Torque Motors

Megaflux Frameless Brushless Torque Motors–MF0210

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 MF0210 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

Torque Motors

MF0210 Series Frameless Brushless Torque Motors

SPECIFICATIONS (all data measured at 20 °C ambient)

Model No.		MF0210010			MF0210025			MF0210050		
Winding Voltage	V	48	150	300	48	150	300	48	150	300
Stall Torque (continuous) (1)	lb-ft	5.9	5.9	5.9	14.3	14.6	14.5	26.9	27.1	26.3
	Nm	8.0	8.0	8.1	19.4	19.7	19.6	36.5	36.8	35.7
Peak Torque (±25%)	lb-ft	40.2	40.2	40.2	105	105	105	214	214	214
	Nm	54.5	54.5	54.5	143	143	143	290	290	290
Peak Current	A	115	50.9	37.6	247	102	79	446	162	137
No Load Speed	RPM	920	1269	1894	760	978	1511	677	769	1302
	rad/s	96	133	198	80	102	158	71	81	136
Cogging Torque (max.)	lb-ft		0.14			0.36			0.68	
	Nm		0.18			0.49			0.93	
Torque Constant (±10%)	lb-ft/A	0.348	0.789	1.068	0.426	1.034	1.338	0.479	1.317	1.557
	Nm/A	0.472	1.070	1.448	0.578	1.402	1.814	0.649	1.786	2.111
Voltage Constant (±10%)	V/kRPM	49.4	112.0	151.6	60.5	146.8	190.0	68.0	187.0	221.1
	V/rad/s	0.472	1.070	1.448	0.578	1.402	1.814	0.649	1.786	2.111
Motor Constant	lb-ft/√W	0.70	0.70	0.71	1.46	1.48	1.47	2.35	2.37	2.30
	Nm/√W	0.95	0.95	0.96	1.98	2.01	1.99	3.18	3.21	3.11
Elect. Time Constant	ms	3.26	3.28	3.32	4.83	4.97	4.91	6.09	6.20	5.83
Mech. Time Constant	ms	1.82	1.81	1.80	1.11	1.08	1.10	0.86	0.85	0.90
Terminal Resistance (±12%)	Ohm	0.246	1.257	2.274	0.085	0.488	0.827	0.042	0.310	0.460
Terminal Inductance (±30%)	mH	0.802	4.119	7.539	0.411	2.423	4.058	0.254	1.922	2.684
Thermal Resistance (1)	°C/W		0.930			0.680			0.500	
Motor Inertia	lb-ft-s²		1.3E-3			3.4E-3			6.7E-3	
	kg-m²		1.7E-3			4.6E-3			9.1E-3	
Motor Weight	lb	4.3	4.0	4.1	10.1	9.5	9.8	18.3	18.2	18.1
	kg	1.93	1.83	1.84	4.57	4.33	4.47	8.30	8.28	8.20
Ambient Storage Temperature	°C	-55 to 150								
Poles	-	32								

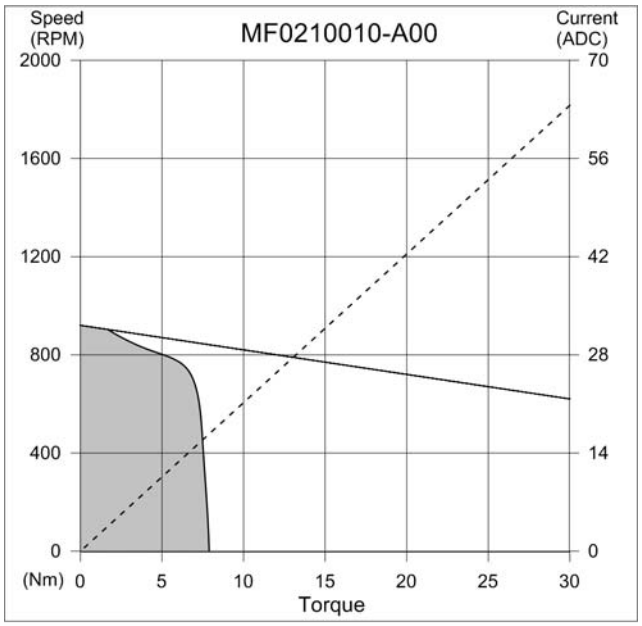
(1) Housed version of motor mounted to 381 mm sq. x 12.7 mm (15 in. sq x 0.5 in.) aluminum plate in still air; maximum operating temperature (ambient + rise) is 130 °C

