



U Channel Linear Motors Hardware Manual

Revision: 2.08.00



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EU Declaration of Conformity

Manufacturer Aerotech, Inc.
Address 101 Zeta Drive
 Pittsburgh, PA 15238-2811
 USA
Product BLMSC, BLMUC, BLMC, BLM, BLMH, BLMX (excluding VAC6 versions)
 Motors
Model/Types All

This is to certify that the aforementioned product is in accordance with the applicable requirements of the following Directive(s):


2014/35/EU	Low Voltage Directive
2011/65/EU	RoHS 2 Directive

and has been designed to be in conformity with the applicable requirements of the following Standard(s) when installed and used in accordance with the manufacturer’s supplied installation instructions.

IEC 60034-1:2010	Rotating Electrical Machines
IEC 61010-1:2010	Safety requirements for Electrical Equipment for measurement, control, and laboratory use

NOTE: Safe operation of the motor requires over speed and over current protection. This may be done by the connected controller / amplifier combination.

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Safety Procedures and Warnings

This manual tells you how to carefully and correctly use and operate the U Channel Linear Motors. Read all parts of this manual before you install or operate the U Channel Linear Motors or before you do maintenance to your system. To prevent injury to you and damage to the equipment, obey the precautions in this manual. The precautions that follow apply when you see a Danger or Warning symbol in this manual. If you do not obey these precautions, injury to you or damage to the equipment can occur. If you do not understand the information in this manual, contact Aerotech Global Technical Support

This product has been designed for light industrial manufacturing or laboratory environments. The protection provided by the equipment could be impaired if the product is used in a manner not specified by the manufacturer.

NOTE: Aerotech continually improves its product offerings; listed options may be superseded at any time. All drawings and illustrations are for reference only and were complete and accurate as of this manual's release. Refer to www.aerotech.com for the most up-to-date information.

DANGER: This product contains potentially lethal voltages. To reduce the possibility of electrical shock, bodily injury, or death the following precautions must be followed.

1. The user must restrict user access to motor coil / wires while energized. This is accomplished by providing an enclosure around the operating components which, when opened, removes power to the drive. The motor may also be contained in a grounded mechanical system (positioning stage) which restricts direct access to the high voltage motor components.
2. Do not connect or disconnect any electrical components or connecting cables while connected to a power source.
3. Disconnect electrical power before servicing equipment.
4. All components must be properly grounded in accordance with local electrical safety requirements.
5. Motor frame is safety grounded with a conductor equal in size to the phase conductors.
6. The drive must contain a properly-sized fuse, matched to the motor cable wire size.
7. Do not attempt to disassemble the U Channel magnet track. The magnet track contains powerful magnets that can suddenly and unexpectedly clamp together with any other object containing iron with extreme force.
8. These motors are not rated for use in explosive atmospheres. They are not to be operated in the presence of potentially explosive mixtures of air-borne dust or combustible vapors.
9. Motors and their associated drive, cabling, etc. are sources of electromagnetic fields. Persons with implanted medical devices need to evaluate the risks associated with these devices before entering an area where they are in use.
10. Operator safeguarding requirements must be addressed during final integration of the product.



DANGER: The motor temperature can pose a burn hazard. Do not touch the motor until it has cooled sufficiently.



WARNING: To minimize the possibility of electrical shock, bodily injury or death the following precautions must be followed.

1. Aerotech's motors are meant to be part of a drive package consisting of an amplifier and a controller. The motor relies on the drive package for fault protection. Aerotech, Inc. does not approve of their motors being used in any other way.
2. To prevent electrical shock hazards, allow only qualified persons to install and service this equipment.
3. Equipment grounds must be in place and maintained to reduce the risk of serious or potentially fatal injury from electric shock.
4. Moving parts can cause crushing or shearing injuries. Access to all stage and motor parts must be restricted while connected to a power source.
5. Never install or operate equipment that appears to be damaged.
6. Disconnect electrical power to the motor before performing maintenance procedures. In addition, uncouple or otherwise prevent motor-coupled machinery from moving the motor during service.
7. Motors are capable of very high speeds and acceleration rates. Always avoid being in the direct path of moving machinery.
8. The motor over temperature sensor must be monitored by the drive and used to shut down the drive in the event of excessive motor temperatures.
9. Cables can pose a tripping hazard. Securely mount and position all system cables to avoid potential hazards.
10. Do not expose this product to environments or conditions outside of the listed specifications. Exceeding environmental or operating specifications can cause damage to the equipment.
11. The U Channel Linear Motors motor must be mounted securely. Improper mounting can result in injury and damage to the equipment.
12. Use care when moving the U Channel Linear Motors motor. Lifting or transporting the U Channel Linear Motors motor improperly can result in injury or damage to the U Channel Linear Motors.
13. If the product is used in a manner not specified by the manufacturer, the protection provided by the product can be impaired and result in damage, shock, injury, or death.

Chapter 1: Overview

Each motor consists of a noncontact forcer assembly with thermal sensor, and “U-channel” magnet track. The forcer assembly is a compact, reinforced ceramic epoxy structure. Cooling is optional for higher rms force.

NOTE: Aerotech continually improves its product offerings; listed options may be superseded at any time. All drawings and illustrations are for reference only and were complete and accurate as of this manual’s release. Refer to www.aerotech.com for the most up-to-date information.

Table 1-1: BLMSC Options

BLMSC Brushless Linear Servomotor	
BLMSC-79	79 mm long linear motor forcer with thermistor
BLMSC-111	111 mm long linear motor forcer with thermistor
BLMSC-143	143 mm long linear motor forcer with thermistor
Winding Option (Required)	
-A	76 cm (2.5 ft) flying leads (standard)
Cooling Option (Required)	
-NC	No air cooling (standard)
Hall-Effect Sensor Options (Required)	
-NH	No Hall-effect sensors
-H	With Hall-effect sensors
Motor Preparation Options (Required)	
-S	Standard motor preparation
-V	Vacuum preparation for 10^{-6} Torr
-UHV	Ultra-high vacuum preparation, contact the factory
Cable Length Options (Required)	
-750	750 mm of high-flex cable
-5000	5.0 m of high-flex cable
Magnet Track Options (Optional)	
MTSC96P	96 mm (3.8 in) long "U" channel magnet track
MTSC128P	128 mm (5.0 in) long "U" channel magnet track
MTSC160P	160 mm (6.3 in) long "U" channel magnet track
MTSC192P	192 mm (7.6 in) long "U" channel magnet track
MTSC224P	224 mm (8.8 in) long "U" channel magnet track
MTSC256P	256 mm (10.1 in) long "U" channel magnet track
MTSC288P	288 mm (11.3 in) long "U" channel magnet track
MTSC352P	352 mm (13.9 in) long "U" channel magnet track
MTSC416P	416 mm (16.4 in) long "U" channel magnet track
MTSC#P	Custom length "U" channel magnet track

Table 1-2: BLMUC Options

BLMUC Brushless Linear Servomotor	
BLMUC-79	79 mm long linear motor forcer with thermistor
BLMUC-95	95 mm long linear motor forcer with thermistor
BLMUC-111	111 mm long linear motor forcer with thermistor
BLMUC-143	143 mm long linear motor forcer with thermistor
Winding Option (Required)	
-A	76 cm (2.5 ft) flying leads (standard)
Cooling Options (Required)	
-NC	No air-cooling fitting
-AC	With air-cooling fitting; not available with -V option
Hall-Effect Sensor Options (Required)	
-NH	No Hall-effect sensors
-H	With Hall-effect sensors
Motor Preparation Options (Required)	
-S	Standard motor preparation
-V	Vacuum preparation for 10^{-6} Torr
-UHV	Ultra-high vacuum preparation, contact the factory
Cable Length Options (Required)	
-750	750 mm of high-flex cable
-5000	5.0 m of high-flex cable
Magnet Track Options (Optional)	
MTUC96P	96 mm (3.8 in) long "U" channel magnet track
MTUC128P	128 mm (5.0 in) long "U" channel magnet track
MTUC160P	160 mm (6.3 in) long "U" channel magnet track
MTUC192P	192 mm (7.6 in) long "U" channel magnet track
MTUC224P	224 mm (8.8 in) long "U" channel magnet track
MTUC256P	256 mm (10.1 in) long "U" channel magnet track
MTUC288P	288 mm (11.3 in) long "U" channel magnet track
MTUC352P	352 mm (13.9 in) long "U" channel magnet track
MTUC416P	416 mm (16.4 in) long "U" channel magnet track
MTUC#P	Custom length "U" channel magnet track
MTUC96S	96 mm (3.8 in) long "U" channel magnet track; magnets on only one side of the track
MTUC128S	128 mm (5.0 in) long "U" channel magnet track; magnets on only one side of the track
MTUC160S	160 mm (6.3 in) long "U" channel magnet track; magnets on only one side of the track
MTUC192S	192 mm (7.6 in) long "U" channel magnet track; magnets on only one side of the track
MTUC224S	224 mm (8.8 in) long "U" channel magnet track; magnets on only one side of the track
MTUC256S	256 mm (10.1 in) long "U" channel magnet track; magnets on only one side of the track
MTUC288S	288 mm (11.3 in) long "U" channel magnet track; magnets on only one side of the track
MTUC352S	352 mm (13.9 in) long "U" channel magnet track; magnets on only one side of the track
MTUC416S	416 mm (16.4 in) long "U" channel magnet track; magnets on only one side of the track
MTUC#S	Custom length "U" channel magnet track; magnets on only one side of the track

