

Torque Motors

Megaflux Frameless Brushless Torque Motors—MF0310

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 MF0310 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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SPECIFICATIONS (all data measured at 20 °C ambient)

Model No.		MF0310010			MF0310025			MF031050		
Winding Voltage	V	48	150	300	48	150	300	48	150	300
Stall Torque (continuous) ⁽¹⁾	lb-ft	13.7	12.8	13.5	32.1	33.2	32.4	66.4	66.4	66.4
	Nm	18.5	17.3	18.4	43.6	45.0	43.9	90.0	90.0	90.0
Peak Torque (±25%)	lb-ft	74.5	74.5	74.5	194	194	194	381	381	381
	Nm	101	101	101	264	264	264	517	517	517
Peak Current	A	146	86.1	47.2	208	121	77	239	179	120
No Load Speed	RPM	625	1150	1260	341	621	784	200	469	625
	rad/s	65	120	132	36	65	82	21	48	65
Cogging Torque (max.)	lb-ft	0.23			0.47			0.72		
	Nm	0.31			0.64			0.97		
Torque Constant (±10%)	lb-ft/A	0.510	0.865	1.580	0.935	1.603	2.538	1.593	2.124	3.186
	Nm/A	0.691	1.173	2.142	1.268	2.173	3.441	2.160	2.880	4.320
Voltage Constant (±10%)	V/kRPM	72	123	224	133	228	360	226	302	452
	V/rad/s	0.691	1.173	2.142	1.268	2.173	3.441	2.160	2.880	4.320
Motor Constant	lb-ft/√W	1.48	1.38	1.46	3.03	3.13	3.05	4.99	4.99	4.99
	Nm/√W	2.00	1.87	1.98	4.11	4.24	4.14	6.76	6.77	6.77
Elect. Time Constant	ms	4.95	4.32	4.85	7.22	7.69	7.34	9.43	9.45	9.46
Mech. Time Constant	ms	1.58	1.82	1.62	0.99	0.93	0.97	0.73	0.73	0.73
Terminal Resistance (±12%)	Ohm	0.119	0.394	1.166	0.095	0.263	0.691	0.102	0.181	0.407
Terminal Inductance (±30%)	mH	0.589	1.702	5.658	0.688	2.02	5.070	0.982	1.711	3.849
Thermal Resistance ⁽¹⁾	°C/W	0.750			0.570			0.365		
Motor Inertia	lb-ft-s ²	5.0E-3			1.3E-2			2.6E-2		
	kg-m ²	6.8E-3			1.8E-2			3.5E-2		
Motor Weight	lb	7.6	7.2	7.5	17.3	17.5	17.4	33.2	33.2	33.2
	kg	3.43	3.24	3.40	7.85	7.96	7.88	15.05	15.05	15.05
Ambient Storage Temperature	°C	-55 to 150								
Poles	-	48								

(1) Housed version of motor mounted to 457 mm sq. x 12.7 mm (18 in. sq x 0.5 in.) aluminum plate in still air; maximum operating temperature (ambient + rise) is 130 °C