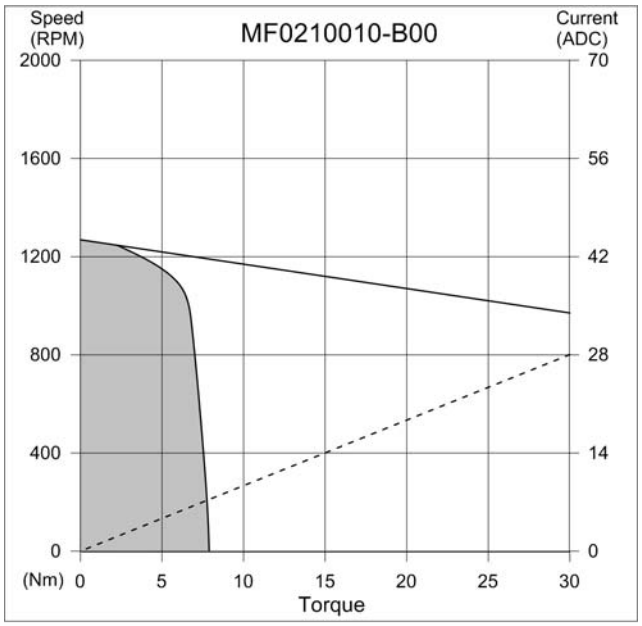
Model No.		MF0210075			MF0210100		
Winding Voltage	V	48	150	300	48	150	300
Stall Torque (continuous) (1)	lb-ft	43.1	42.4	43.9	55.3	54.2	53.1
	Nm	58.4	57.4	59.5	75.0	73.5	72.0
Peak Torque (±25%)	lb-ft	320	320	320	426	426	426
	Nm	433	433	433	578	578	578
Peak Current	A	446	297	198	445	297	222
No Load Speed	RPM	452	942	1256	338	705	1057
	rad/s	47	99	132	35	74	111
Cogging Torque (max.)	lb-ft		1.00			1.38	
	Nm		1.36			1.87	
Torque Constant (±10%)	lb-ft/A	0.717	1.076	1.614	0.958	1.436	1.915
	Nm/A	0.972	1.459	2.188	1.299	1.947	2.596
Voltage Constant (±10%)	V/kRPM	102	153	229	136	204	272
	V/rad/s	0.972	1.459	2.188	1.299	1.947	2.596
Motor Constant	lb-ft/√W	3.02	2.97	3.08	3.60	3.52	3.46
	Nm/√W	4.10	4.03	4.17	4.89	4.78	4.69
Elect. Time Constant	ms	6.53	6.45	6.91	7.01	6.2	6.45
Mech. Time Constant	ms	0.78	0.81	0.75	0.73	0.76	0.78
Terminal Resistance (±12%)	Ohm	0.056	0.131	0.275	0.071	0.166	0.307
Terminal Inductance (±30%)	mH	0.368	0.845	1.900	0.495	1.115	1.981
Thermal Resistance (1)	°C/W		0.325			0.280	
Motor Inertia	lb-ft-s²		1.0E-2			1.3E-2	
	kg-m²		1.4E-2			1.8E-2	
Motor Weight	lb	27.0	26.8	27.0	35.6	35.4	35.2
	kg	12.25	12.16	12.26	16.16	16.07	15.97
Ambient Storage Temperature	°C	-55 to 150					
Poles	-	32					

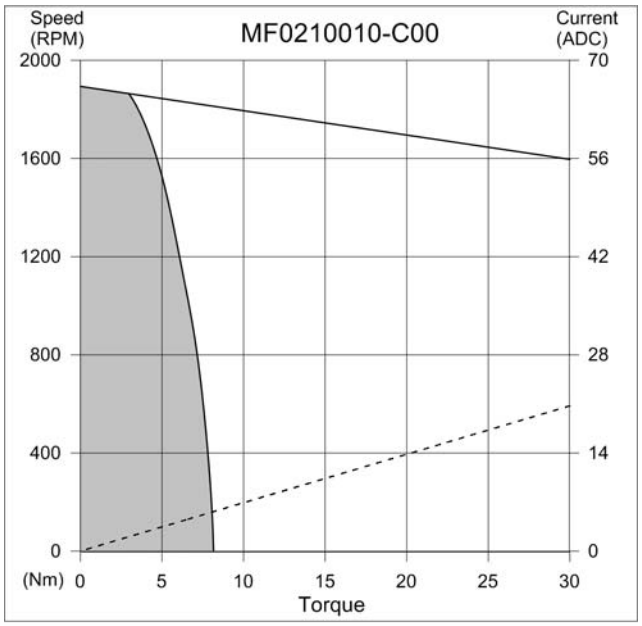
(1) Housed version of motor mounted to 381 mm sq. x 12.7 mm (15 in. sq x 0.5 in.) aluminum plate in still air; maximum operating temperature (ambient + rise) is 130 °C