Table 1-3: BLMC Forcer Options

BLMC Brushless Linear Servomotor	
BLMC-92	92 mm long linear motor forcer with thermistor
BLMC-142	142 mm long linear motor forcer with thermistor
BLMC-192	192 mm long linear motor forcer with thermistor
BLMC-267	267 mm long linear motor forcer with thermistor
Winding Option (Required)	
-A	76 cm (2.5 ft) flying leads (standard)
Cooling Options (Required)	
-NC	No air-cooling fitting
-ACC	With a rear center air-cooling fitting; not available with -V option
-ACL	With a rear left-side air-cooling fitting; not available with -V option
-ACR	With a rear right-side air-cooling fitting; not available with -V option
Hall-Effect Sensor Options (Required)	
-NH	No Hall-effect sensors
-H	With Hall-effect sensors
Motor Preparation Options (Required)	
-S	Standard motor preparation
-V	Vacuum preparation for 10^{-6} Torr
-UHV	Ultra-high vacuum preparation, contact the factory
Cable Length Options (Required)	
-750	750 mm of high-flex cable
-5000	5.0 m of high-flex cable
Magnet Track Options (Optional)	
MTC150P	150 mm (5.9 in) long compact "U" channel magnet track
MTC250P	250 mm (9.8 in) long compact "U" channel magnet track
MTC350P	350 mm (13.7 in) long compact "U" channel magnet track
MTC450P	450 mm (17.7 in) long compact "U" channel magnet track
MTC500P	500 mm (19.7 in) long compact "U" channel magnet track
MTC#P	Custom length compact "U" channel magnet track
MTC150S	150 mm (5.9 in) long compact "U" channel track; magnets on only one side of the track
MTC250S	250 mm (9.8 in) long compact "U" channel track; magnets on only one side of the track
MTC350S	350 mm (13.7 in) long compact "U" channel track; magnets on only one side of the track
MTC450S	450 mm (17.7 in) long compact "U" channel track; magnets on only one side of the track
MTC500S	500 mm (19.7 in) long compact "U" channel track; magnets on only one side of the track
MTC#S	Custom length compact "U" channel track; magnets on only one side of the track

Table 1-4: BLM Options

BLM Brushless Linear Servomotor	
BLM-142	142 mm long linear motor forcer with thermistor
BLM-203	203 mm long linear motor forcer with thermistor
BLM-264	264 mm long linear motor forcer with thermistor
BLM-325	325 mm long linear motor forcer with thermistor
BLM-386	386 mm long linear motor forcer with thermistor
Winding Options (Required)	
-A	76 cm (2.5 ft) flying leads (standard)
-B	Optional winding
Cooling Options (Required)	
-NC	No air-cooling fitting
-AC	With air-cooling fitting; not available with -V option
Hall-Effect Sensor Options (Required)	
-NH	No Hall-effect sensors
-H	With Hall-effect sensors
Motor Preparation Options (Required)	
-S	Standard motor preparation
-V	Vacuum preparation for 10^{-6} Torr
-UHV	Ultra-high vacuum preparation, contact the factory
Cable Length Options (Required)	
-750	750 mm of high-flex cable
-5000	5.0 m of high-flex cable
Magnet Track Options (Optional)	
MT240P	244 mm (9.6 in) length "U" channel magnet track
MT300P	305 mm (12.0 in) long "U" channel magnet track
MT360P	366 mm (14.4 in) long "U" channel magnet track
MT420P	427 mm (16.8 in) long "U" channel magnet track
MT480P	487 mm (19.2 in) long "U" channel magnet track
MT600P	610 mm (24.0 in) long "U" channel magnet track
MT#P	Custom length "U" channel magnet track
MT240S	244 mm (9.6 in) long "U" channel magnet track; magnets on only one side of the track
MT300S	305 mm (12.0 in) long "U" channel magnet track; magnets on only one side of the track
MT360S	366 mm (14.4 in) long "U" channel magnet track; magnets on only one side of the track
MT420S	427 mm (16.8 in) long "U" channel magnet track; magnets on only one side of the track
MT480S	487 mm (19.2 in) long "U" channel magnet track; magnets on only one side of the track
MT600S	610 mm (24.0 in) long "U" channel magnet track; magnets on only one side of the track
MT#S	Custom length "U" channel magnet track; magnets on only one side of the track

Table 1-5: BLMH Options

BLMH Brushless Linear Servomotor	
BLMH-142	142 mm long linear motor forcer with thermistor
BLMH-202	202 mm long linear motor forcer with thermistor
BLMH-262	262 mm long linear motor forcer with thermistor
BLMH-322	322 mm long linear motor forcer with thermistor
BLMH-382	382 mm long linear motor forcer with thermistor
Winding Options (Required)	
-A	76 cm (2.5 ft) flying leads (standard)
-B	Optional winding
Cooling Options (Required)	
-NC	No air-cooling fitting
-AC	With air-cooling fitting; not available with -V option
Hall-Effect Sensor Options (Required)	
-NH	No Hall-effect sensors
-H	With Hall-effect sensors
Motor Preparation Options (Required)	
-S	Standard motor preparation
-V	Vacuum preparation for 10^{-6} Torr
-UHV	Ultra-high vacuum preparation, contact the factory
Cable Length Options (Required)	
-750	750 mm of high-flex cable
-5000	5.0 m of high-flex cable
Magnet Track Options (Optional)	
MTH360P	360 mm (14.2 in) long "U" channel magnet track
MTH480P	480 mm (18.9 in) long "U" channel magnet track
MTH600P	600 mm (23.6 in) long "U" channel magnet track
MTH#P	Custom length "U" channel magnet track

Table 1-6: BLMX Options

BLMX Brushless Linear Servomotor	
BLMX-382	382 mm long linear motor forcer with thermistor
BLMX-502	502 mm long linear motor forcer with thermistor
Winding Options (Required)	
-A	76 cm (2.5 ft) flying leads (standard)
-B	Optional winding
Cooling Options (Required)	
-NC	No air-cooling fitting
-AC	With air-cooling fitting; not available with -V option
Hall-Effect Sensor Options (Required)	
-NH	No Hall-effect sensors
-H	With Hall-effect sensors
Motor Preparation Options (Required)	
-S	Standard motor preparation
-V	Vacuum preparation for 10^{-6} Torr
-UHV	Ultra-high vacuum preparation, contact the factory
Cable Length Options (Required)	
-750	750 mm of high-flex cable
-5000	5.0 m of high-flex cable
Magnet Track Options (Optional)	
MTX480P	480 mm (18.9 in) long "U" channel magnet track
MTX600P	600 mm (23.6 in) long "U" channel magnet track
MTX720P	720 mm (28.4 in) long "U" channel magnet track
MTX#P	Custom length "U" channel magnet track

1.1. Motor Specifications

NOTE: Aerotech continually improves its product offerings; listed options may be superseded at any time. All drawings and illustrations are for reference only and were complete and accurate as of this manual's release. Refer to www.aerotech.com for the most up-to-date information.

