

# BLMF Series

## Linear Motors

Non-magnetic forcer coil provides high force with zero cogging for super-smooth velocity and position control

Continuous force to 159.4 N (35.8 lb); peak force to 637.7 N (143.4 lb)

Unlimited travel length by stacking magnet tracks

High-energy, rare-earth magnets used in magnet track for high acceleration capability



The BLMF series linear motors are designed to provide a lower cost and lower profile alternative to conventional linear motor applications. The BLMFI forcer contains no magnetic material to achieve zero cogging and magnetic attraction. The BLMFS forcer contains magnetic material to achieve higher force per unit volume. The flat magnet track can accommodate either the BLMFI or BLMFS.

The moving forcer coil assembly contains Hall-effect devices, and a thermal sensor, and is a compact, reinforced ceramic epoxy structure.



*The BLMF is shown with Aerotech's linear motor line.*

The BLMFI series nonmagnetic forcer eliminates cogging and magnetic attraction to allow for extremely smooth motion and very tight velocity and position control.

The BLMFS series utilizes steel laminations to produce more force for a given forcer coil length. This makes it ideal for high speed point-to-point motion. The attraction force can also be used as a bearing pre-load.

Offering high peak forces in its standard configuration, BLMF motors are available with higher-power magnets that can be used to increase output force.

These linear motors are ideal for any application requiring high levels of positioning resolution and accuracy. Tracks are stackable for any travel length. The BLMF linear motors are also for cleanroom use as they produce no particulates.

The BLMF can be driven using standard Aerotech brushless amplifiers and controllers to provide a complete, integrated system.

# BLMF Series SPECIFICATIONS

## BLMFI "Ironless" Forcer Models

Motor Model	Units	BLMFI-81	BLMFI-142	BLMFI-264	BLMFI-325	BLMFI-386					
<b>Performance Specifications<sup>(1,5)</sup></b>											
Continuous Force, No Air <sup>(2)</sup>	N (lb)	18.7 (4.2)	32.4 (7.3)	64.8 (14.6)	90.2 (20.3)	112.1 (25.2)					
Peak Force <sup>(3)</sup>	N (lb)	74.7 (16.8)	129.7 (29.2)	259.1 (58.2)	360.7 (81.1)	448.4 (100.8)					
Attraction Force	N (lb)	0	0	0	0	0					
<b>Electrical Specifications<sup>(5)</sup></b>											
Winding Designation		-A	-B	-A	-B	-A	-B	-A	-B	-A	-B
BEMF Constant (Line-Line, Max)	V/m/s (V/in/s)	7.16 (0.18)	3.58 (0.09)	13.81 (0.35)	6.90 (0.18)	14.32 (0.36)	28.63 (0.73)	18.51 (0.47)	37.02 (0.94)	23.01 (0.58)	46.02 (1.17)
Continuous Current, No Air <sup>(2)</sup>	Amp <sub>pk</sub> (Amp <sub>rms</sub> )	3.00 (2.12)	6.00 (4.24)	2.70 (1.91)	5.40 (3.82)	5.20 (3.68)	2.60 (1.84)	5.60 (3.96)	2.80 (1.98)	5.60 (3.96)	2.80 (1.98)
Peak Current, Stall <sup>(3)</sup>	Amp <sub>pk</sub> (Amp <sub>rms</sub> )	12.00 (8.49)	24.00 (16.97)	10.80 (7.64)	21.60 (15.27)	20.80 (14.71)	10.40 (7.35)	22.40 (15.84)	11.20 (7.92)	22.40 (15.84)	11.20 (7.92)
Force Constant, Sine Drive <sup>(4,8)</sup>	N/Amp <sub>pk</sub> (lb/Amp <sub>pk</sub> )	6.23 (1.40)	3.11 (0.70)	12.01 (2.70)	6.00 (1.35)	12.45 (2.80)	24.91 (5.60)	16.10 (3.62)	32.20 (7.24)	20.02 (4.50)	40.03 (9.00)
	N/Amp <sub>rms</sub> (lb/Amp <sub>rms</sub> )	8.81 (1.98)	4.40 (0.99)	16.98 (3.82)	8.49 (1.91)	17.61 (3.96)	35.23 (7.92)	22.77 (5.12)	45.54 (10.24)	28.31 (6.36)	56.61 (12.73)
Motor Constant <sup>(2,4)</sup>	N/√W (lb/√W)	2.59 (0.58)		3.55 (0.80)		5.28 (1.19)		6.16 (1.39)		6.91 (1.55)	
Resistance, 25°C (Line-Line)	ohms	5.5	1.4	10.9	2.7	5.3	21.2	6.5	26.0	8.0	32.0
Inductance (Line-Line)	mH	2.90	0.73	6.50	1.63	3.50	14.00	4.48	17.92	5.30	21.20
Thermal Resistance, No Cooling	°C/W	1.92		1.20		0.66		0.47		0.38	
Maximum Bus Voltage	VDC	340		340		340		340		340	
<b>Mechanical Specifications</b>											
Coil Weight	kg (lb)	0.50 (1.10)		0.84 (1.85)		1.10 (2.42)		1.40 (3.08)		1.70 (3.74)	
Coil Length	mm (in)	81.0 (3.19)		142.2 (5.60)		264.2 (10.40)		325.1 (12.80)		386.1 (15.20)	
Heat Sink	mm (in)	100x100x13 (4x4x0.5)		150x150x13 (6x6x0.5)		300x300x13 (12x12x0.5)		350x350x13 (14x14x0.5)		400x400x13 (16x16x0.5)	
Magnet Track Weight	kg/m (lb/ft)	4.75 (3.19)		4.75 (3.19)		4.75 (3.19)		4.75 (3.19)		4.75 (3.19)	
Magnetic Pole Pitch	mm (in)	30.00 (1.18)		30.00 (1.18)		30.00 (1.18)		30.00 (1.18)		30.00 (1.18)	

