

# BLM Series

## Linear Motors

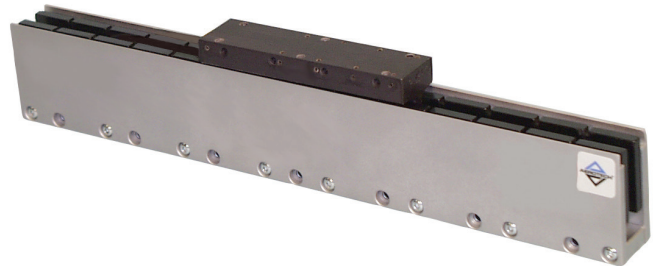
High output force in an 86.4 mm x 34.3 mm cross section

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

Follows the 2011/65/EU RoHS 2 Directive



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.

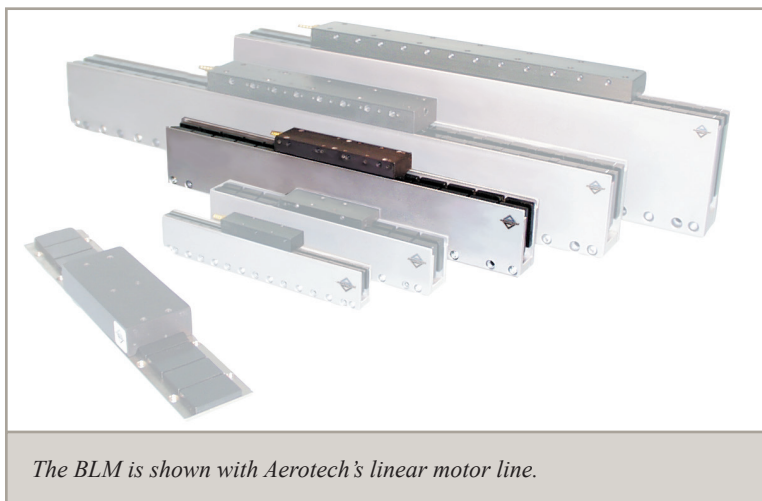
BLM series motors are direct drive and consist of a noncontacting forcer coil and "U-channel" rare-earth magnet track. This design eliminates backlash, windup, wear and maintenance issues associated with ball screws, belts, and rack and pinions.

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 is shown with Aerotech's linear motor line.