Table 1-7: BLMSC Motor Specifications

		BLMSC-79	BLMSC-111	BLMSC-143
Performance Specifications⁽¹⁾⁽²⁾				
Continuous Force ⁽³⁾	N (lb)	14.0 (3.1)	20.8 (4.7)	27.7 (6.2)
Peak Force ⁽⁴⁾	N (lb)	55.9 (12.6)	83.3 (18.7)	110.9 (24.9)
Electrical Specifications⁽²⁾				
Winding Designation		-A	-A	-A
BEMF Constant (line-line, max)	V/(m/s) (V/(in/s))	5.5 (0.14)	9.2 (0.23)	12.9 (0.31)
Continuous Current ⁽³⁾	A _{pk} (A _{rms})	2.97 (2.10)	2.67 (1.89)	2.59 (1.83)
Peak Current, Stall ⁽⁴⁾	A _{pk} (A _{rms})	11.88 (8.4)	10.68 (7.55)	10.36 (7.33)
Force Constant, Sine Drive ⁽⁵⁾⁽⁶⁾	N/A _{pk} (lb/A _{pk})	4.7 (1.06)	7.8 (1.75)	10.7 (2.41)
	N/A _{rms} (lb/A _{rms})	6.65 (1.49)	11.03 (2.48)	15.13 (3.40)
Motor Constant ⁽³⁾⁽⁵⁾	N/√W (lb/√W)	2.26 (0.51)	2.91 (0.65)	3.4 (0.76)
Resistance, 25°C (line-line)	Ω	4.1	6.8	9.4
Inductance (line-line)	mH	0.59	1.02	1.45
Thermal Resistance	°C/W	2.63	1.95	1.51
Maximum Bus Voltage	V _{DC}	340	340	340
Mechanical Specifications				
Coil Weight	kg (lb)	0.09 (0.20)	0.13 (0.29)	0.16 (0.35)
Coil Length	mm (in)	79 (3.11)	111 (4.37)	143 (5.63)
Heat Sink	mm (in)	250x250x25 (10x10x1)	250x250x25 (10x10x1)	250x250x25 (10x10x1)
Magnet Track Weight	kg/m (lb/ft)	2.81 (1.88)	2.81 (1.88)	2.81 (1.88)
Magnetic Pole Pitch	mm (in)	16.0 (0.63)	16.0 (0.63)	16.0 (0.63)
1. Performance is dependent upon heat sink configuration, system cooling conditions, and ambient temperature 2. All performance and electrical specifications ±10% 3. Values shown @ 100°C rise above a 25°C ambient temperature, with motor mounted to the specified aluminum heat sink. 4. Peak force assumes correct rms current; consult Aerotech. 5. Force constant and motor constant specified at stall 6. All Aerotech amplifiers are rated Apk; use force constant in N·m/Apk when sizing. 7. Maximum winding temperature is 125°C. 8. Ambient operating temperature range 0 °C - 25 °C; consult Aerotech for performance in elevated ambient temperatures				

Table 1-8: BLMUC Motor Specifications (P Magnet Track)

		BLMUC-79	BLMUC-95	BLMUC-111	BLMUC-143
Performance Specifications ⁽¹⁾⁽⁵⁾					
Continuous Force, 1.4 bar (20 psi) ⁽²⁾	N (lb)	31.4 (7.0)	40.5 (9.1)	46.9 (10.5)	58.0 (13.0)
Continuous Force, No Forced Cooling ⁽²⁾	N (lb)	18.3 (4.1)	23.0 (5.2)	30.6 (6.9)	39.8 (9.0)
Peak Force ⁽³⁾	N (lb)	125.4 (28.2)	161.9 (36.4)	187.6 (42.2)	231.8 (52.1)
Electrical Specifications ⁽⁵⁾					
Winding Designation		-A	-A	-A	-A
BEMF Constant (line-line, max)	V/(m/s) (V/(in/s))	6.80 (0.17)	9.00 (0.23)	11.35 (0.29)	15.90 (0.40)
Continuous Current 1.4 bar (20 psi) ⁽²⁾	A _{pk} (A _{rms})	5.30 (3.75)	5.17 (3.66)	4.75 (3.36)	4.19 (2.96)
Continuous Current, No Forced Cooling ⁽²⁾	A _{pk} (A _{rms})	3.10 (2.19)	2.94 (2.08)	3.10 (2.19)	2.88 (2.04)
Peak Current, Stall ⁽³⁾	A _{pk} (A _{rms})	21.20 (14.99)	20.68 (14.62)	19.00 (13.44)	16.76 (11.85)
Force Constant, Sine Drive ⁽⁴⁾⁽⁸⁾	N/A _{pk} (lb/A _{pk})	5.92 (1.33)	7.83 (1.76)	9.87(2.22)	13.83 (3.11)
	N/A _{rms} (lb/A _{rms})	8.37 (1.88)	11.07 (2.49)	13.96 (3.14)	19.56 (4.40)
Motor Constant ⁽²⁾⁽⁴⁾	N/√W (lb/√W)	2.89 (0.65)	3.35 (0.75)	3.78 (0.85)	4.53 (1.02)
Resistance, 25°C (line-line)	Ω	4.0	5.2	6.5	8.9
Inductance (line-line)	mH	0.51	0.70	0.87	1.10
Thermal Resistance, 1.4 bar (20 psi)	°C/W	0.85	0.69	0.65	0.61
Thermal Resistance, No Forced Cooling	°C/W	2.48	2.12	1.52	1.29
Maximum Bus Voltage	V _{DC}	340	340	340	340
Mechanical Specifications					
Air Flow, 20 psi	m ³ /s (SCFM)	1.5x10 ⁻³ (3.12)	1.5x10 ⁻³ (3.15)	1.5x10 ⁻³ (3.22)	1.5x10 ⁻³ (3.12)
Coil Weight	kg (lb)	0.10 (0.22)	0.12 (0.26)	0.14 (0.31)	0.20 (0.44)
Coil Length	mm (in)	80.0 (3.15)	96.0 (3.78)	112.0 (4.41)	144.0 (5.67)
Heat Sink	mm (in)	250x250x25 (10x10x1)	250x250x25 (10x10x1)	250x250x25 (10x10x1)	250x250x25 (10x10x1)
Magnet Track Weight	kg/m (lb/ft)	3.33 (2.23)	3.33 (2.23)	3.33 (2.23)	3.33 (2.23)
Magnetic Pole Pitch	mm (in)	16.00 (0.63)	16.00 (0.63)	16.00 (0.63)	16.00 (0.63)
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 Apk; use force constant in N·m/ Apk when sizing.					

Table 1-9: BLMUC Motor Specifications (S Magnet Track)

		BLMUC-79	BLMUC-95	BLMUC-111	BLMUC-143
Performance Specifications ⁽¹⁾⁽⁵⁾					
Continuous Force, 1.4 bar (20 psi) ⁽²⁾	N (lb)	20.7 (4.7)	26.7 (6.0)	31.0 (7.0)	38.3 (8.6)
Continuous Force, No Forced Cooling ⁽²⁾	N (lb)	12.1 (2.7)	15.2 (3.4)	20.2 (4.5)	26.3 (5.9)
Peak Force ⁽³⁾	N (lb)	82.8 (18.6)	106.8 (24.0)	123.8 (27.8)	153.0 (34.4)
Electrical Specifications ⁽⁵⁾					
Winding Designation		-A	-A	-A	-A
BEMF Constant (line-line, max)	V/(m/s) (V/(in/s))	4.49 (0.11)	5.94 (0.15)	7.49 (0.19)	10.49 (0.27)
Continuous Current 1.4 bar (20 psi) ⁽²⁾	A _{pk} (A _{rms})	5.30 (3.75)	5.17 (3.66)	4.75 (3.36)	4.19 (2.96)
Continuous Current, No Forced Cooling ⁽²⁾	A _{pk} (A _{rms})	3.10 (2.19)	2.94 (2.08)	3.10 (2.19)	2.88 (2.04)
Peak Current, Stall ⁽³⁾	A _{pk} (A _{rms})	21.20 (14.99)	20.68 (14.62)	19.00 (13.44)	16.76 (11.85)
Force Constant, Sine Drive ⁽⁴⁾⁽⁸⁾	N/A _{pk} (lb/A _{pk})	3.90 (0.88)	5.17 (1.16)	6.52 (1.47)	9.13 (2.05)
	N/A _{rms} (lb/A _{rms})	5.52 (1.24)	7.31 (1.64)	9.22 (2.07)	12.91 (2.90)
Motor Constant ⁽²⁾⁽⁴⁾	N/√W (lb/√W)	1.91 (0.43)	2.21 (0.50)	2.49 (0.56)	2.99 (0.67)
Resistance, 25°C (line-line)	Ω	4.0	5.2	6.5	8.9
Inductance (line-line)	mH	0.51	0.70	0.87	1.10
Thermal Resistance, 1.4 bar (20 psi)	°C/W	0.85	0.69	0.65	0.61
Thermal Resistance, No Forced Cooling	°C/W	2.48	2.12	1.52	1.29
Maximum Bus Voltage	V _{DC}	340	340	340	340
Mechanical Specifications					
Air Flow, 20 psi	m ³ /s (SCFM)	1.5x10 ⁻³ (3.12)	1.5x10 ⁻³ (3.15)	1.5x10 ⁻³ (3.22)	1.5x10 ⁻³ (3.12)
Coil Weight	kg (lb)	0.10 (0.22)	0.12 (0.26)	0.14 (0.31)	0.20 (0.44)
Coil Length	mm (in)	80.0 (3.15)	96.0 (3.78)	112.0 (4.41)	144.0 (5.67)
Heat Sink	mm (in)	250x250x25 (10x10x1)	250x250x25 (10x10x1)	250x250x25 (10x10x1)	250x250x25 (10x10x1)
Magnet Track Weight	kg/m (lb/ft)	3.59 (2.41)	3.59 (2.41)	3.59 (2.41)	3.59 (2.41)
Magnetic Pole Pitch	mm (in)	16.00 (0.63)	16.00 (0.63)	16.00 (0.63)	16.00 (0.63)
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 Apk; use force constant in N·m/Apk when sizing.					