Notes:

- Performance is dependent upon heat sink configuration, system cooling conditions, and ambient temperature.
- Values shown @ 100°C rise above a 25°C ambient temperature, with motor mounted to the specified aluminum heat sink.
- Peak force assumes correct rms current; consult Aerotech.
- Force constant and motor constant specified at stall.
- All performance and electrical specifications ±10%.
- Maximum winding temperature is 125°C.
- Ambient operating temperature range 0°C - 25°C. Consult Aerotech for performance in elevated ambient temperatures.
- All Aerotech amplifiers are rated A<sub>pk</sub>; use torque constant in N-m/A<sub>pk</sub> when sizing.

## BLMF Series SPECIFICATIONS

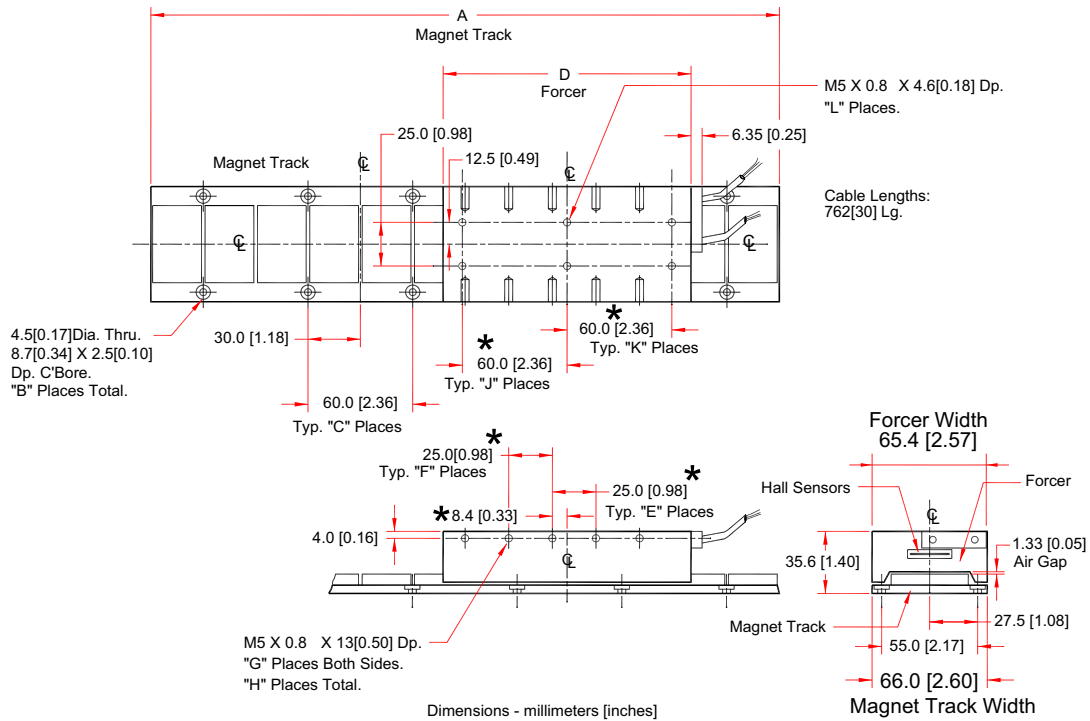
### BLMFS "Steel Laminated" Forcer Models