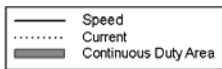
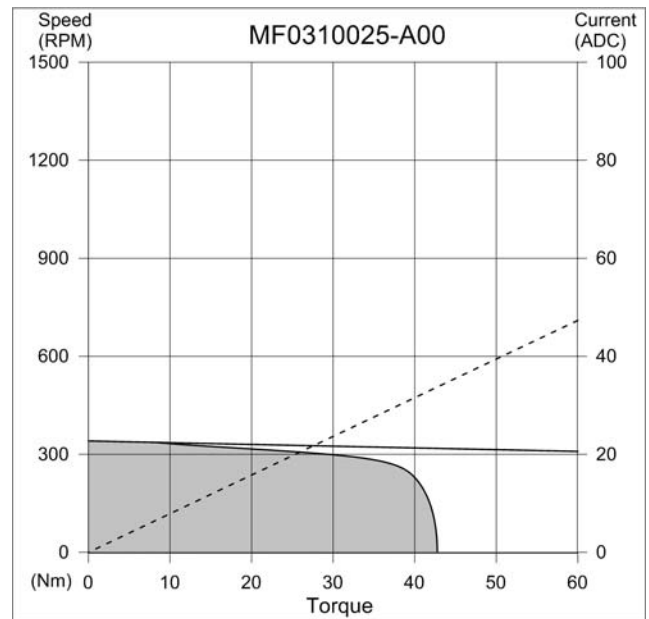
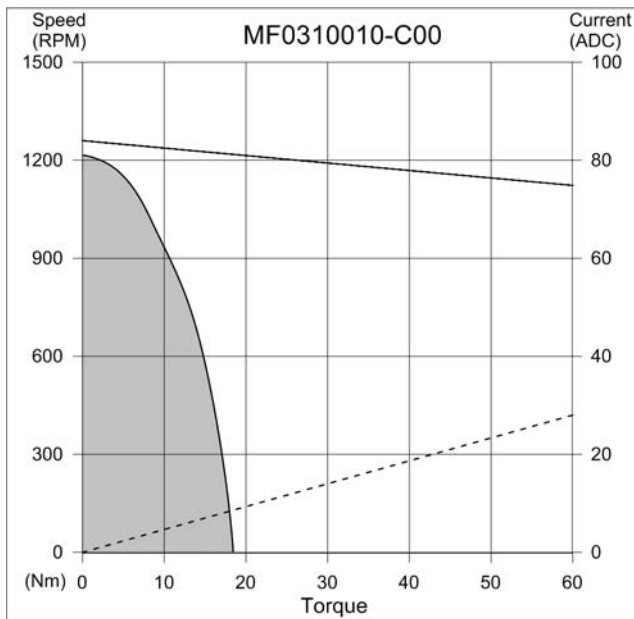
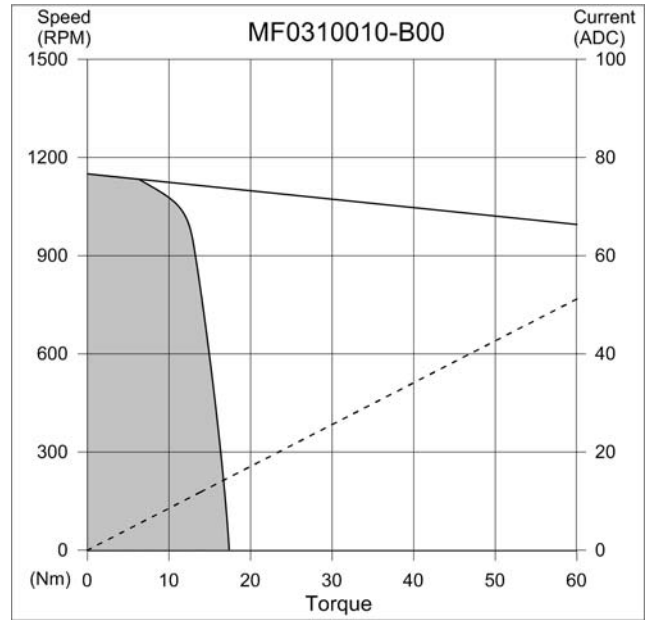
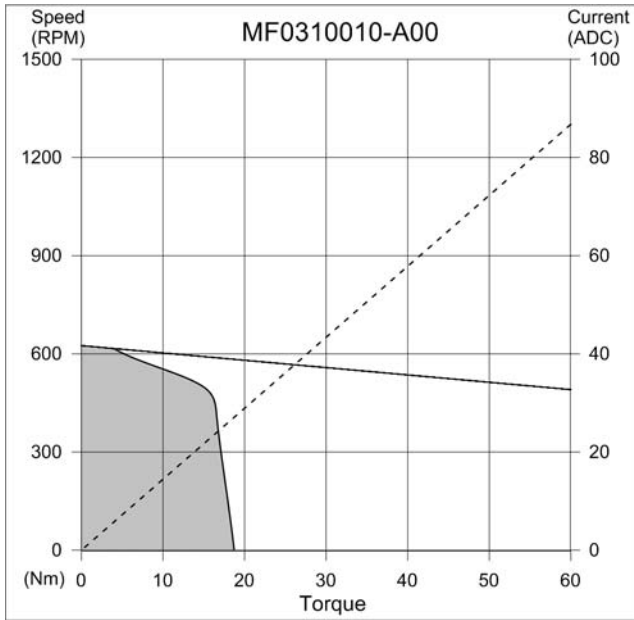
Model No.		MF0310075			MF0310100		
Winding Voltage	V	48	150	300	48	150	300
Stall Torque (continuous) ⁽¹⁾	lb-ft	99.3	99.3	96.1	133.7	133.4	133.7
	Nm	134.6	134.6	130.3	181.3	180.8	181.2
Peak Torque (±25%)	lb-ft	570	570	570	761	761	761
	Nm	773	773	773	1031	1031	1031
Peak Current	A	286	239	179	239	179	144
No Load Speed	RPM	160	417	625	100	235	375
	rad/s	17	44	65	10	25	39
Cogging Torque (max.)	lb-ft	1.07			1.53		
	Nm	1.45			2.07		
Torque Constant (±10%)	lb-ft/A	1.989	2.387	3.183	3.180	4.240	5.300
	Nm/A	2.697	3.236	4.316	4.312	5.749	7.186
Voltage Constant (±10%)	V/kRPM	282	339	452	451	602	752
	V/rad/s	2.697	3.236	4.316	4.312	5.749	7.186
Motor Constant	lb-ft/√W	6.43	6.43	6.22	7.62	7.62	7.63
	Nm/√W	8.71	8.71	8.43	10.34	10.32	10.34
Elect. Time Constant	ms	10.31	10.31	9.66	10.80	10.78	10.81
Mech. Time Constant	ms	0.66	0.66	0.70	0.62	0.63	0.62
Terminal Resistance (±12%)	Ohm	0.096	0.138	0.262	0.174	0.310	0.483
Terminal Inductance (±30%)	mH	0.988	1.423	2.531	1.880	3.342	5.223
Thermal Resistance ⁽¹⁾	°C/W	0.270			0.210		
Motor Inertia	lb-ft-s ²	3.9E-2			5.2E-2		
	kg-m ²	5.3E-2			7.1E-2		
Motor Weight	lb	51.4	49.0	50.4	66.4	65.8	64.6
	kg	23.31	22.21	22.86	30.10	29.85	29.30
Ambient Storage Temperature	°C	-55 to 150					
Poles	-	48					