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

# BLM Series SPECIFICATIONS

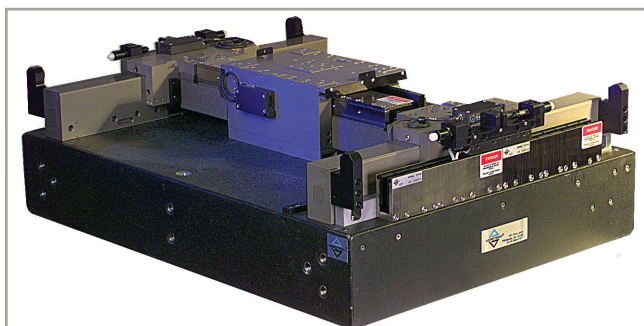
Linear Motors

BLM Series

Motor Model (assumes -P magnet track)	Units	BLM-142	BLM-203	BLM-264	BLM-325	BLM-386					
<b>Performance Specifications<sup>(1,2)</sup></b>											
Continuous Force, 1.4 bar (20 psi) <sup>(3)</sup>	N (lb)	-A	-B (opt)	251.6 (56.6)	301.7 (67.8)	332.2 (74.7)	397.6 (89.4)				
		173.2 (38.9)	158.7 (35.7)								
Continuous Force, No Forced Cooling <sup>(3)</sup>	N (lb)	110.5 (24.8)	153.3 (34.5)	197.2 (44.3)	230.7 (51.9)	257.3 (57.8)					
Peak Force <sup>(4)</sup>	N (lb)	692.7 (155.7)	1006.4 (226.3)	1206.6 (271.3)	1328.6 (298.7)	1590.4 (357.5)					
<b>Electrical Specifications<sup>(2)</sup></b>											
Winding Designation		-A	-B (opt)	-A	-B (opt)	-A	-B (opt)	-A	-B (opt)	-A	-B (opt)
BEMF Constant (Line to 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 ps <sup>(3)</sup>	Amp <sub>pk</sub>	4.86	8.91	8.70	4.35	7.80	3.90	7.20	3.60	6.80	3.40
	Amp <sub>rms</sub>	3.44	6.30	6.15	3.08	5.52	2.76	5.09	2.55	4.81	2.40
Continuous Current, No Forced Cooling <sup>(3)</sup>	Amp <sub>pk</sub>	3.10	6.20	5.30	2.65	5.10	2.55	5.00	2.50	4.40	2.20
	Amp <sub>rms</sub>	2.19	4.38	3.75	1.87	3.61	1.80	3.54	1.77	3.11	1.56
Peak Current, Stall <sup>(4)</sup>	Amp <sub>pk</sub>	19.44	38.88	34.80	17.40	31.20	15.60	28.80	14.40	27.20	13.60
	Amp <sub>rms</sub>	13.75	27.49	24.61	12.30	22.06	11.03	20.36	10.18	19.23	9.62
Force Constant, Sine Drive <sup>(5,6)</sup>	N/Amp <sub>pk</sub> (lb/Amp <sub>pk</sub> )	17.82 (4.01)	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 <sub>rms</sub> (lb/Amp <sub>rms</sub> )	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 <sup>(3,5)</sup>	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 to Line)	ohms	10.9	2.7	4.0	16.0	5.3	21.2	6.5	26.0	8.0	32.0
Inductance (Line to 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 Forced Cooling	°C/W	0.91		0.85		0.69		0.59		0.61	
Maximum Bus Voltage	VDC	340		340		340		340		340	
<b>Mechanical Specifications</b>											
Air Flow, 20 psi	m <sup>3</sup> /s (SCFM)	1.7x10 <sup>-3</sup> (3.5)		1.5x10 <sup>-3</sup> (3.2)		1.6x10 <sup>-3</sup> (3.3)		1.6x10 <sup>-3</sup> (3.3)		1.6x10 <sup>-3</sup> (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)	143.8 (5.66)		204.7 (8.06)		265.7 (10.46)		326.6 (12.86)		387.6 (15.26)	
Heat Sink	mm (in)	250x250x25 (10x10x1)		250x250x25 (10x10x1)		250x250x25 (10x10x1)		250x400x25 (10x16x1)		250x400x25 (10x16x1)	
Magnet Track Weight	kg/m (lb/ft)	10.12 (6.79)									
Magnet Pole Pitch	mm (in)	30.48 (1.20)		30.48 (1.20)		30.48 (1.20)		30.48 (1.20)		30.48 (1.20)	
Standards		2011/65/EU RoHS 2 Directive									

**Notes:**

- Performance is dependent upon heat sink configuration, system cooling conditions, and ambient temperature.
- All performance and electrical specifications ±10%.
- 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 Aerotech amplifiers are rated A<sub>pk</sub>; use torque constant in N/A<sub>pk</sub> when sizing.
- Maximum winding temperature is 125°C.
- Ambient operating temperature range 0°C - 25°C. Consult Aerotech for performance in elevated ambient temperatures.