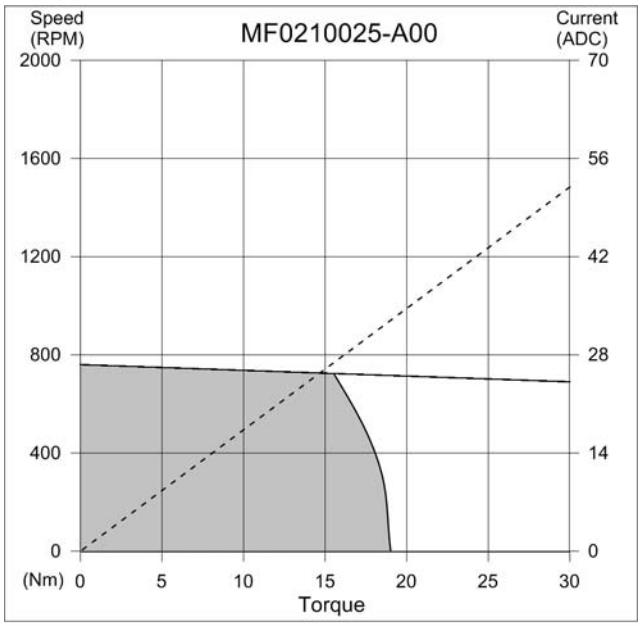
Issued: January 19, 2017

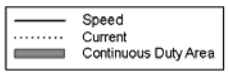
PERFORMANCE



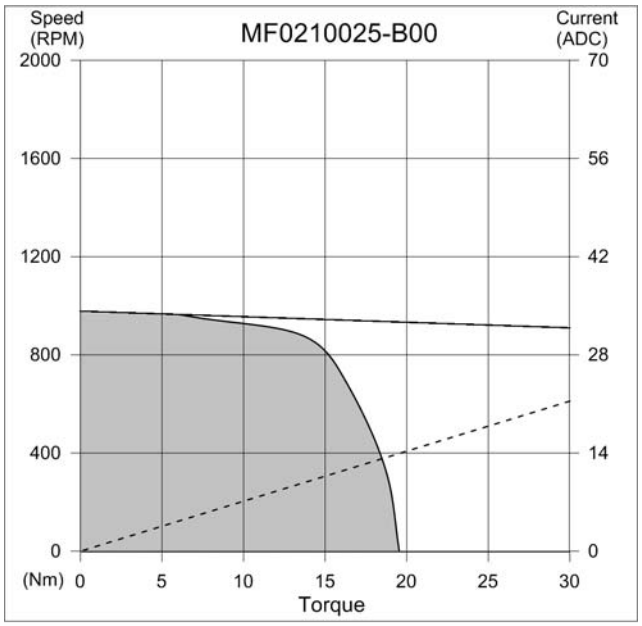


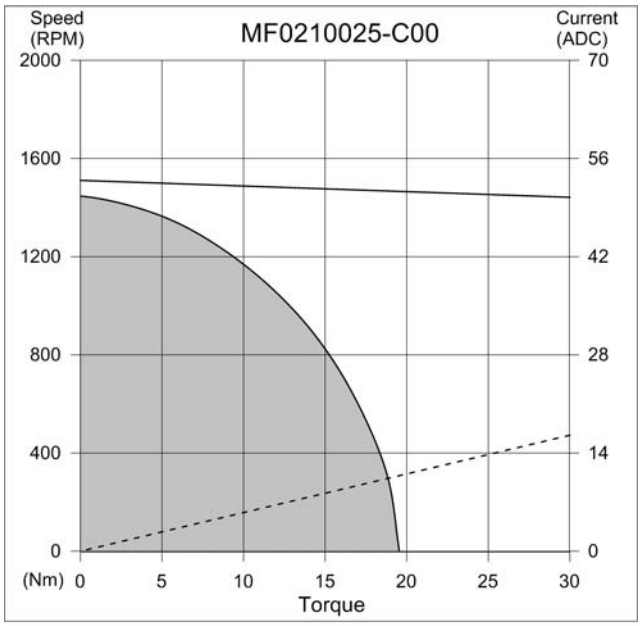