(1) Housed version of motor mounted to 457 mm sq. x 12.7 mm (18 in. sq x 0.5 in.) aluminum plate in still air; maximum operating temperature (ambient + rise) is 130 °C

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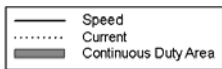
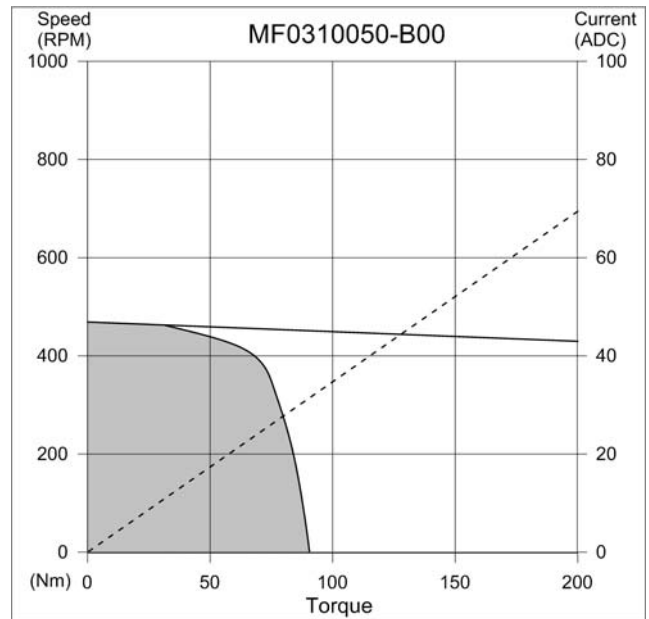
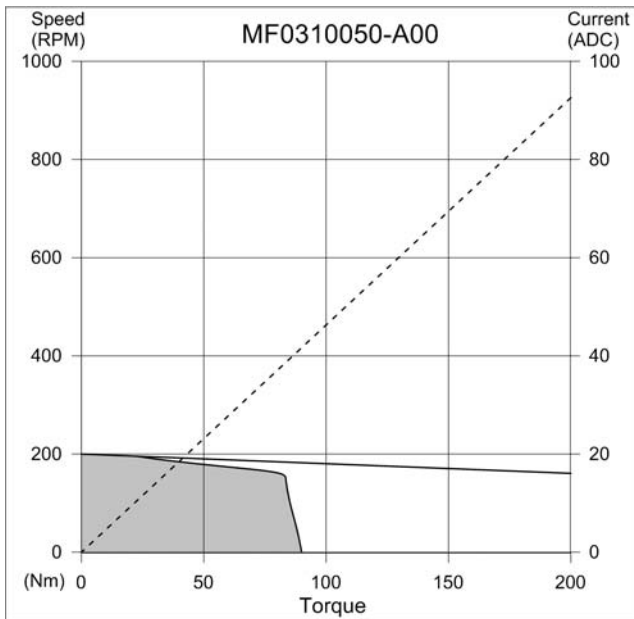
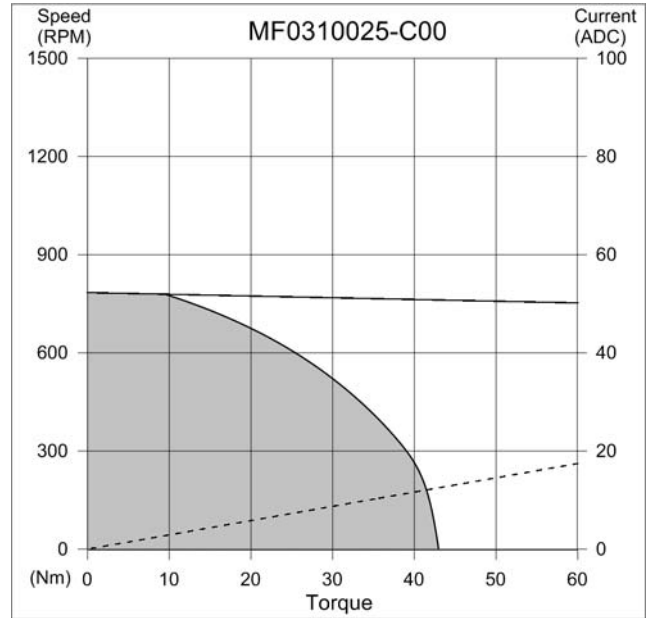
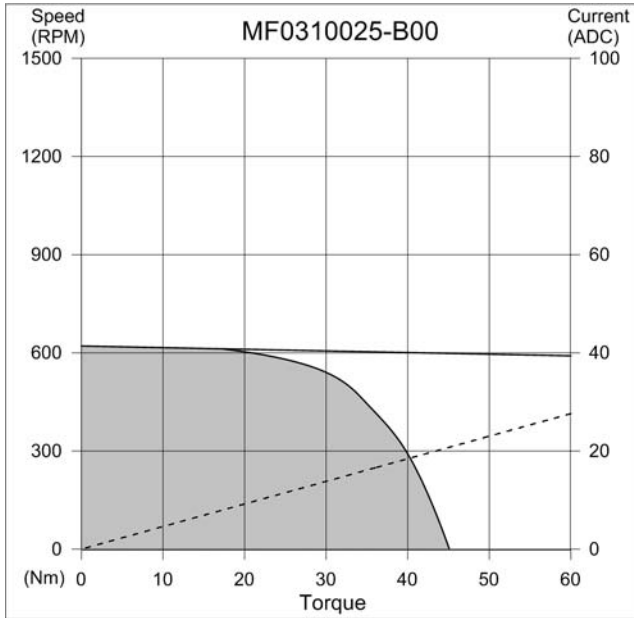
PERFORMANCE



