

BLM Series

Linear Motors

High output force in an 86.4 mm x 34.3 mm cross section

Continuous force to 397.6 N (89.4 lb); peak force to 1590.4 N (357.5 lb)

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

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



Aerotech's "U-channel" BLM series linear motors are 86.4 mm x 34.3 mm in cross section and have proven ideal for both high-accuracy and high-throughput applications.

BLM series motors are direct drive and consist of a noncontacting forcer coil and "U-channel" rare-earth magnet track. This design eliminates backlash, windup, wear and maintenance issues associated with ball screws, belts, and rack and pinions.

The noncontact design of the forcer and magnet track results in a maintenance-free system.

The compact moving forcer coil assembly contains Hall-effect devices, and a thermal sensor, and is constructed of reinforced ceramic epoxy. This ironless design eliminates eddy-current losses that otherwise would limit speed and produce additional heat. For highest rms force, optional air cooling is available. Offering high peak forces in its standard configuration, BLM motors are available with special high-power magnets that can increase output force.

The BLM series nonmagnetic forcer eliminates cogging and magnetic attraction to allow for extremely smooth motion and very tight velocity and position control. These linear motors are ideal for any application that requires high levels of positioning resolution and accuracy. BLM series linear

motors are forgiving to align, easy to assemble, and keep the magnetic field well-contained. Magnet tracks are stackable for any travel length. They are also suited for cleanroom use as they produce no particulates.

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



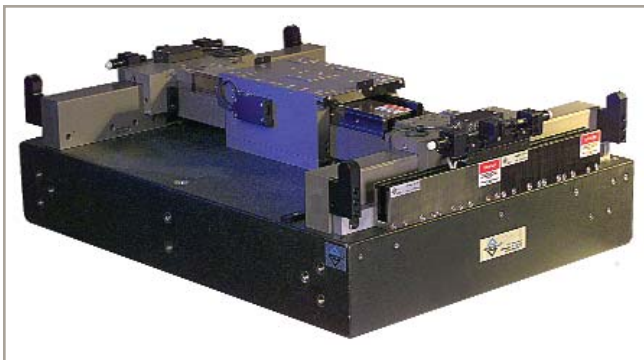
The BLM is shown with Aerotech's linear motor line.

BLM Series SPECIFICATIONS

Motor Model (assumes -P magnet track)	Units	BLM-142	BLM-203	BLM-264	BLM-325	BLM-386					
Performance Specifications^(1,5)											
Continuous Force, 1.4 bar (20 psi) ⁽²⁾	N (lb)	173.2 (38.9)	251.6 (56.6)	301.7 (67.8)	332.2 (74.7)	397.6 (89.4)					
Continuous Force, No Air ⁽²⁾	N (lb)	110.5 (24.8)	153.3 (34.5)	197.2 (44.3)	230.7 (51.9)	257.3 (57.8)					
Peak Force ⁽³⁾	N (lb)	692.7 (155.7)	1006.4 (226.3)	1206.6 (271.3)	1328.6 (298.7)	1590.4 (357.5)					
Electrical Specifications⁽⁵⁾											
Winding Designation		-A	-B (opt)	-A	-B (opt)	-A	-B (opt)	-A	-B (opt)	-A	-B (opt)
BEMF Constant (Line-Line, Max)	V/m/s (V/in/s)	40.96 (1.04)	20.48 (0.52)	33.24 (0.84)	66.49 (1.69)	44.46 (1.13)	88.91 (2.26)	53.03 (1.35)	106.06 (2.69)	67.21 (1.71)	134.42 (3.41)
Continuous Current, 1.4 bar, 20 psi ⁽²⁾	Amp _{pk} (Amp _{rms})	4.86 (3.44)	9.72 (6.87)	8.70 (6.15)	4.35 (3.08)	7.80 (5.52)	3.90 (2.76)	7.20 (5.09)	3.60 (2.55)	6.80 (4.81)	3.40 (2.40)
Continuous Current, No Air ⁽²⁾	Amp _{pk} (Amp _{rms})	3.10 (2.19)	6.20 (4.38)	5.30 (3.75)	2.65 (1.87)	5.10 (3.61)	2.55 (1.80)	5.00 (3.54)	2.50 (1.77)	4.40 (3.11)	2.20 (1.56)
Peak Current, Stall ⁽³⁾	Amp _{pk} (Amp _{rms})	19.44 (13.75)	38.88 (27.49)	34.80 (24.61)	17.40 (12.30)	31.20 (22.06)	15.60 (11.03)	28.80 (20.36)	14.40 (10.18)	27.20 (19.23)	13.60 (9.62)
Force Constant, Sine Drive ^(4,8)	N/Amp _{pk} (lb/Amp _{pk})	35.63 (8.01)	17.82 (4.01)	28.92 (6.50)	57.84 (13.00)	38.67 (8.69)	77.35 (17.39)	46.13 (10.37)	92.27 (20.74)	58.47 (13.15)	116.94 (26.29)
	N/Amp _{rms} (lb/Amp _{rms})	50.39 (11.33)	25.20 (5.66)	40.90 (9.19)	81.80 (18.39)	54.69 (12.30)	109.39 (24.59)	65.24 (14.67)	130.48 (29.34)	82.69 (18.59)	165.38 (37.18)
Motor Constant ^(2,4)	N/√W (lb/√W)	10.53 (2.37)		14.11 (3.17)		16.39 (3.69)		17.66 (3.97)		20.17 (4.54)	
Resistance, 25°C (Line-Line)	ohms	10.9	2.7	4.0	16.0	5.3	21.2	6.5	26.0	8.0	32.0
Inductance (Line-Line)	mH	8.70	2.18	3.20	12.80	4.20	16.80	5.20	20.80	6.20	24.80
Thermal Resistance, 1.4 bar, 20 psi	°C/W	0.37		0.31		0.30		0.28		0.26	
Thermal Resistance, No Cooling	°C/W	0.91		0.85		0.69		0.59		0.61	
Maximum Bus Voltage	VDC	340		340		340		340		340	
Mechanical Specifications											
Air Flow, 20 psi	m ³ /s SCFM	1.7x10 ⁻³ 3.5		1.5x10 ⁻³ 3.2		1.6x10 ⁻³ 3.3		1.6x10 ⁻³ 3.3		1.6x10 ⁻³ 3.4	
Coil Weight	kg (lb)	0.60 (1.32)		0.90 (1.98)		1.10 (2.42)		1.40 (3.08)		1.70 (3.74)	
Coil Length	mm (in)	142.2 (5.60)		203.2 (8.00)		264.2 (10.40)		325.1 (12.80)		386.1 (15.20)	
Heat Sink	mm (in)	250x250x25 (10x10x1)		250x250x25 (10x10x1)		250x250x25 (10x10x1)		250x400x25 (10x16x1)		250x400x25 (10x16x1)	
Magnet Track Weight	kg/m (lb/ft)	10.76 (7.22)		10.76 (7.22)		10.76 (7.22)		10.76 (7.22)		10.76 (7.22)	
Magnetic Pole Pitch	mm (in)	30.48 (1.20)		30.48 (1.20)		30.48 (1.20)		30.48 (1.20)		30.48 (1.20)	