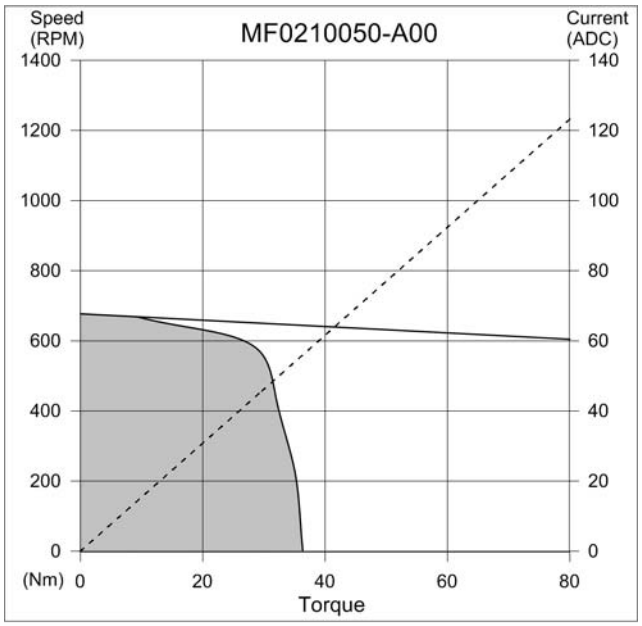


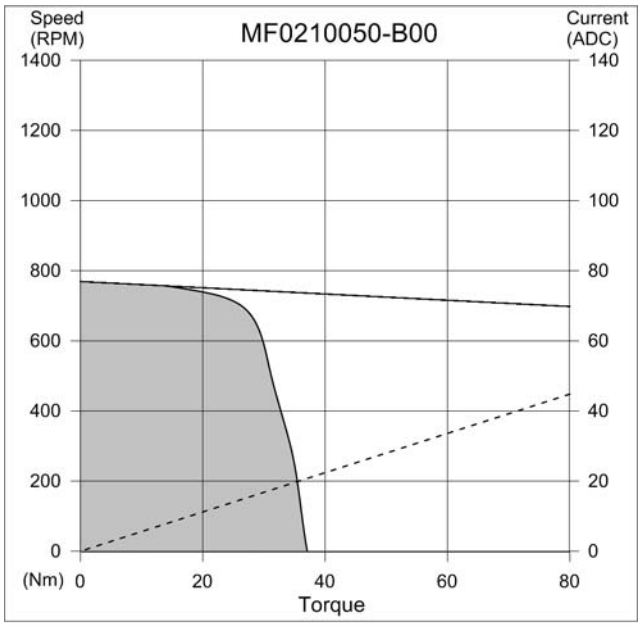


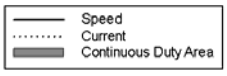
PERFORMANCE



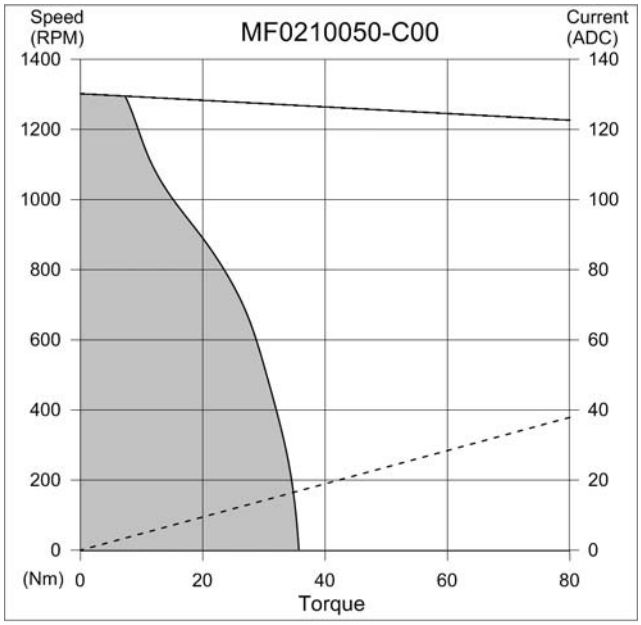