Table 1-10: BLMC Motor Specifications (P Magnet Track)

		BLMC-92	BLMC-142	BLMC-192	BLMC-267
Performance Specifications (1)(5)					
Continuous Force, 1.4 bar (20 psi) (2)	N (lb)	75.1 (16.9)	120.3 (27.0)	154.7 (34.8)	184.0 (41.4)
Continuous Force, No Forced Cooling (2)	N (lb)	44.5 (10.0)	77.7 (17.5)	106.7 (24.0)	123.5 (27.8)
Peak Force (3)	N (lb)	300.6 (67.6)	481.2 (108.2)	618.8 (139.1)	736.0 (165.5)
Electrical Specifications(5)					
Winding Designation	A / B	-A	-A	-A	-A
BEMF Constant (line-line, max)	V/(m/s) (V/(in/s))	11.37 (0.29)	21.28 (0.54)	30.66 (0.78)	41.15 (1.05)
Continuous Current 1.4 bar (20 psi) (2)	A _{pk} (A _{rms})	7.60 (5.37)	6.50 (4.60)	5.80 (4.10)	5.14 (3.63)
Continuous Current, No Forced Cooling (2)	A _{pk} (A _{rms})	4.50 (3.18)	4.20 (2.97)	4.00 (2.83)	3.45 (2.44)
Peak Current, Stall (3)	A _{pk} (A _{rms})	30.40 (21.50)	26.00 (18.38)	23.20 (16.40)	20.56 (14.54)
Force Constant, Sine Drive (4)(8)	N/A _{pk} (lb/A _{pk})	9.89 (2.22)	18.51 (4.16)	26.67 (6.00)	35.80 (8.05)
	N/A _{rms} (lb/A _{rms})	13.98 (3.14)	26.17 (5.88)	37.72 (8.48)	50.63 (11.38)
Motor Constant (2)(4)	N/√W (lb/√W)	5.67 (1.27)	8.24 (1.85)	10.29 (2.31)	11.52 (2.59)
Resistance, 25°C (line-line)	Ω	2.9	4.8	6.4	9.2
Inductance (line-line)	mH	0.83	1.33	1.90	3.40
Thermal Resistance, 1.4 bar (20 psi)	°C/W	0.57	0.47	0.44	0.39
Thermal Resistance, No Forced Cooling	°C/W	1.62	1.12	0.93	0.87
Max. Bus Voltage	V _{DC}	340	340	340	340
Mechanical Specifications					
Air Flow, 20 psi	m ³ /s (SCFM)	1.4 x10 ⁻³ (2.9)	1.7 x10 ⁻³ (3.6)	1.4 x10 ⁻³ (2.9)	1.5 x10 ⁻³ (3.2)
Coil Weight	kg (lb)	0.16 (0.35)	0.26 (0.57)	0.34 (0.75)	0.52 (1.14)
Coil Length	mm (in)	91.0 (3.58)	142.0 (5.59)	192.0 (7.56)	267.0 (10.51)
Heat Sink	mm (in)	250 x 250 x 25 (10 x 10 x 1)	250 x 250 x 25 (10 x 10 x 1)	250 x 250 x 25 (10 x 10 x 1)	250 x 250 x 25 (10 x 10 x 1)
Magnet Track Weight	kg/m (lb/ft)	6.59 (4.42)	6.59 (4.42)	6.59 (4.42)	6.59 (4.42)
Magnetic Pole Pitch	mm (in)	25 (0.98)	25 (0.98)	25 (0.98)	25 (0.98)
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 Apk; use force constant in N·m/Apk when sizing.					

Table 1-11: BLMC Motor Specifications (S Magnet Track)

		BLMC-92	BLMC-142	BLMC-192	BLMC-267
Performance Specifications ⁽¹⁾⁽⁵⁾					
Continuous Force, 1.4 bar (20 psi) ⁽²⁾	N (lb)	54.1 (12.2)	86.6 (19.5)	111.4 (25.0)	132.5 (29.8)
Continuous Force, No Forced Cooling ⁽²⁾	N (lb)	32.0 (7.2)	56.0 (12.6)	76.8 (17.3)	88.9 (20.0)
Peak Force ⁽³⁾	N (lb)	216.4 (48.7)	346.5 (77.9)	445.5 (100.2)	529.9 (119.1)
Electrical Specifications ⁽⁵⁾					
Winding Designation	A / B	-A	-A	-A	-A
BEMF Constant (line-line, max)	V/(m/s) (V/(in/s))	8.18 (0.21)	15.32 (0.39)	22.07 (0.56)	29.63 (0.75)
Continuous Current 1.4 bar (20 psi) ⁽²⁾	A _{pk} (A _{rms})	7.60 (5.37)	6.50 (4.60)	5.80 (4.10)	5.14 (3.63)
Continuous Current, No Forced Cooling ⁽²⁾	A _{pk} (A _{rms})	4.50 (3.18)	4.20 (2.97)	4.00 (2.83)	3.45 (2.44)
Peak Current, Stall ⁽³⁾	A _{pk} (A _{rms})	30.40 (21.50)	26.00 (18.38)	23.20 (16.40)	20.56 (14.54)
Force Constant, Sine Drive ⁽⁴⁾⁽⁸⁾	N/A _{pk} (lb/A _{pk})	7.12 (1.60)	13.33 (3.00)	19.20 (4.32)	25.78 (5.79)
	N/A _{rms} (lb/A _{rms})	10.07 (2.26)	18.85 (4.24)	27.16 (6.11)	36.45 (8.20)
Motor Constant ⁽²⁾⁽⁴⁾	N/√W (lb/√W)	4.08 (0.92)	5.94 (1.33)	7.41 (1.67)	8.29 (1.86)
Resistance, 25°C (line-line)	Ω	2.9	4.8	6.4	9.2
Inductance (line-line)	mH	0.83	1.33	1.90	3.40
Thermal Resistance, 1.4 bar (20 psi)	°C/W	0.57	0.47	0.44	0.39
Thermal Resistance, No Forced Cooling	°C/W	1.62	1.12	0.93	0.87
Maximum Bus Voltage	V _{DC}	340	340	340	340
Mechanical Specifications					
Air Flow, 20 psi	m ³ /s (SCFM)	1.4 x10 ⁻³ (2.9)	1.7 x10 ⁻³ (3.6)	1.4 x10 ⁻³ (2.9)	1.5 x10 ⁻³ (3.2)
Coil Weight	kg (lb)	0.16 (0.35)	0.26 (0.57)	0.34 (0.75)	0.52 (1.14)
Coil Length	mm (in)	91.0 (3.58)	142.0 (5.59)	192.0 (7.56)	267.0 (10.51)
Heat Sink	mm (in)	250 x 250 x 25 (10 x 10 x 1)	250 x 250 x 25 (10 x 10 x 1)	250 x 250 x 25 (10 x 10 x 1)	250 x 250 x 25 (10 x 10 x 1)
Magnet Track Weight	kg/m (lb/ft)	7.11 (4.76)	7.11 (4.76)	7.11 (4.76)	7.11 (4.76)
Magnetic Pole Pitch	mm (in)	25 (0.98)	25 (0.98)	25 (0.98)	25 (0.98)
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 Apk; use force constant in N·m/ Apk when sizing.					

Table 1-12: BLM Motor Specifications (P Magnet Track, BLM-142, BLM-203, BLM-264)

		BLM-142		BLM-203		BLM-264	
Performance Specifications (1)(5)							
Continuous Force, 1.4 bar (20 psi) (2)	N (lb)	173.2 (38.9)	158.7 (35.7)	251.6 (56.6)		301.7 (67.8)	
Continuous Force, No Forced Cooling (2)	N (lb)	110.5 (24.8)		153.3 (34.5)		197.2 (44.3)	
Peak Force (3)	N (lb)	692.7 (155.7)		1006.4 (226.3)		1206.6 (271.3)	
Electrical Specifications(5)							
Winding Designation	A / B	-A	-B	-A	-B	-A	-B
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)
Continuous Current 1.4 bar (20 psi) (2)	A _{pk} (A _{rms})	4.86 (3.44)	8.91 (6.30)	8.70 (6.15)	4.35 (3.08)	7.80 (5.52)	3.90 (2.76)
Continuous Current, No Forced Cooling (2)	A _{pk} (A _{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)
Peak Current, Stall (3)	A _{pk} (A _{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)
Force Constant, Sine Drive (4) (8)	N/A _{pk} (lb/A _{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)
	N/A _{rms} (lb/A _{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)
Motor Constant (2)(4)	N/√W (lb/√W)	10.53 (2.37)		14.11 (3.17)		16.39 (3.69)	
Resistance, 25°C (line-line)	Ω	10.9	2.7	4.0	16.0	5.3	21.2
Inductance (line-line)	mH	8.70	2.18	3.20	12.80	4.20	16.80
Thermal Resistance, 1.4 bar (20 psi)	°C/W	0.37		0.31		0.30	
Thermal Resistance, No Forced Cooling	°C/W	0.91		0.85		0.69	
Maximum Bus Voltage	V _{DC}	340		340		340	
Mechanical Specifications							
Air Flow, 20 psi	m ³ /s (SCFM)	1.7x10 ⁻³ (3.50)		1.5x10 ⁻³ (3.20)		1.6x10 ⁻³ (3.30)	
Coil Weight	kg (lb)	0.60 (1.32)		0.90 (1.98)		1.10 (2.42)	
Coil Length	mm (in)	143.8 (5.66)		204.7 (8.06)		265.7 (10.46)	
Heat Sink	mm (in)	250x250x25 (10x10x1)		250x250x25 (10x10x1)		250x250x25 (10x10x1)	
Magnet Track Weight	kg/m (lb/ft)	10.12 (6.79)		10.12 (6.79)		10.12 (6.79)	
Magnetic Pole Pitch	mm (in)	30.48 (1.20)		30.48 (1.20)		30.48 (1.20)	
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 Apk; use force constant in N·m/Apk when sizing.							