Notes:

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



BLM linear motors are used in a high-performance Aerotech air-bearing system.

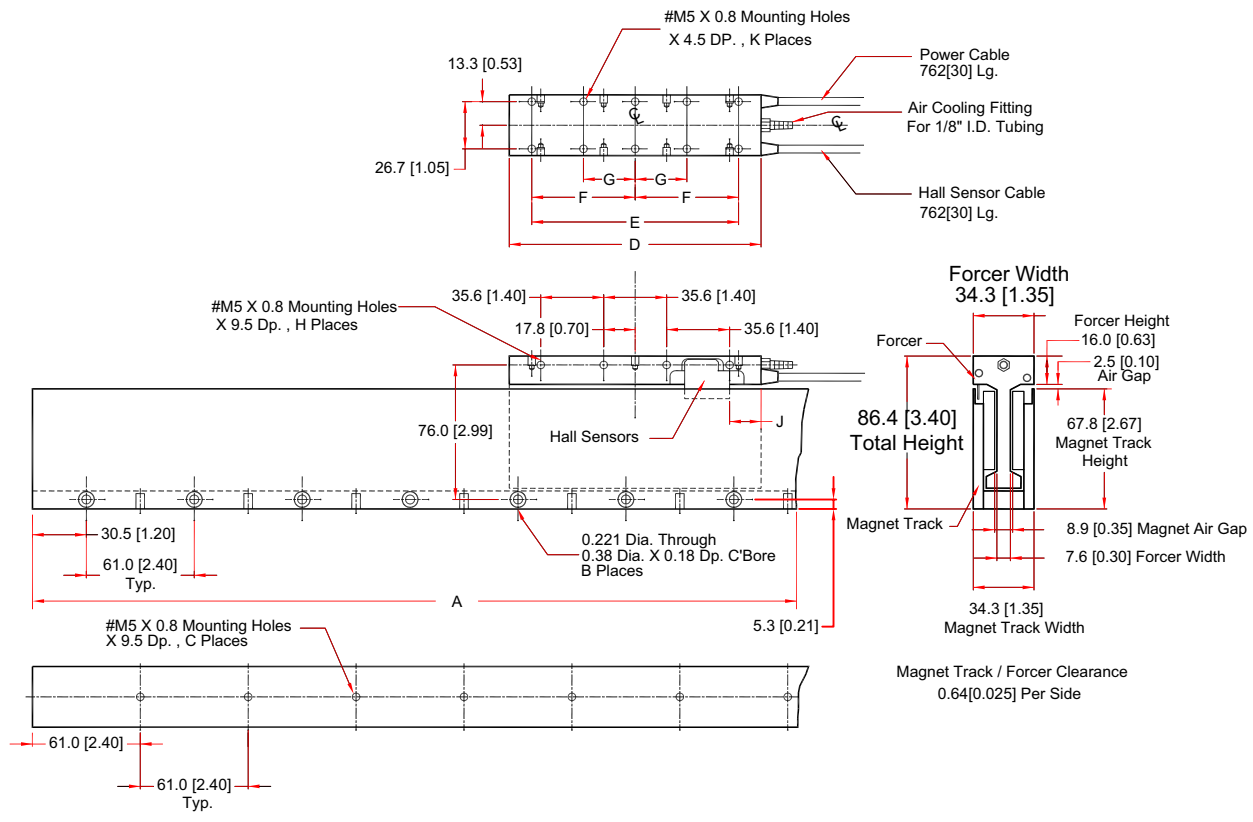
BLM Series SPECIFICATIONS

Motor Model (assumes -S magnet track)	Units	BLM-142	BLM-203	BLM-264	BLM-325	BLM-386					
Performance Specifications^(1,5)											
Continuous Force, 1.4 bar (20 psi) ⁽²⁾	N (lb)	108.9 (24.5)	158.2 (35.6)	189.6 (42.6)	208.8 (46.9)	250.0 (56.2)					
Continuous Force, No Air ⁽²⁾	N (lb)	69.4 (15.6)	96.4 (21.7)	124.0 (27.9)	145.0 (32.6)	161.7 (36.4)					
Peak Force ⁽³⁾	N (lb)	435.5 (97.9)	632.7 (142.2)	758.6 (170.5)	835.3 (187.8)	999.8 (224.8)					
Electrical Specifications⁽⁵⁾											
Winding Designation		-A	-B (opt)	-A	-B (opt)	-A	-B (opt)	-A	-B (opt)	-A	-B (opt)
BEMF Constant (Line-Line, Max)	V/m/s (V/in/s)	25.75 (0.65)	12.88 (0.33)	20.90 (0.53)	41.80 (1.06)	27.95 (0.71)	55.90 (1.42)	33.34 (0.85)	66.68 (1.69)	42.25 (1.07)	84.51 (2.15)
Continuous Current, 1.4 bar, 20 psi ⁽²⁾	Amp _{pk} (Amp _{rms})	4.86 (3.44)	9.72 (6.87)	8.70 (6.15)	4.35 (3.08)	7.80 (5.52)	3.90 (2.76)	7.20 (5.09)	3.60 (2.55)	6.80 (4.81)	3.40 (2.40)
Continuous Current, No Air ⁽²⁾	Amp _{pk} (Amp _{rms})	3.10 (2.19)	6.20 (4.38)	5.30 (3.75)	2.65 (1.87)	5.10 (3.61)	2.55 (1.80)	5.00 (3.54)	2.50 (1.77)	4.40 (3.11)	2.20 (1.56)
Peak Current, Stall ⁽³⁾	Amp _{pk} (Amp _{rms})	19.44 (13.75)	38.88 (27.49)	34.80 (24.61)	17.40 (12.30)	31.20 (22.06)	15.60 (11.03)	28.80 (20.36)	14.40 (10.18)	27.20 (19.23)	13.60 (9.62)
