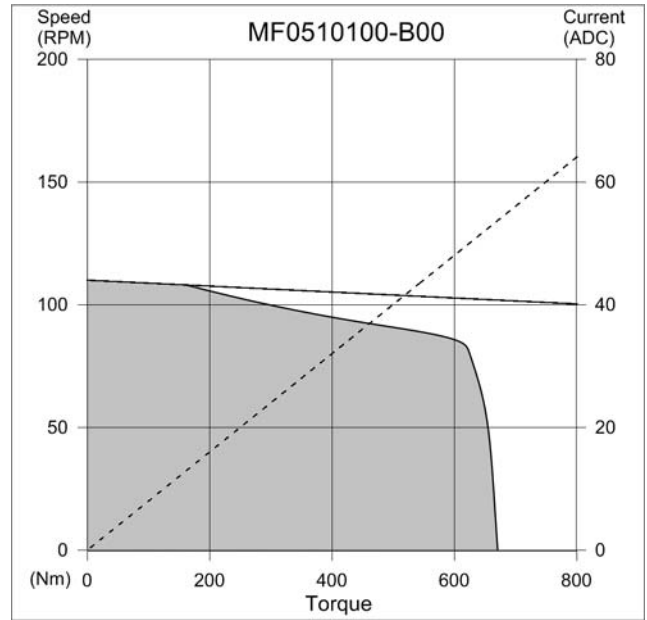
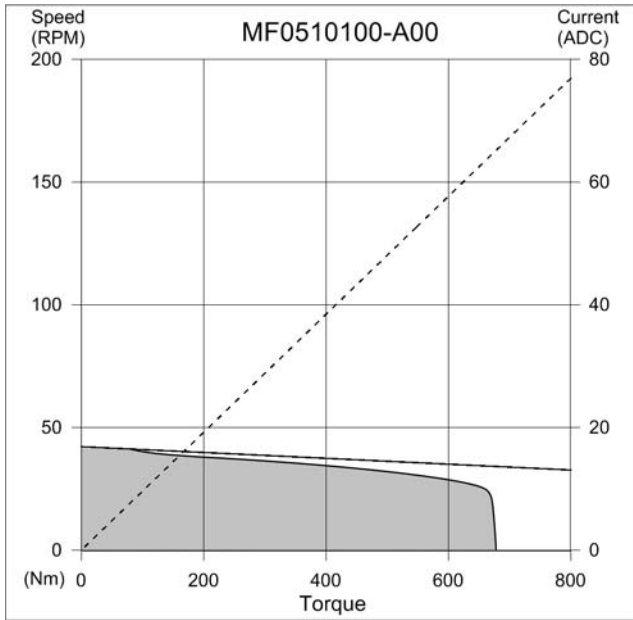
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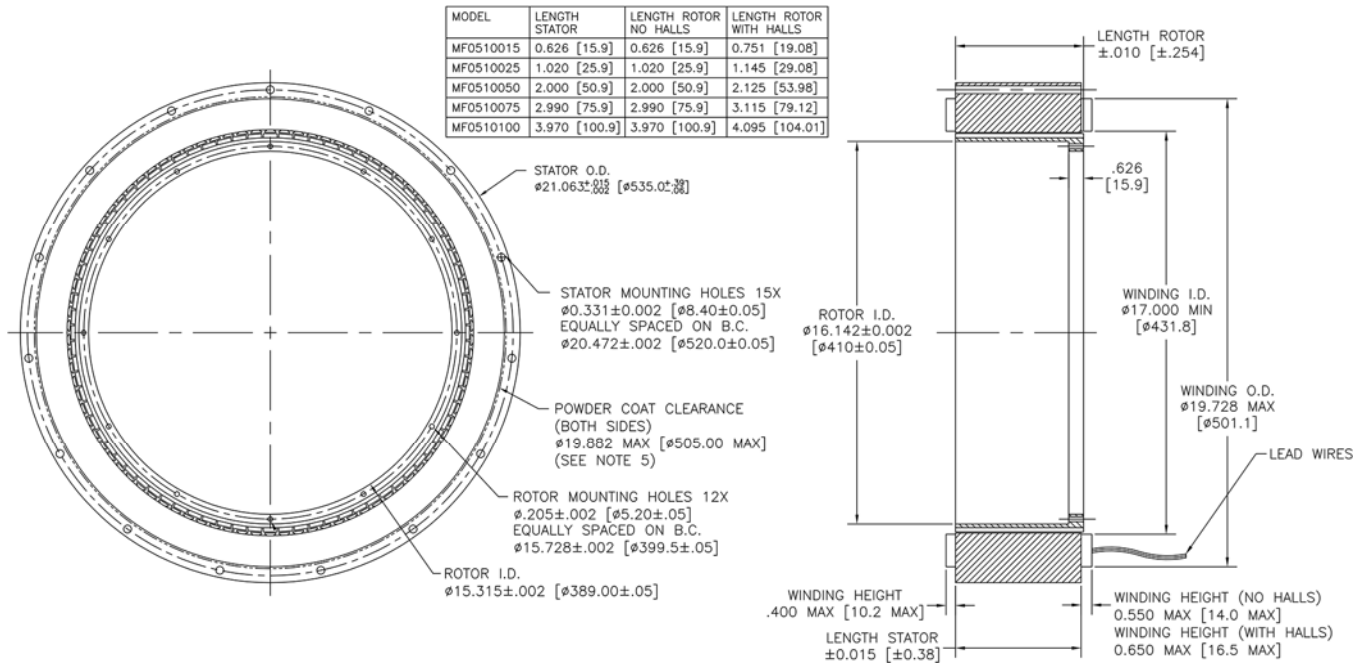
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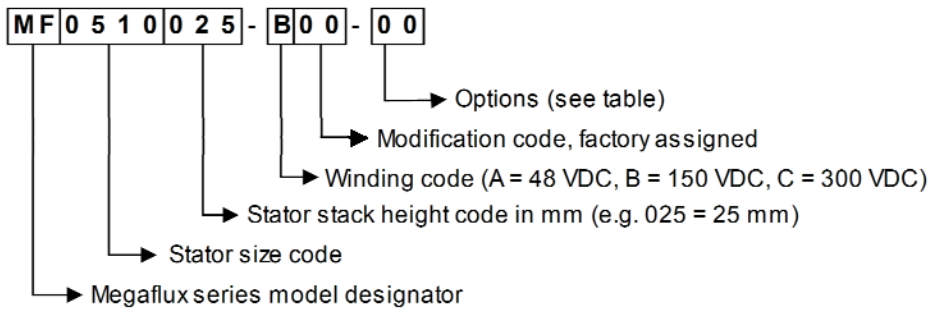
### DIMENSIONS



in (mm)



### MODEL NUMBERING



Options
C = Customer-specified connector
Z = RoHS compliant