Table 1-13: BLM Motor Specifications (P Magnet Track, BLM-325, BLM-386)

		BLM-325		BLM-386	
Performance Specifications (1)(5)					
Winding Designation	A / B	-A	-B	-A	-B
Continuous Force, 1.4 bar (20 psi) (2)	N (lb)	332.2 (74.7)		397.6 (89.4)	
Continuous Force, No Forced Cooling (2)	N (lb)	230.7 (51.9)		257.3 (57.8)	
Peak Force (3)	N (lb)	1328.6 (298.7)		1590.4 (357.5)	
Electrical Specifications(5)					
Winding Designation	A / B	-A	-B	-A	-B
BEMF Constant (line-line, max)	V/(m/s) (V/(in/s))	53.03 (1.35)	106.6 (2.69)	67.21 (1.71)	134.42 (3.41)
Continuous Current 1.4 bar (20 psi) (2)	A _{pk} (A _{rms})	7.20 (5.09)	3.60 (2.55)	6.80 (4.81)	3.40 (2.40)
Continuous Current, No Forced Cooling (2)	A _{pk} (A _{rms})	5.00 (3.54)	2.50 (1.77)	4.40 (3.11)	2.20 (1.56)
Peak Current, Stall (3)	A _{pk} (A _{rms})	28.80 (20.36)	14.40 (10.18)	27.20 (19.23)	13.60 (9.62)
Force Constant, Sine Drive (4) (8)	N/A _{pk} (lb/A _{pk})	46.13 (10.37)	92.27 (20.74)	58.47 (13.15)	116.94 (26.29)
	N/A _{rms} (lb/A _{rms})	65.24 (14.67)	130.48 (29.34)	82.69 (18.59)	165.38 (37.18)
Motor Constant (2)(4)	N/√W (lb/√W)	17.66 (3.97)		20.17 (4.54)	
Resistance, 25°C (line-line)	Ω	6.5	26.0	8.0	32.0
Inductance (line-line)	mH	5.20	20.80	6.20	24.80
Thermal Resistance, 1.4 bar (20 psi)	°C/W	0.28		0.26	
Thermal Resistance, No Forced Cooling	°C/W	0.59		0.61	
Maximum Bus Voltage	V _{DC}	340		340	
Mechanical Specifications					
Air Flow, 20 psi	m ³ /s (SCFM)	1.6x10 ⁻³ (3.30)		1.6x10 ⁻³ (3.40)	
Coil Weight	kg (lb)	1.40 (3.08)		1.70 (3.74)	
Coil Length	mm (in)	326.6 (12.86)		387.6 (15.26)	
Heat Sink	mm (in)	250x400x25 (10x16x1)		250x400x25 (10x16x1)	
Magnet Track Weight	kg/m (lb/ft)	10.12 (6.79)		10.12 (6.79)	
Magnetic Pole Pitch	mm (in)	30.48 (1.20)		30.48 (1.20)	
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 Apk; use force constant in N·m/Apk when sizing.					

Table 1-14: BLM Motor Specifications (S Magnet Track, BLM-142, BLM-203, BLM-264)

		BLM-142		BLM-203		BLM-264	
Performance Specifications ⁽¹⁾⁽⁵⁾							
Winding Designation	A / B	-A	-B	-A	-B	-A	-B
Continuous Force, 1.4 bar (20 psi) ⁽²⁾	N (lb)	108.9 (24.5)	99.8 (22.4)	158.2 (35.6)		189.6 (42.6)	
Continuous Force, No Forced Cooling ⁽²⁾	N (lb)	69.4 (15.6)		96.4 (21.7)		124.0 (27.9)	
Peak Force ⁽³⁾	N (lb)	435.5 (97.9)		632.7 (142.2)		758.6 (170.5)	
Electrical Specifications ⁽⁵⁾							
Winding Designation	A / B	-A	-B	-A	-B	-A	-B
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)
Continuous Current 1.4 bar (20 psi) ⁽²⁾	A _{pk} (A _{rms})	4.86 (3.44)	8.91 (6.30)	8.70 (6.15)	4.35 (3.08)	7.80 (5.52)	3.90 (2.76)
Continuous Current, No Forced Cooling ⁽²⁾	A _{pk} (A _{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)
Peak Current, Stall ⁽³⁾	A _{pk} (A _{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)
Force Constant, Sine Drive ⁽⁴⁾⁽⁸⁾	N/A _{pk} (lb/A _{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)
	N/A _{rms} (lb/A _{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)
Motor Constant ⁽²⁾⁽⁴⁾	N/√W (lb/√W)	6.62 (1.49)		8.87 (1.99)		10.31 (2.32)	
Resistance, 25°C (line-line)	Ω	10.9	2.7	4.0	16.0	5.3	21.2
Inductance (line-line)	mH	8.7	2.2	3.2	12.8	4.2	16.8
Thermal Resistance, 1.4 bar (20 psi)	°C/W	0.37		0.31		0.30	
Thermal Resistance, No Forced Cooling	°C/W	0.91		0.85		0.69	
Maximum Bus Voltage	V _{DC}	340		340		340	
Mechanical Specifications							
Air Flow, 20 psi	m ³ /s (SCFM)	1.7x10 ⁻³ (3.50)		1.5x10 ⁻³ (3.20)		1.6x10 ⁻³ (3.30)	
Coil Weight	kg (lb)	0.60 (1.32)		0.90 (1.98)		1.10 (2.42)	
Coil Length	mm (in)	143.8 (5.66)		204.7 (8.06)		265.7 (10.46)	
Heat Sink	mm (in)	250x250x25 (10x10x1)		250x250x25 (10x10x1)		250x250x25 (10x10x1)	
Magnet Track Weight	kg/m (lb/ft)	10.92 (7.32)		10.92 (7.32)		10.92 (7.32)	
Magnetic Pole Pitch	mm (in)	30.48 (1.20)		30.48 (1.20)		30.48 (1.20)	
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 Apk; use force constant in N·m/Apk when sizing.							

Table 1-15: BLM Motor Specifications (S Magnet Track, BLM-325, BLM-386)

		BLM-325		BLM-386	
Performance Specifications ⁽¹⁾⁽⁵⁾					
Winding Designation	A / B	-A	-B	-A	-B
Continuous Force, 1.4 bar (20 psi) ⁽²⁾	N (lb)	208.8 (46.9)		250.0 (56.2)	
Continuous Force, No Forced Cooling ⁽²⁾	N (lb)	145.0 (32.6)		161.7 (36.4)	
Peak Force ⁽³⁾	N (lb)	835.3 (187.8)		999.8 (224.8)	
Electrical Specifications ⁽⁵⁾					
Winding Designation	A / B	-A	-B	-A	-B
BEMF Constant (line-line, max)	V/(m/s) (V/(in/s))	33.34 (0.85)	66.68 (1.69)	42.25 (1.07)	84.51 (2.15)
Continuous Current 1.4 bar (20 psi) ⁽²⁾	A _{pk} (A _{rms})	7.20 (5.09)	3.60 (2.55)	6.80 (4.81)	3.40 (2.40)
Continuous Current, No Forced Cooling ⁽²⁾	A _{pk} (A _{rms})	5.00 (3.54)	2.50 (1.77)	4.40 (3.11)	2.20 (1.56)
Peak Current, Stall ⁽³⁾	A _{pk} (A _{rms})	28.80 (20.36)	14.40 (10.18)	27.20 (19.23)	13.60 (9.62)
Force Constant, Sine Drive ⁽⁴⁾⁽⁸⁾	N/A _{pk} (lb/A _{pk})	29.00 (6.52)	58.01 (13.04)	36.76 (8.26)	73.52 (16.53)
	N/A _{rms} (lb/A _{rms})	41.02 (9.22)	82.03 (18.44)	51.98 (11.69)	103.97 (23.37)
Motor Constant ⁽²⁾⁽⁴⁾	N/√W (lb/√W)	11.10 (2.50)		12.68 (2.85)	
Resistance, 25°C (line-line)	Ω	6.5	26.0	8.0	32.0
Inductance (line-line)	mH	5.2	20.8	6.2	24.8
Thermal Resistance, 1.4 bar (20 psi)	°C/W	0.28		0.26	
Thermal Resistance, No Forced Cooling	°C/W	0.59		0.61	
Maximum Bus Voltage	V _{DC}	340		340	
Mechanical Specifications					
Air Flow, 20 psi	m ³ /s (SCFM)	1.6x10 ⁻³ (3.30)		1.6x10 ⁻³ (3.40)	
Coil Weight	kg (lb)	1.40 (3.08)		1.70 (3.74)	
Coil Length	mm (in)	326.6 (12.86)		387.6 (15.26)	
Heat Sink	mm (in)	250x400x25 (10x16x1)		250x400x25 (10x16x1)	
Magnet Track Weight	kg/m (lb/ft)	10.92 (7.32)		10.92 (7.32)	
Magnetic Pole Pitch	mm (in)	30.48 (1.20)		30.48 (1.20)	
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 Apk; use force constant in N·m/ Apk when sizing.					