Force Constant, Sine Drive ^(4,8)	N/Amp _{pk} (lb/Amp _{pk})	22.40 (5.04)	11.20 (2.52)	18.18 (4.09)	36.36 (8.17)	24.31 (5.47)	48.63 (10.93)	29.00 (6.52)	58.01 (13.04)	36.76 (8.26)	73.52 (16.53)
	N/Amp _{rms} (lb/Amp _{rms})	31.68 (7.12)	15.84 (3.56)	25.71 (5.78)	51.42 (11.56)	34.38 (7.73)	68.77 (15.46)	41.02 (9.22)	82.03 (18.44)	51.98 (11.69)	103.97 (23.37)
Motor Constant ^(2,4)	N/√W (lb/√W)	6.62 (1.49)		8.87 (1.99)		10.31 (2.32)		11.10 (2.50)		12.68 (2.85)	
Resistance, 25°C (Line-Line)	ohms	10.9	2.7	4.0	16.0	5.3	21.2	6.5	26.0	8.0	32.0
Inductance (Line-Line)	mH	8.7	2.2	3.2	12.8	4.2	16.8	5.2	20.8	6.2	24.8
Thermal Resistance, 1.4 bar, 20 psi	°C/W	0.37		0.31		0.30		0.28		0.26	
Thermal Resistance, No Cooling	°C/W	0.91		0.85		0.69		0.59		0.61	
Maximum Bus Voltage	VDC	340		340		340		340		340	
Mechanical Specifications											
Air Flow, 20 psi	m ³ /s SCFM	1.7x10 ⁻³ 3.5		1.5x10 ⁻³ 3.2		1.6x10 ⁻³ 3.3		1.6x10 ⁻³ 3.3		1.6x10 ⁻³ 3.4	
Coil Weight	kg (lb)	0.60 (1.32)		0.90 (1.98)		1.10 (2.42)		1.40 (3.08)		1.70 (3.74)	
Coil Length	mm (in)	142.2 (5.60)		203.2 (8.00)		264.2 (10.40)		325.1 (12.80)		386.1 (15.20)	
Heat Sink	mm (in)	250x250x25 (10x10x1)		250x250x25 (10x10x1)		250x250x25 (10x10x1)		250x400x25 (10x16x1)		250x400x25 (10x16x1)	
Magnet Track Weight	kg/m (lb/ft)	10.76 (7.22)		10.76 (7.22)		10.76 (7.22)		10.76 (7.22)		10.76 (7.22)	
Magnetic Pole Pitch	mm (in)	30.48 (1.20)		30.48 (1.20)		30.48 (1.20)		30.48 (1.20)		30.48 (1.20)	