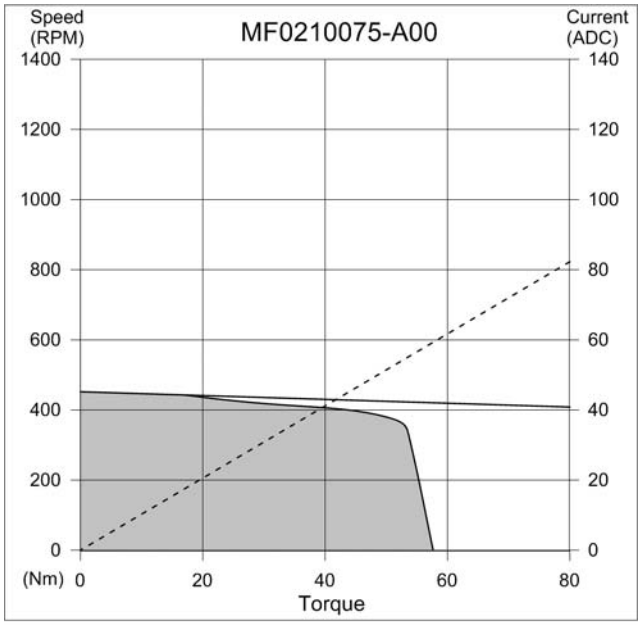


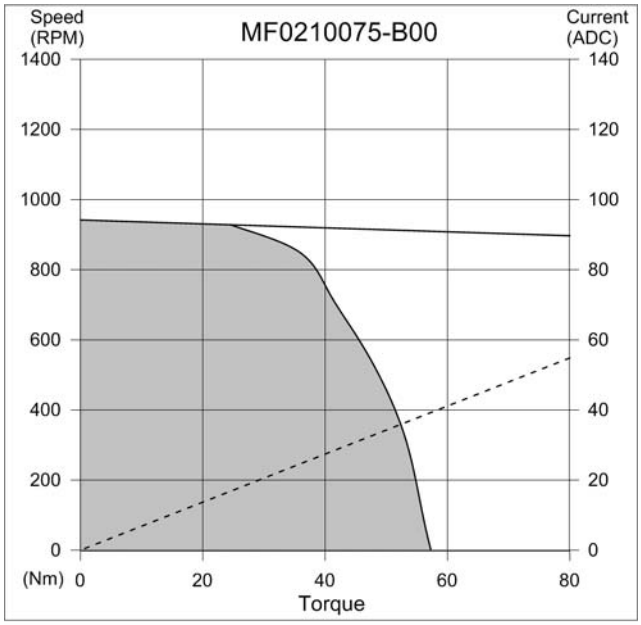


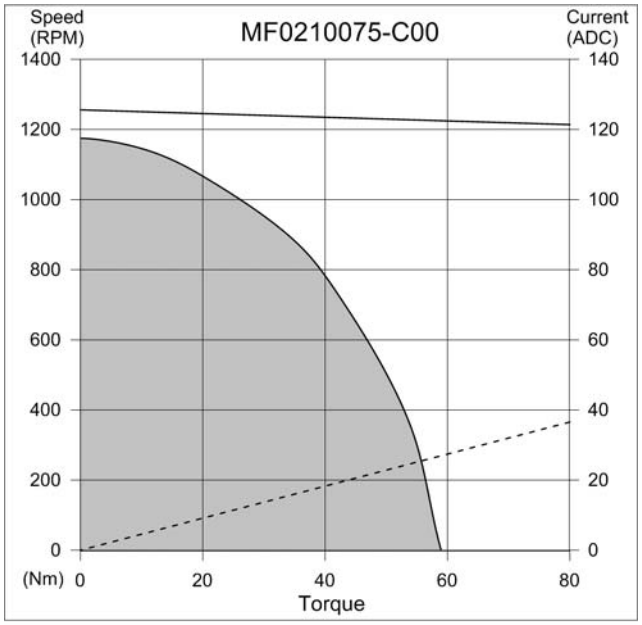


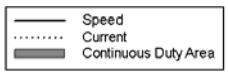
PERFORMANCE