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

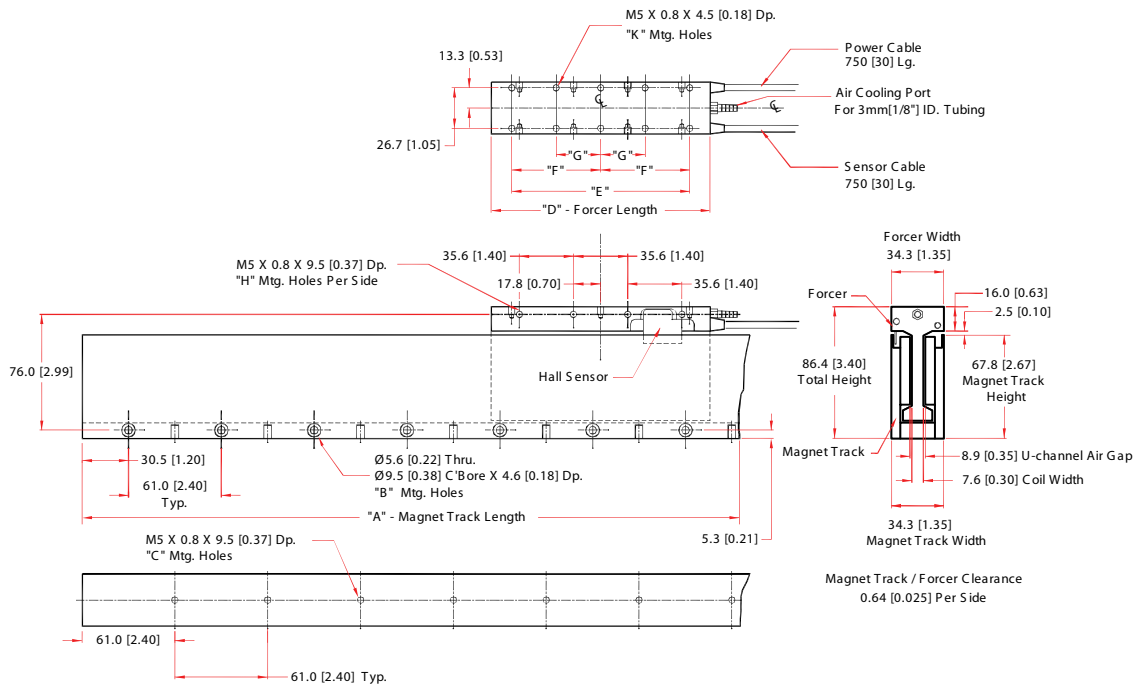
# BLM Series SPECIFICATIONS

Motor Model (assumes -S magnet track)	Units	BLM-142	BLM-203	BLM-264	BLM-325	BLM-386					
<b>Performance Specifications<sup>(1,2)</sup></b>											
Continuous Force, 1.4 bar (20 psi) <sup>(3)</sup>	N (lb)	-A	-B (opt)	158.2 (35.6)	189.6 (42.6)	208.8 (46.9)	250.0 (56.2)				
		108.9 (24.5)	99.8 (22.4)								
Continuous Force, No Forced Cooling <sup>(3)</sup>	N (lb)	69.4 (15.6)	96.4 (21.7)	124.0 (27.9)	145.0 (32.6)	161.7 (36.4)					
Peak Force <sup>(4)</sup>	N (lb)	435.5 (97.9)	632.7 (142.2)	758.6 (170.5)	835.3 (187.8)	999.8 (224.8)					
<b>Electrical Specifications<sup>(2)</sup></b>											
Winding Designation		-A	-B (opt)	-A	-B (opt)	-A	-B (opt)	-A	-B (opt)	-A	-B (opt)
BEMF Constant (Line to 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 ps <sup>(3)</sup>	Amp <sub>pk</sub>	4.86	8.91	8.70	4.35	7.80	3.90	7.20	3.60	6.80	3.40
	Amp <sub>rms</sub>	3.44	6.30	6.15	3.08	5.52	2.76	5.09	2.55	4.81	2.40
Continuous Current, No Forced Cooling <sup>(3)</sup>	Amp <sub>pk</sub>	3.10	6.20	5.30	2.65	5.10	2.55	5.00	2.50	4.40	2.20
	Amp <sub>rms</sub>	2.19	4.38	3.75	1.87	3.61	1.80	3.54	1.77	3.11	1.56
Peak Current, Stall <sup>(4)</sup>	Amp <sub>pk</sub>	19.44	38.88	34.80	17.40	31.20	15.60	28.80	14.40	27.20	13.60
	Amp <sub>rms</sub>	13.75	27.49	24.61	12.30	22.06	11.03	20.36	10.18	19.23	9.62
Force Constant, Sine Drive <sup>(5,6)</sup>	N/Amp <sub>pk</sub> (lb/Amp <sub>pk</sub> )	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 <sub>rms</sub> (lb/Amp <sub>rms</sub> )	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 <sup>(3,5)</sup>	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 to Line)	ohms	10.9	2.7	4.0	16.0	5.3	21.2	6.5	26.0	8.0	32.0
Inductance (Line to 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 Forced Cooling	°C/W	0.91	0.85	0.69	0.59	0.61					
Maximum Bus Voltage	VDC	340	340	340	340	340					
<b>Mechanical Specifications</b>											
Air Flow, 20 psi	m <sup>3</sup> /s (SCFM)	1.7x10 <sup>-3</sup> (3.5)	1.5x10 <sup>-3</sup> (3.2)	1.6x10 <sup>-3</sup> (3.3)	1.6x10 <sup>-3</sup> (3.3)	1.6x10 <sup>-3</sup> (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)	143.8 (5.66)	204.7 (8.06)	265.7 (10.46)	326.6 (12.86)	387.6 (15.26)					
Heat Sink	mm (in)	250x250x25 (10x10x1)	250x250x25 (10x10x1)	250x250x25 (10x10x1)	250x400x25 (10x16x1)	250x400x25 (10x16x1)					
Magnet Track Weight	kg/m (lb/ft)	10.92 (7.32)									
Magnet Pole Pitch	mm (in)	30.48 (1.20)	30.48 (1.20)	30.48 (1.20)	30.48 (1.20)	30.48 (1.20)					
Standards		2011/65/EU RoHS 2 Directive									