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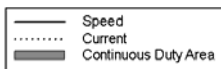
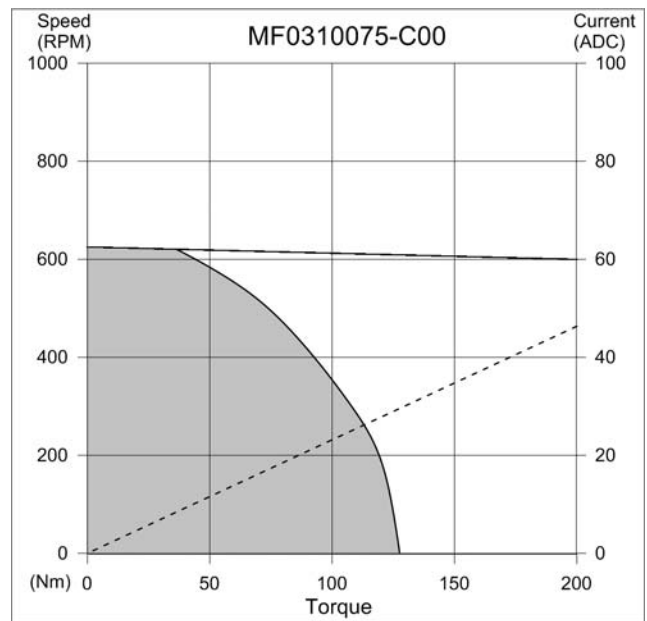
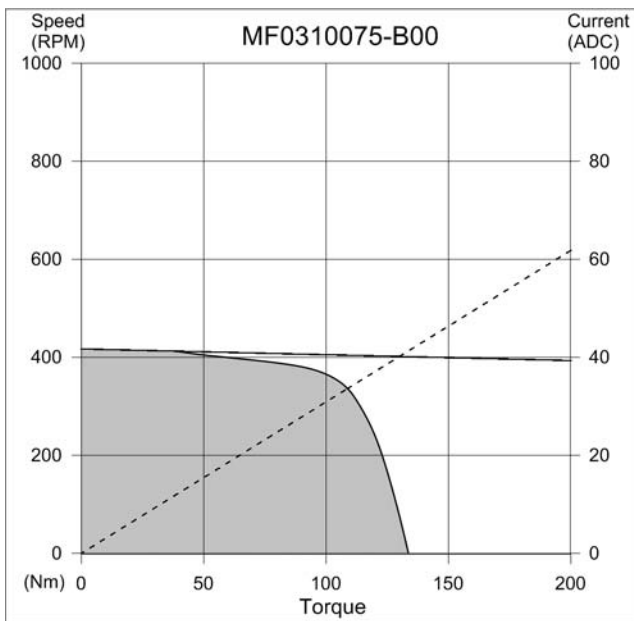
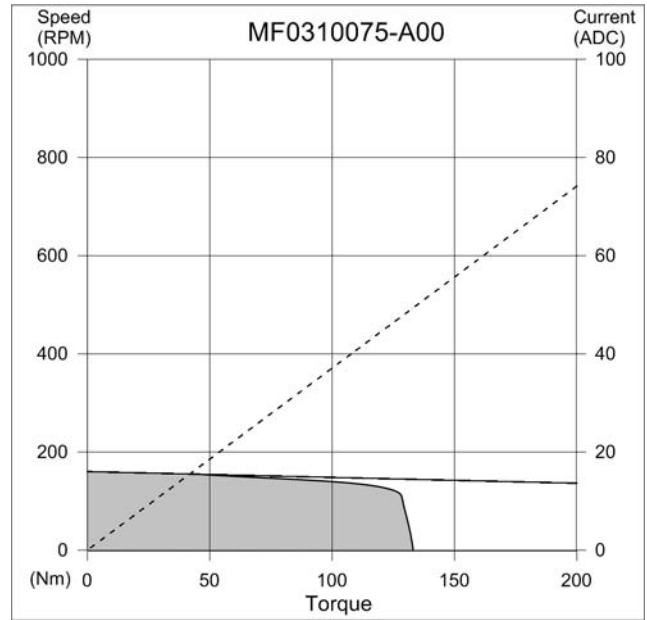