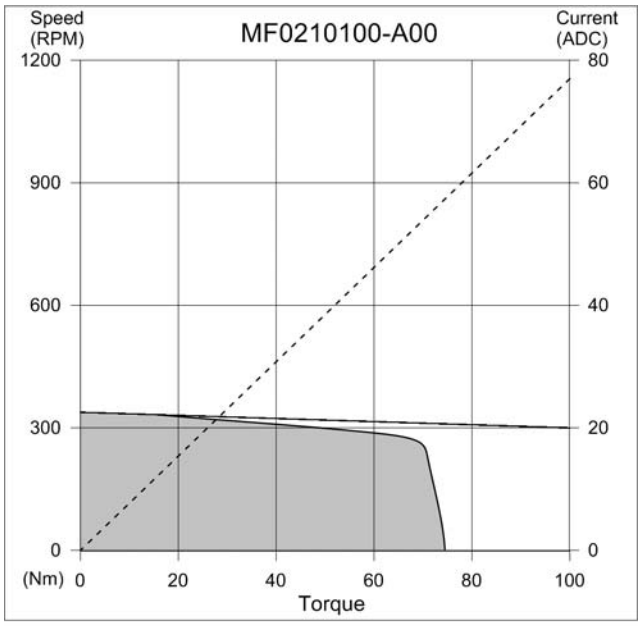


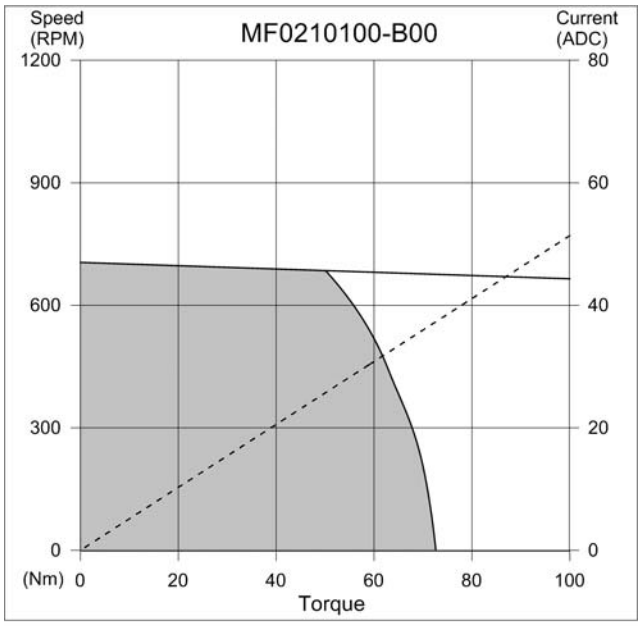


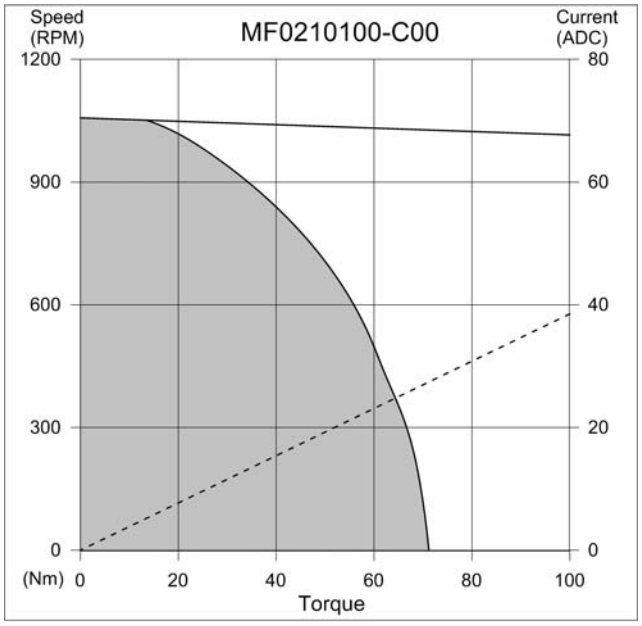


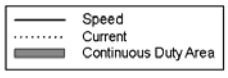
MF0210 Series Frameless Brushless Torque Motors