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_{pk}; use torque constant in N-m/A_{pk} when sizing.

BLM Series DIMENSIONS



Magnet Track

Model No.	A	B	C
MT240	243,8 9,6"	4	3
MT300	304,8 12,0"	5	4
MT360	365,8 14,4"	6	5
MT420	426,7 16,8"	7	6
MT480	487,7 19,2"	8	7
MT600	609,6 24,0"	10	9

Dimensions - millimeters[inches]

Forcer

Model No.	D	E	F	G	H	J	K
BLM-142	142,2 5,60"	116,8 4,60"	58,4 2,30"	NA	8	17,8 0,70"	6
BLM-203	203,2 8,00"	177,8 7,00"	88,9 3,50"	NA	8	48,3 1,90"	6
BLM-264	264,2 10,40"	238,8 9,40"	119,4 4,70"	NA	12	43,2 1,70"	6
BLM-325	325,1 12,80"	299,7 11,80"	149,9 5,90"	82,7 3,26"	16	38,1 1,50"	10
BLM-386	386,1 15,20"	360,6 14,20"	180,3 7,10"	96,5 3,80"	18	68,6 2,70"	10

BLM Series ORDERING INFORMATION

Ordering Example

BLM	-142	-A
Motor Series	Forcer Coil Length	Standard Winding
	142 mm, 203 mm, 264 mm, 325 mm, 386 mm	76 cm (2.5 ft) flying leads std

Brushless Linear Servomotors - BLM Series Compact "U" Channel Forcer Coils

BLM-142-A	Linear motor coil, with HED, air cooling and temperature switch, Fcont = 173.2 N (38.9 lb) @ 20 psi
BLM-203-A	Linear motor coil, with HED, air cooling and temperature switch, Fcont = 251.6 N (56.6 lb) @ 20 psi
BLM-264-A	Linear motor coil, with HED, air cooling and temperature switch, Fcont = 301.7 N (67.8 lb) @ 20 psi
BLM-325-A	Linear motor coil, with HED, air cooling and temperature switch, Fcont = 332.2 N (74.7 lb) @ 20 psi
BLM-386-A	Linear motor coil, with HED, air cooling and temperature switch, Fcont = 397.6 N (89.4 lb) @ 20 psi

BLM Options

-LH	Remove HED sensor from BLM series forcer coil
-HF	High-flex cable
-UHV	Ultra-high vacuum prepared
-V	Vacuum prepared
-B	Optional winding

"U" Channel Magnet Tracks - MT Series for BLM motors

MT240-x	Compact "U" channel magnet track for use with BLM forcer coil, 244 mm (9.6 in) length
MT300-x	Compact "U" channel magnet track for use with BLM forcer coil, 305 mm (12.0 in) length
MT360-x	Compact "U" channel magnet track for use with BLM forcer coil, 366 mm (14.4 in) length
MT420-x	Compact "U" channel magnet track for use with BLM forcer coil, 427 mm (16.8 in) length
MT480-x	Compact "U" channel magnet track for use with BLM forcer coil, 487 mm (19.2 in) length
MT600-x	Compact "U" channel magnet track for use with BLM forcer coil, 610 mm (24.0 in) length
MTx	Custom track lengths available; please consult factory

Note: x = -S or -P (see specification tables for differences)

-HS	High strength magnets
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