Notes:

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- All performance and electrical specifications ±10%.
- Values shown @ 100°C rise above a 25°C ambient temperature, with motor mounted to the specified aluminum heat sink.
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- Maximum winding temperature is 125°C.
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# 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	K
BLM-142	143.8 [5.66]	116.8 [4.60]	58.4 [2.30]	NA	4	6
BLM-203	204.7 [8.06]	177.8 [7.00]	88.9 [3.50]	NA	4	6
BLM-264	265.7 [10.46]	238.8 [9.40]	119.4 [4.70]	NA	6	6
BLM-325	326.6 [12.86]	299.7 [11.80]	149.9 [5.90]	82.7 [3.26]	8	10
BLM-386	387.6 [15.26]	360.6 [14.20]	180.3 [7.10]	96.5 [3.80]	9	10

## BLM Series ORDERING INFORMATION

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

BLM-142	Linear motor forcer with thermistor; 142 mm long
BLM-203	Linear motor forcer with thermistor; 203 mm long
BLM-264	Linear motor forcer with thermistor; 264 mm long
BLM-325	Linear motor forcer with thermistor; 325 mm long
BLM-386	Linear motor forcer with thermistor; 386 mm long
BLM-x	Linear motor forcer with thermistor; custom length

### Winding

-A	76 cm (2.5 ft) flying leads (standard)
-B	Optional winding

### Air Cooling

-NC	No air cooling fitting is installed
-AC	Includes air cooling fitting

### Hall Effect

-H	Hall effect sensors included
-NH	No hall effect sensors included

### Preparation

-S	Standard preparation
-V	Vacuum preparation for $10^{-6}$ Torr
-UHV	Ultra-high vacuum preparation, contact factory

### Cable Length

-750	750 mm length high-flex cables
-5000	5.0 meter length high-flex cables

### Magnet Tracks

MT180P	"U" channel magnet track for use with BLM-series forcers, 180 mm long
MT240P	"U" channel magnet track for use with BLM-series forcers, 240 mm long
MT300P	"U" channel magnet track for use with BLM-series forcers, 300 mm long
MT330P	"U" channel magnet track for use with BLM-series forcers, 330 mm long
MT360P	"U" channel magnet track for use with BLM-series forcers, 360 mm long
MT420P	"U" channel magnet track for use with BLM-series forcers, 420 mm long
MT480P	"U" channel magnet track for use with BLM-series forcers, 480 mm long
MT540P	"U" channel magnet track for use with BLM-series forcers, 540 mm long
MT600P	"U" channel magnet track for use with BLM-series forcers, 600 mm long
MTxP	"U" channel magnet track for use with BLM-series forcers; custom length
MT240S	"U" channel magnet track for use with BLM-series forcers, 240 mm long
MT300S	"U" channel magnet track for use with BLM-series forcers, 300 mm long
MT360S	"U" channel magnet track for use with BLM-series forcers, 360 mm long
MT420S	"U" channel magnet track for use with BLM-series forcers, 420 mm long
MT480S	"U" channel magnet track for use with BLM-series forcers, 480 mm long
MT540S	"U" channel magnet track for use with BLM-series forcers, 540 mm long
MT600S	"U" channel magnet track for use with BLM-series forcers, 600 mm long
MTxS	"U" channel magnet track for use with BLM-series forcers; custom length

Note: Magnet tracks are ordered as separate line items. Magnet track part numbers ending with "P" are high performance grade, including magnets on both sides of the track. Magnet track numbers ending with "S" are standard performance grade, including magnets on a single side of the track.

## BLM Series ORDERING INFORMATION

### Integration (Required)

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Aerotech offers both standard and custom integration services to help you get your system fully operational as quickly as possible. The following standard integration options are available for this system. Please consult Aerotech if you are unsure what level of integration is required, or if you desire custom integration support with your system.

-TAS	Integration - Test as system Testing, integration, and documentation of a group of components as a complete system that will be used together (ex: drive, controller, and stage). This includes parameter file generation, system tuning, and documentation of the system configuration.
-TAC	Integration - Test as components Testing and integration of individual items as discrete components that ship together. This is typically used for spare parts, replacement parts, or items that will not be used together. These components may or may not be part of a larger system.