PERFORMANCE









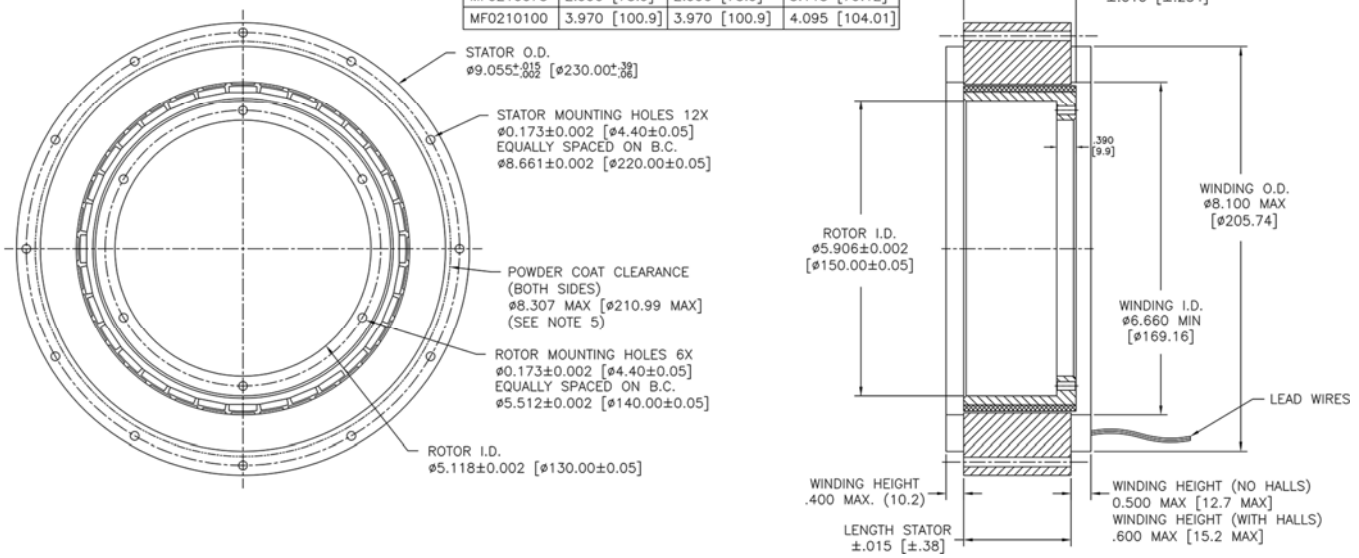
Issued: May 6, 2016

Torque Motors

MF0210 Series Frameless Brushless Torque Motors

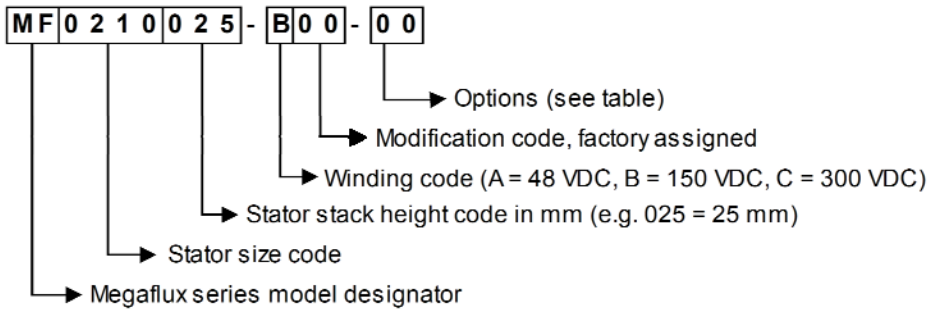
DIMENSIONS

MODEL	LENGTH STATOR	LENGTH ROTOR NO HALLS	LENGTH ROTOR WITH HALLS
MF0210010	0.390 [9.9]	0.390 [9.9]	0.515 [13.08]
MF0210025	1.020 [25.9]	1.020 [25.9]	1.145 [29.08]
MF0210050	2.000 [50.9]	2.000 [50.9]	2.125 [53.98]
MF0210075	2.990 [75.9]	2.990 [75.9]	3.115 [79.12]
MF0210100	3.970 [100.9]	3.970 [100.9]	4.095 [104.01]



in (mm)

MODEL NUMBERING



Options	
C	= Customer–specified connector
Z	= RoHS compliant