Table 1-16: BLMH Motor Specifications (BLMH-142, BLMH-202, BLMH-262)

		BLMH-142		BLMH-202		BLMH-262	
Performance Specifications ⁽¹⁾⁽⁵⁾							
Continuous Force, 1.4 bar (20 psi) ⁽²⁾	N (lb)	270.7 (60.9)		351.2 (79.0)		437.1 (98.3)	
Continuous Force, No Forced Cooling ⁽²⁾	N (lb)	150.0 (33.7)		194.2 (43.7)		266.2 (59.9)	
Peak Force ⁽³⁾	N (lb)	1082.7 (243.4)		1404.9 (315.9)		1748.6 (393.1)	
Electrical Specifications ⁽⁵⁾							
Winding Designation	A / B	-A	-B	-A	-B	-A	-B
BEMF Constant (line-line, max)	V/(m/s) (V/(in/s))	32.11 (0.82)	64.22 (1.63)	47.50 (1.21)	95.00 (2.41)	64.42 (1.64)	128.85 (3.27)
Continuous Current 1.4 bar (20 psi) ⁽²⁾	A _{pk} (A _{rms})	9.69 (6.85)	4.85 (3.43)	8.50 (6.01)	4.25 (3.01)	7.80 (5.52)	3.90 (2.76)
Continuous Current, No Forced Cooling ⁽²⁾	A _{pk} (A _{rms})	5.37 (3.80)	2.69 (1.90)	4.70 (3.32)	2.35 (1.66)	4.75 (3.36)	2.38 (1.68)
Peak Current, Stall ⁽³⁾	A _{pk} (A _{rms})	38.76 (27.41)	19.38 (13.70)	34.00 (24.04)	17.00 (12.02)	31.20 (22.06)	15.60 (11.03)
Force Constant, Sine Drive ⁽⁴⁾⁽⁸⁾	N/A _{pk} (lb/A _{pk})	27.93 (6.28)	55.87 (12.56)	41.32 (9.29)	82.64 (18.58)	56.04 (12.60)	112.09 (25.20)
	N/A _{rms} (lb/A _{rms})	39.50 (8.88)	79.01 (17.76)	58.44 (13.14)	116.88 (26.28)	79.26 (17.82)	158.52 (35.64)
Motor Constant ⁽²⁾⁽⁴⁾	N/√W (lb/√W)	14.17 (3.19)		17.20 (3.87)		20.24 (4.55)	
Resistance, 25°C (line-line)	Ω	3.7	14.8	5.5	22.0	7.3	29.2
Inductance (line-line)	mH	2.40	9.60	3.80	15.20	4.60	18.40
Thermal Resistance, 1.4 bar (20 psi)	°C/W	0.27		0.24		0.21	
Thermal Resistance, No Forced Cooling	°C/W	0.89		0.78		0.58	
Maximum Bus Voltage	V _{DC}	340		340		340	
Mechanical Specifications							
Air Flow, 20 psi	m ³ /s (SCFM)	2.5x10 ⁻³ (5.30)		2.8x10 ⁻³ (5.90)		2.8x10 ⁻³ (5.90)	
Coil Weight	kg (lb)	1.10 (2.42)		1.60 (3.52)		2.10 (4.62)	
Coil Length	mm (in)	142.0 (5.59)		202.0 (7.95)		262.0 (10.31)	
Heat Sink	mm (in)	250x250x25 (10x10x1)		250x250x25 (10x10x1)		250x250x25 (10x10x1)	
Magnet Track Weight	kg/m (lb/ft)	20.4 (13.68)		20.4 (13.68)		20.4 (13.68)	
Magnetic Pole Pitch	mm (in)	30.00 (1.18)		30.00 (1.18)		30.00 (1.18)	
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 Apk; use force constant in N·m/Apk when sizing.							

Table 1-17: BLMH Motor Specifications (BLMH-322, BLMH-382)

		BLMH-322		BLMH-382	
Performance Specifications ⁽¹⁾⁽⁵⁾					
Continuous Force, 1.4 bar (20 psi) ⁽²⁾	N (lb)	489.2 (110.0)		-A 435.8 (98.0)	-B 548.8 (123.4)
Continuous Force, No Forced Cooling ⁽²⁾	N (lb)	303.2 (68.2)		357.9 (80.5)	
Peak Force ⁽³⁾	N (lb)	1956.7 (439.9)		2195.0 (493.5)	
Electrical Specifications ⁽⁵⁾					
Winding Designation	A / B	-A	-B	-A	-B
BEMF Constant (line-line, max)	V/(m/s) (V/(in/s))	79.20 (2.01)	158.40 (4.02)	45.71 (1.16)	91.42 (2.32)
Continuous Current 1.4 bar (20 psi) ⁽²⁾	A _{pk} (A _{rms})	7.10 (5.02)	3.55 (2.51)	10.96 (7.75)	6.90 (4.88)
Continuous Current, No Forced Cooling ⁽²⁾	A _{pk} (A _{rms})	4.40 (3.11)	2.20 (1.56)	9.00 (6.36)	4.50 (3.18)
Peak Current, Stall ⁽³⁾	A _{pk} (A _{rms})	28.40 (20.08)	14.20 (10.04)	55.20 (39.03)	27.60 (19.52)
Force Constant, Sine Drive ⁽⁴⁾⁽⁸⁾	N/A _{pk} (lb/A _{pk})	68.90 (15.49)	137.80 (30.98)	39.77 (8.94)	79.53 (17.88)
	N/A _{rms} (lb/A _{rms})	97.44 (21.91)	194.88 (43.81)	56.24 (12.64)	112.47 (25.29)
Motor Constant ⁽²⁾⁽⁴⁾	N/√W (lb/√W)	22.29 (5.01)		23.19 (5.21)	
Resistance, 25°C (line-line)	Ω	9.1	36.4	2.8	11.2
Inductance (line-line)	mH	6.00	24.00	1.80	7.20
Thermal Resistance, 1.4 bar (20 psi)	°C/W	0.21		0.18	
Thermal Resistance, No Forced Cooling	°C/W	0.54		0.42	
Maximum Bus Voltage	V _{DC}	340		340	
Mechanical Specifications					
Air Flow, 20 psi	m ³ /s (SCFM)	2.9x10 ⁻³ (6.20)		2.7x10 ⁻³ (5.80)	
Coil Weight	kg (lb)	2.60 (5.72)		3.10 (6.82)	
Coil Length	mm (in)	322.0 (12.68)		382.0 (15.04)	
Heat Sink	mm (in)	250x400x25 (10x16x1)		250x400x25 (10x16x1)	
Magnet Track Weight	kg/m (lb/ft)	20.4 (13.68)		20.4 (13.68)	
Magnetic Pole Pitch	mm (in)	30.00 (1.18)		30.00 (1.18)	
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 Apk; use force constant in N·m/Apk when sizing.					