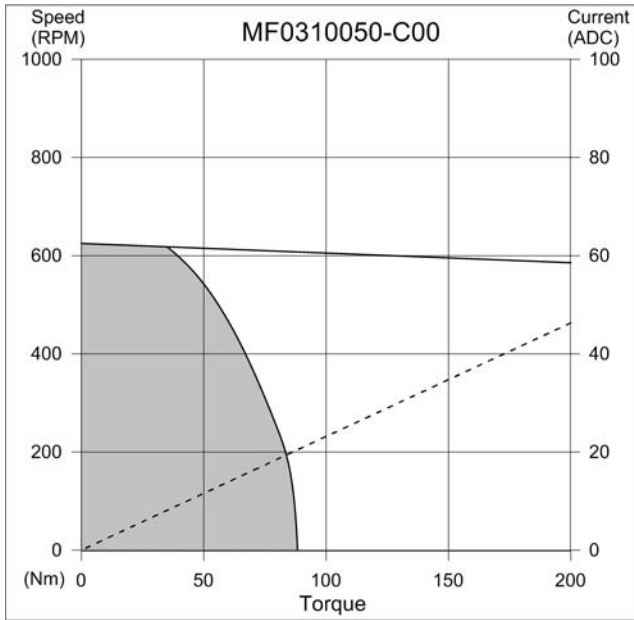
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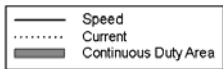
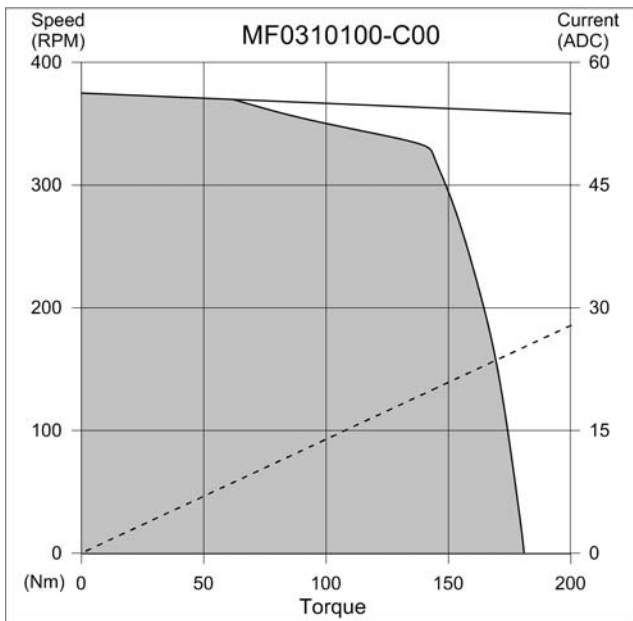