Motor Model	Units	BLMFS-81	BLMFS-142	BLMFS-264	BLMFS-325	BLMFS-386					
<b>Performance Specifications<sup>(1,5)</sup></b>											
Continuous Force, No Air <sup>(2)</sup>	N (lb)	28.0 (6.3)	48.0 (10.8)	97.1 (21.8)	134.5 (30.2)	159.4 (35.8)					
Peak Force <sup>(3)</sup>	N (lb)	112.1 (25.2)	192.2 (43.2)	388.6 (87.4)	538.0 (121.0)	637.7 (143.4)					
Attraction Force	N (lb)	134 (30)	232 (52)	427 (96)	535 (120)	629 (141)					
<b>Electrical Specifications<sup>(5)</sup></b>											
Winding Designation		-A	-B	-A	-B	-A	-B	-A	-B	-A	-B
BEMF Constant (Line-Line, Max)	V/m/s (V/in/s)	10.74 (0.27)	5.37 (0.14)	20.45 (0.52)	10.23 (0.26)	21.47 (0.55)	42.95 (1.09)	27.61 (0.70)	55.22 (1.40)	32.72 (0.83)	65.45 (1.66)
Continuous Current, No Air <sup>(2)</sup>	Amp <sub>pk</sub> (Amp <sub>rms</sub> )	3.0 (2.12)	6.00 (4.24)	2.70 (1.91)	5.40 (3.82)	5.20 (3.68)	2.60 (1.84)	5.60 (3.96)	2.80 (1.98)	5.60 (3.96)	2.80 (1.98)
Peak Current, Stall <sup>(3)</sup>	Amp <sub>pk</sub> (Amp <sub>rms</sub> )	12.00 (8.49)	24.00 (16.97)	10.80 (7.64)	21.60 (15.27)	20.80 (14.71)	10.40 (7.35)	22.40 (15.84)	11.20 (7.92)	22.40 (15.84)	11.20 (7.92)
Force Constant, Sine Drive <sup>(4,8)</sup>	N/Amp <sub>pk</sub> (lb/Amp <sub>pk</sub> )	9.34 (2.10)	4.67 (1.05)	17.79 (4.00)	8.90 (2.00)	18.68 (4.20)	37.36 (8.40)	24.02 (5.40)	48.04 (10.80)	28.47 (6.40)	56.93 (12.80)
	N/Amp <sub>rms</sub> (lb/Amp <sub>rms</sub> )	13.21 (2.97)	6.60 (1.48)	25.16 (5.66)	12.58 (2.83)	26.42 (5.94)	52.84 (11.88)	33.97 (7.64)	67.94 (15.27)	40.26 (9.05)	80.52 (18.10)
Motor Constant <sup>(2,4)</sup>	N/√W (lb/√W)	3.89 (0.87)		5.26 (1.18)		7.92 (1.78)		9.19 (2.07)		9.82 (2.21)	
Resistance, 25°C (Line-Line)	ohms	5.5	1.4	10.9	2.7	5.3	21.2	6.5	26.0	8.0	32.0
Inductance (Line-Line)	mH	4.50	1.13	10.40	2.60	5.70	22.80	7.40	29.60	8.75	35.00
Thermal Resistance, No Cooling	°C/W	1.92		1.20		0.66		0.47		0.38	
Maximum Bus Voltage	VDC	340		340		340		340		340	
<b>Mechanical Specifications</b>											
Coil Weight	kg (lb)	0.60 (1.32)		1.02 (2.24)		1.90 (4.18)		2.31 (5.08)		2.76 (6.07)	
Coil Length	mm (in)	81.0 (3.19)		142.2 (5.60)		264.2 (10.40)		325.1 (12.80)		386.1 (15.20)	
Heat Sink	mm (in)	100x100x13 (4x4x0.5)		150x150x13 (6x6x0.5)		300x300x13 (12x12x0.5)		350x350x13 (14x14x0.5)		400x400x13 (16x16x0.5)	
Magnet Track Weight	kg/m (lb/ft)	4.75 (3.19)		4.75 (3.19)		4.75 (3.19)		4.75 (3.19)		4.75 (3.19)	
Magnetic Pole Pitch	mm (in)	30.00 (1.18)		30.00 (1.18)		30.00 (1.18)		30.00 (1.18)		30.00 (1.18)	