Table 1-18: BLMX Motor Specifications

		BLMX-382		BLMX-502	
Performance Specifications (1)(5)					
Continuous Force, 1.4 bar (20 psi) (2)	N (lb)	972 (218)		-A 1063 (239)	-B 1011 (227)
Continuous Force, No Forced Cooling (2)	N (lb)	537 (121)		601 (135)	
Peak Force (3)	N (lb)	3887 (874)		4252 (956)	
Electrical Specifications(5)					
Winding Designation	A / B	-A	-B	-A	-B
BEMF Constant (line-line, max)	V/(m/s) (V/(in/s))	86.26 (2.19)	172.52 (4.38)	109.59 (2.78)	54.79 (1.39)
Continuous Current 1.4 bar (20 psi) (2)	A _{pk} (A _{rms})	12.95 (9.16)	6.48 (4.58)	11.15 (7.88)	21.21 (15.00)
Continuous Current, No Forced Cooling (2)	A _{pk} (A _{rms})	7.15 (5.06)	3.58 (2.53)	6.30 (4.45)	12.60 (8.91)
Peak Current, Stall (3)	A _{pk} (A _{rms})	51.80 (36.63)	25.90 (18.31)	44.60 (31.54)	89.20 (63.08)
Force Constant, Sine Drive (4) (8)	N/A _{pk} (lb/A _{pk})	75.04 (16.87)	150.09 (33.74)	95.33 (21.43)	47.67 (10.72)
	N/A _{rms} (lb/A _{rms})	106.13 (23.86)	212.25 (47.72)	134.82 (30.31)	67.41 (15.16)
Motor Constant (2)(4)	N/√W (lb/√W)	39.72 (8.93)		46.23 (10.39)	
Resistance, 25°C (line-line)	Ω	3.4	13.6	4.5	1.1
Inductance (line-line)	mH	3.00	12.00	4.00	1.00
Thermal Resistance, 1.4 bar (20 psi)	°C/W	0.12		0.12	
Thermal Resistance, No Forced Cooling	°C/W	0.40		0.39	
Maximum Bus Voltage	V _{DC}	340		340	
Mechanical Specifications					
Air Flow, 20 psi	m ³ /s (SCFM)	5.4x10 ⁻³ (11.5)		5.6x10 ⁻³ (11.8)	
Coil Weight	kg (lb)	3.40 (7.48)		4.45 (9.79)	
Coil Length	mm (in)	382.0 (15.04)		502.0 (19.76)	
Heat Sink	mm (in)	250x400x25 (10x16x1)		250x500x25 (10x20x1)	
Magnet Track Weight	kg/m (lb/ft)	35.8 (24.01)		35.8 (24.01)	
Magnetic Pole Pitch	mm (in)	30.00 (1.18)		30.00 (1.18)	
1. Performance is dependent upon heat sink configuration, system cooling conditions, and ambient temperature 2. Values shown @ 65°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 90 °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 force constant in N·m/A _{pk} when sizing.					

1.2. Dimensions

NOTE: Aerotech continually improves its product offerings; listed options may be superseded at any time. All drawings and illustrations are for reference only and were complete and accurate as of this manual's release. Refer to www.aerotech.com for the most up-to-date information.