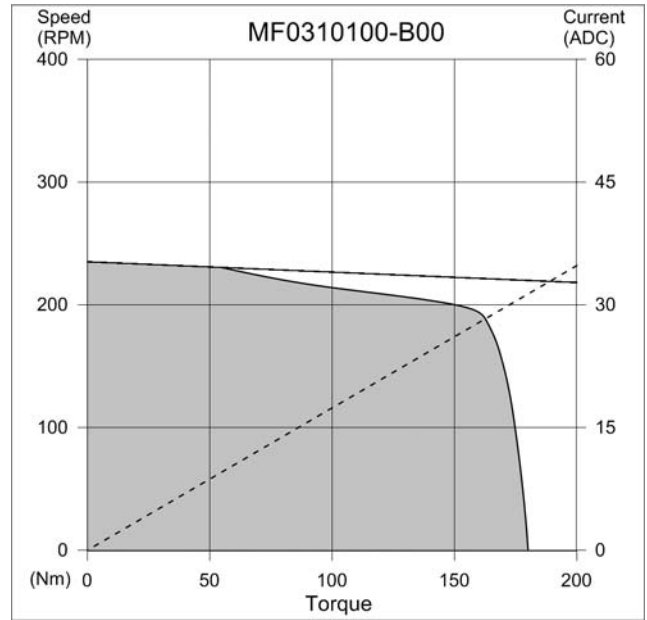
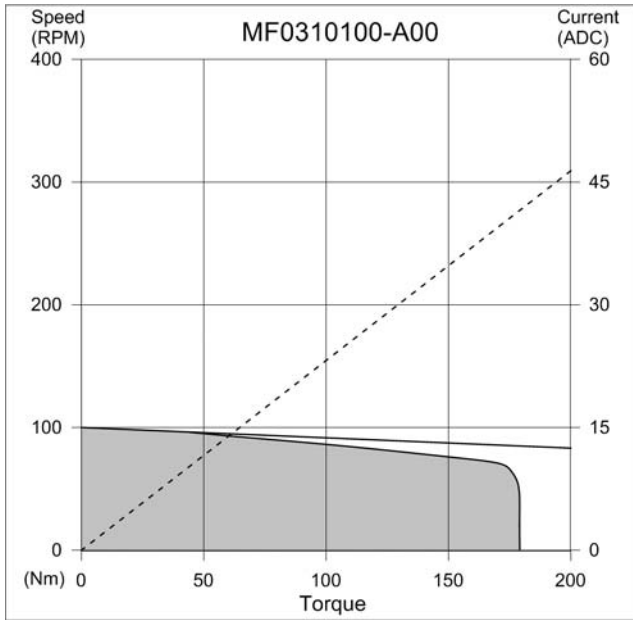
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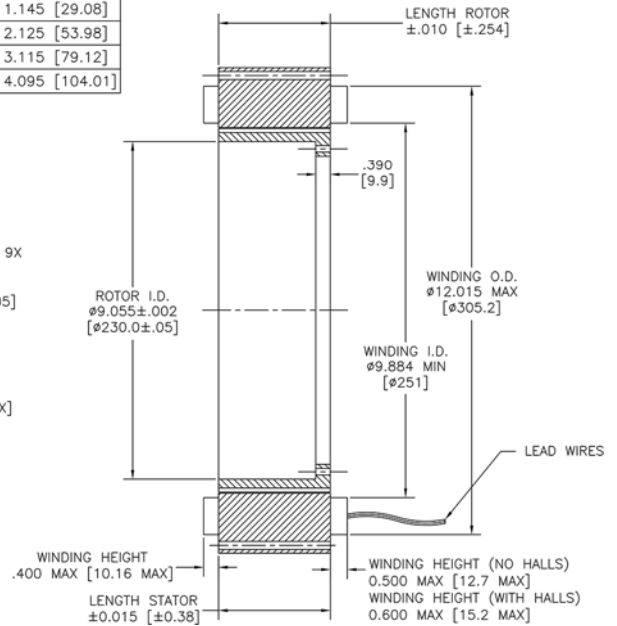
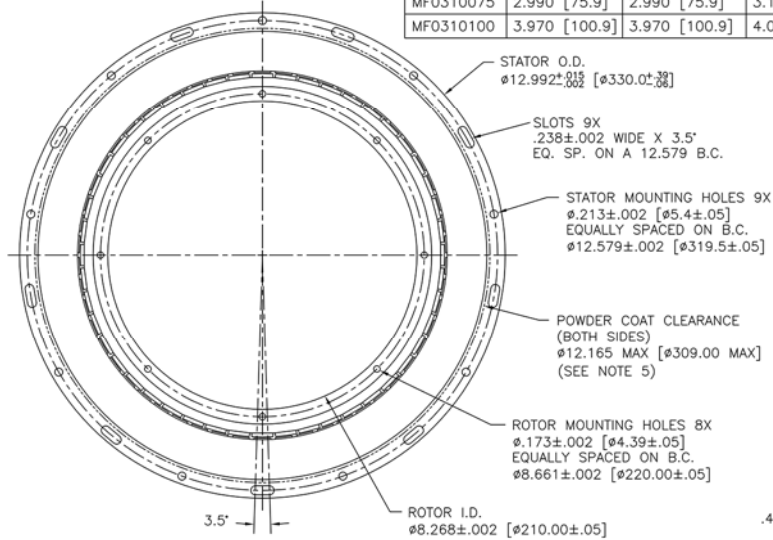