Notes:

- Performance is dependent upon heat sink configuration, system cooling conditions, and ambient temperature.
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- Peak force assumes correct rms current; consult Aerotech.
- Force constant and motor constant specified at stall.
- All performance and electrical specifications ±10%.
- Maximum winding temperature is 125°C.
- Ambient operating temperature range 0°C - 25°C. Consult Aerotech for performance in elevated ambient temperatures.
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# BLMF Series DIMENSIONS



Magnet Track

Model No.	A	B	C
MTF240	240mm 9.45"	8	3
MTF300	300mm 11.81"	10	4
MTF360	360mm 14.17"	12	5
MTF480	480mm 18.90"	16	7
MTF540	540mm 21.26"	16	7

Dimensions - millimeters [inches]

Forcer

Model No.	D	E	F	G	H	J	K	L
BLMF-81	81mm 3.19"	1	1	2	4	1	1	4
BLMF-142	142mm 5.59"	2	2	5	10	1	1	6
BLMF-264	264mm 10.39"	4	4	9	18	2	2	10
BLMF-325	325mm 12.80"	5	5	11	22	2	2	10
BLMF-386	386mm 15.20"	7	7	15	30	3	3	14

\* Dimensions Do Not Apply To BLMF-81. Consult Aerotech Inc.

MTFx custom track lengths available

## BLMF Series ORDERING INFORMATION

### Ordering Example

BLMFI	-81	-A
Motor Series	Forcer Coil Length	Standard Winding
BLMFI BLMFS	81 mm, 142 mm, 264 mm, 325 mm, 386 mm	76 cm (2.5 ft) flying leads std

### Brushless Linear Servomotors - BLMF Series Compact "U" Channel Forcer Coils - BLMFI Series Flat Ironless Forcer Coils

BLMFI-81-A	Flat linear motor coil, ironless design for zero cogging with HED and temperature switch, Fcont = 18.7 N (4.2 lb) no cooling
BLMFI-142-A	Flat linear motor coil, ironless design for zero cogging with HED and temperature switch, Fcont = 32.4 N (7.3 lb) no cooling
BLMFI-264-A	Flat linear motor coil, ironless design for zero cogging with HED and temperature switch, Fcont = 64.8 N (14.6 lb) no cooling
BLMFI-325-A	Flat linear motor coil, ironless design for zero cogging with HED and temperature switch, Fcont = 90.2 N (20.3 lb) no cooling
BLMFI-386-A	Flat linear motor coil, ironless design for zero cogging with HED and temperature switch, Fcont = 112.1 N (25.2 lb) no cooling

### BLMFI Options

-LH	Remove HED sensor from BLMFI series forcer coil
-B	Optional winding
-V	Vacuum prepared

### Brushless Linear Servomotors - BLMF Series Compact "U" Channel Forcer Coils - BLMFS Series Flat Steel Lamination Forcer Coils

BLMFS-81-A	Flat linear motor coil, steel lamination design for higher force with HED and temperature switch, Fcont = 28.0 N (6.3 lb) no cooling
BLMFS-142-A	Flat linear motor coil, steel lamination design for higher force with HED and temperature switch, Fcont = 48.0 N (10.8 lb) no cooling
BLMFS-264-A	Flat linear motor coil, steel lamination design for higher force with HED and temperature switch, Fcont = 97.1 N (21.8 lb) no cooling
BLMFS-325-A	Flat linear motor coil, steel lamination design for higher force with HED and temperature switch, Fcont = 134.5 N (30.2 lb) no cooling
BLMFS-386-A	Flat linear motor coil, steel lamination design for higher force with HED and temperature switch, Fcont = 159.4 N (35.8 lb) no cooling

### BLMFS Options

-LH	Remove HED sensor from BLMFS series forcer coil
-B	Optional winding
-V	Vacuum prepared

### Flat Magnet Tracks - MTF Series for BLMF motors

MTF240	Flat magnet track, for use with BLMFI or BLMFS forcer coil, 240 mm (9.4 in) length
MTF360	Flat magnet track, for use with BLMFI or BLMFS forcer coil, 360 mm (14.2 in) length
MTF480	Flat magnet track, for use with BLMFI or BLMFS forcer coil, 480 mm (18.9 in) length
MTFx	Custom flat magnet track length available. Please consult factory.