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DIMENSIONS

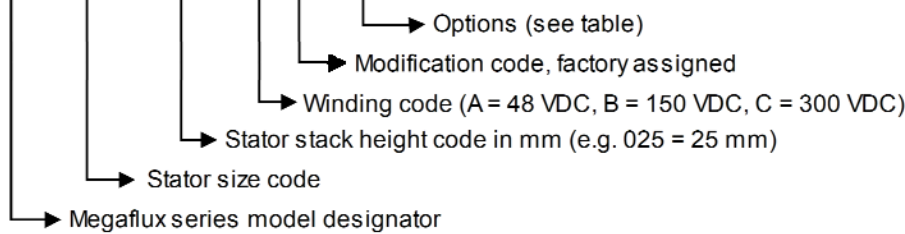
MODEL	LENGTH STATOR	LENGTH ROTOR NO HALLS	LENGTH ROTOR WITH HALLS
MF0310010	0.390 [9.9]	0.390 [9.9]	0.515 [13.08]
MF0310025	1.020 [25.9]	1.020 [25.9]	1.145 [29.08]
MF0310050	2.000 [50.9]	2.000 [50.9]	2.125 [53.98]
MF0310075	2.990 [75.9]	2.990 [75.9]	3.115 [79.12]
MF0310100	3.970 [100.9]	3.970 [100.9]	4.095 [104.01]



in (mm)

MODEL NUMBERING

MF0310025 - B00 - 00



Options
C = Customer-specified connector
Z = RoHS compliant