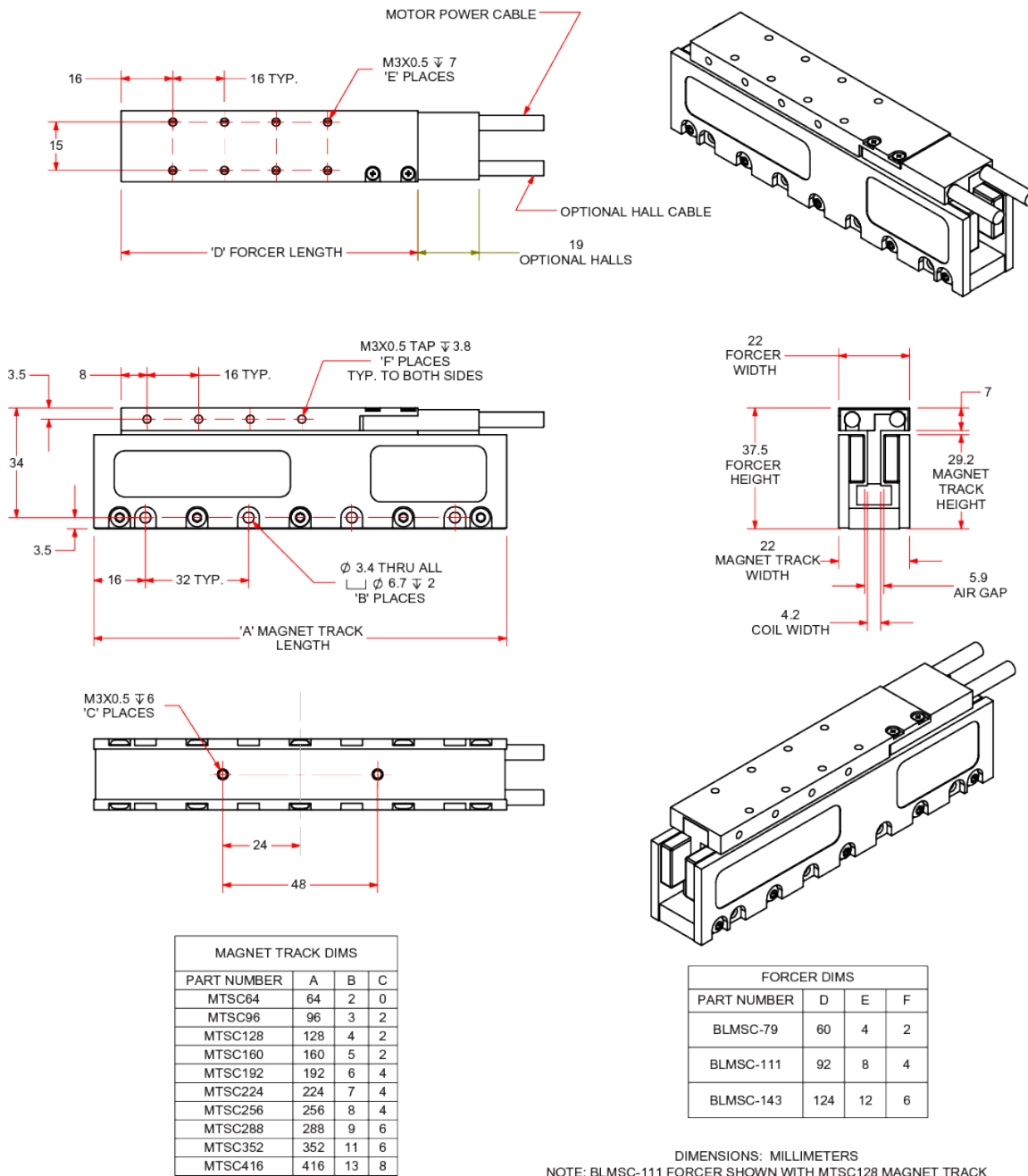


Figure 1-1: BLMSC Model Dimensions

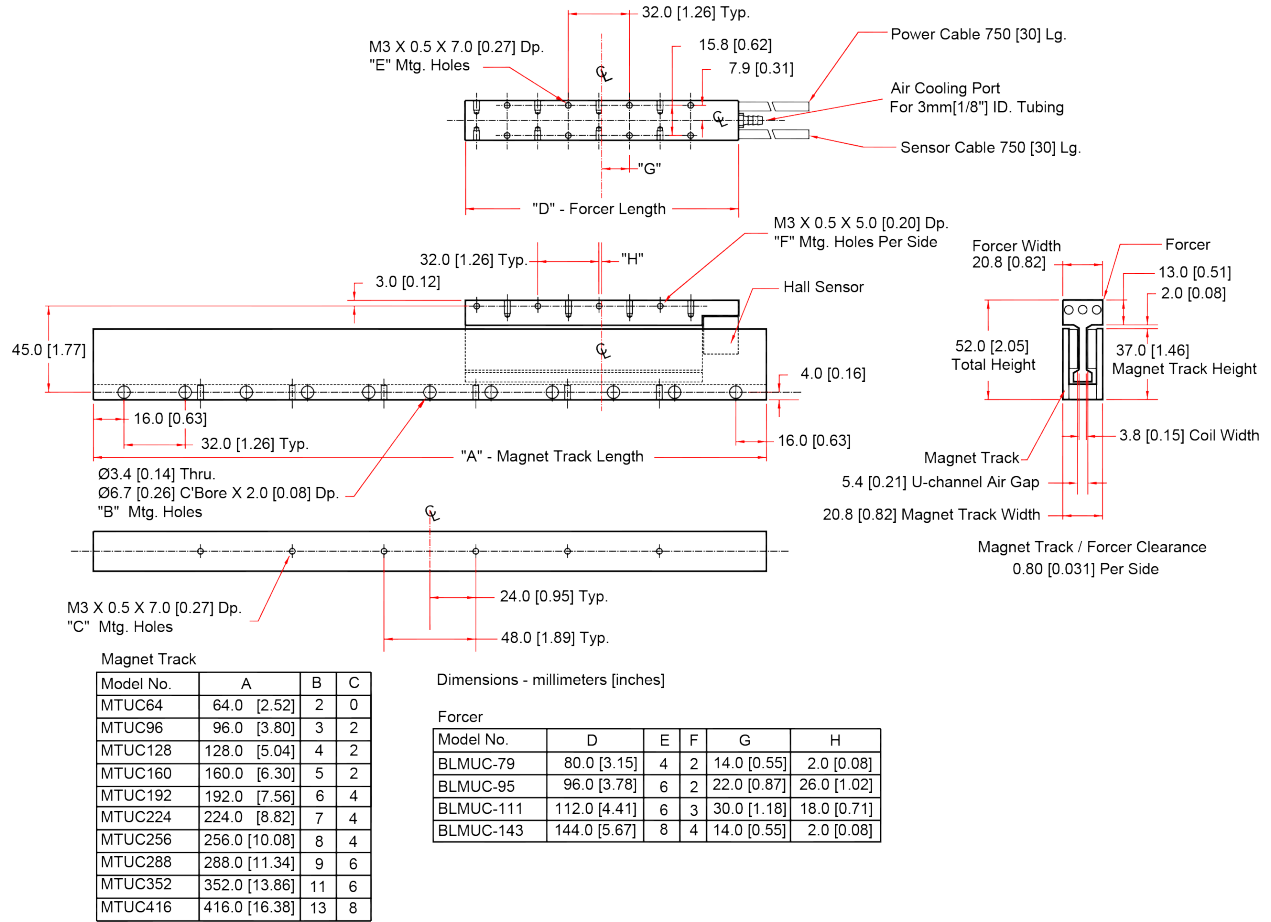
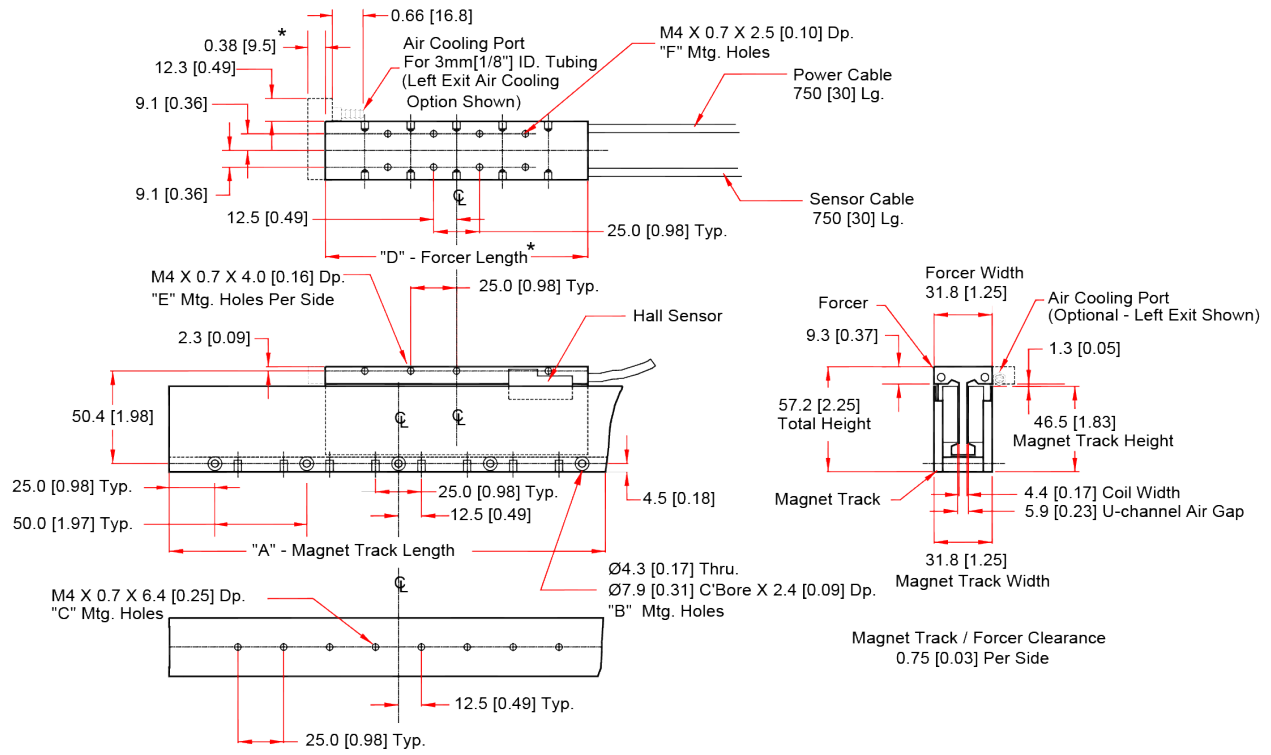


Figure 1-2: BLMUC Model Dimensions



Dimensions - millimeters [inches]

Magnet Track

Model No.	A	B	C
MTC150	150.0 [5.91]	3	4
MTC250	250.0 [9.84]	5	8
MTC350	350.0 [13.78]	7	12
MTC450	450.0 [17.72]	9	16
MTC500	500.0 [19.68]	10	18

Forcer

Model No.	D	E	F
BLMC-92	93.0 [3.66]	2	4
BLMC-142	143.0 [5.63]	5	8
BLMC-192	193.0 [7.60]	7	12
BLMC-267	268.0 [10.55]	8	20

*Add 9.5 [0.38] To Forcer Length "D" For Optional Cooling

Figure 1-3: BLMC Model Dimensions

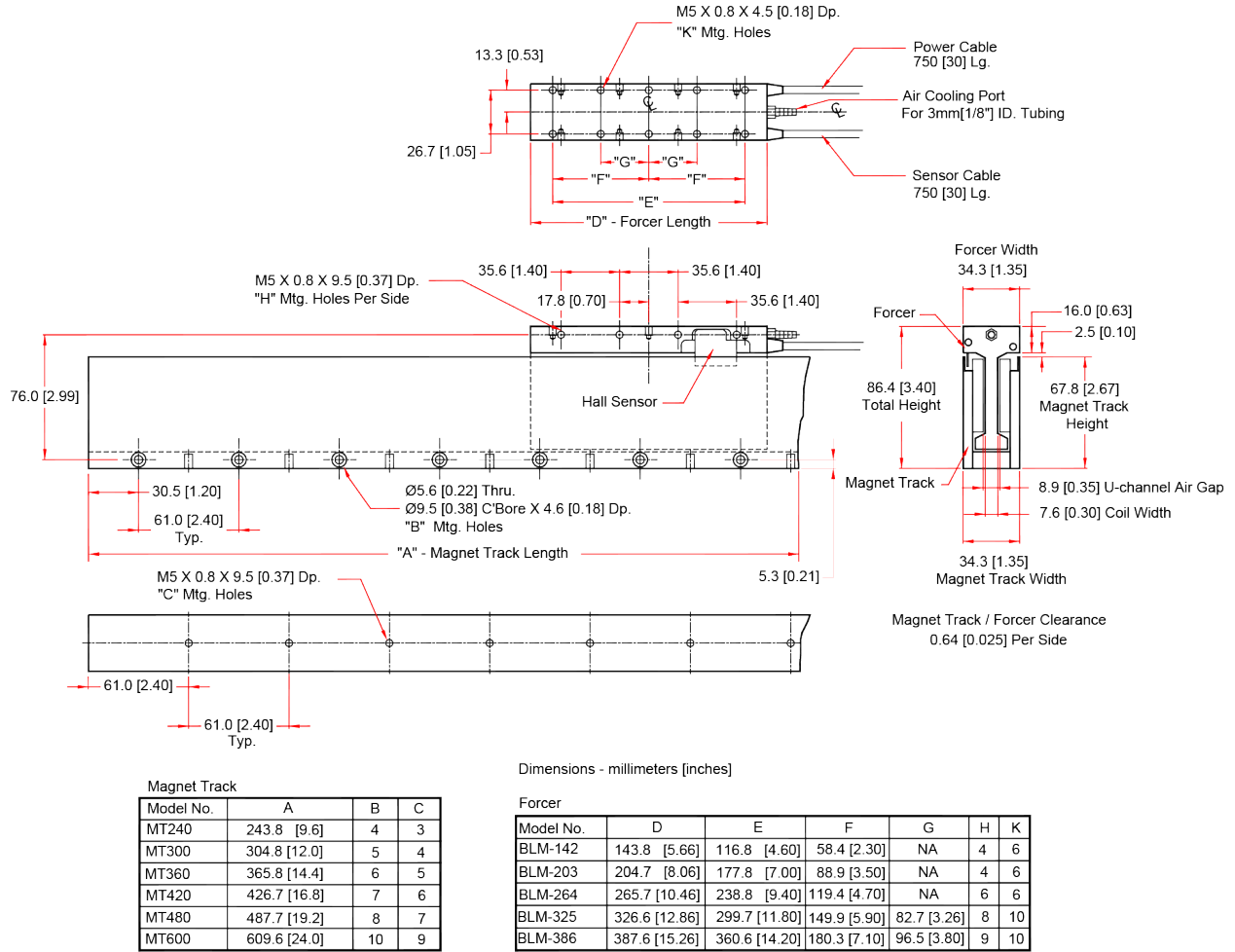
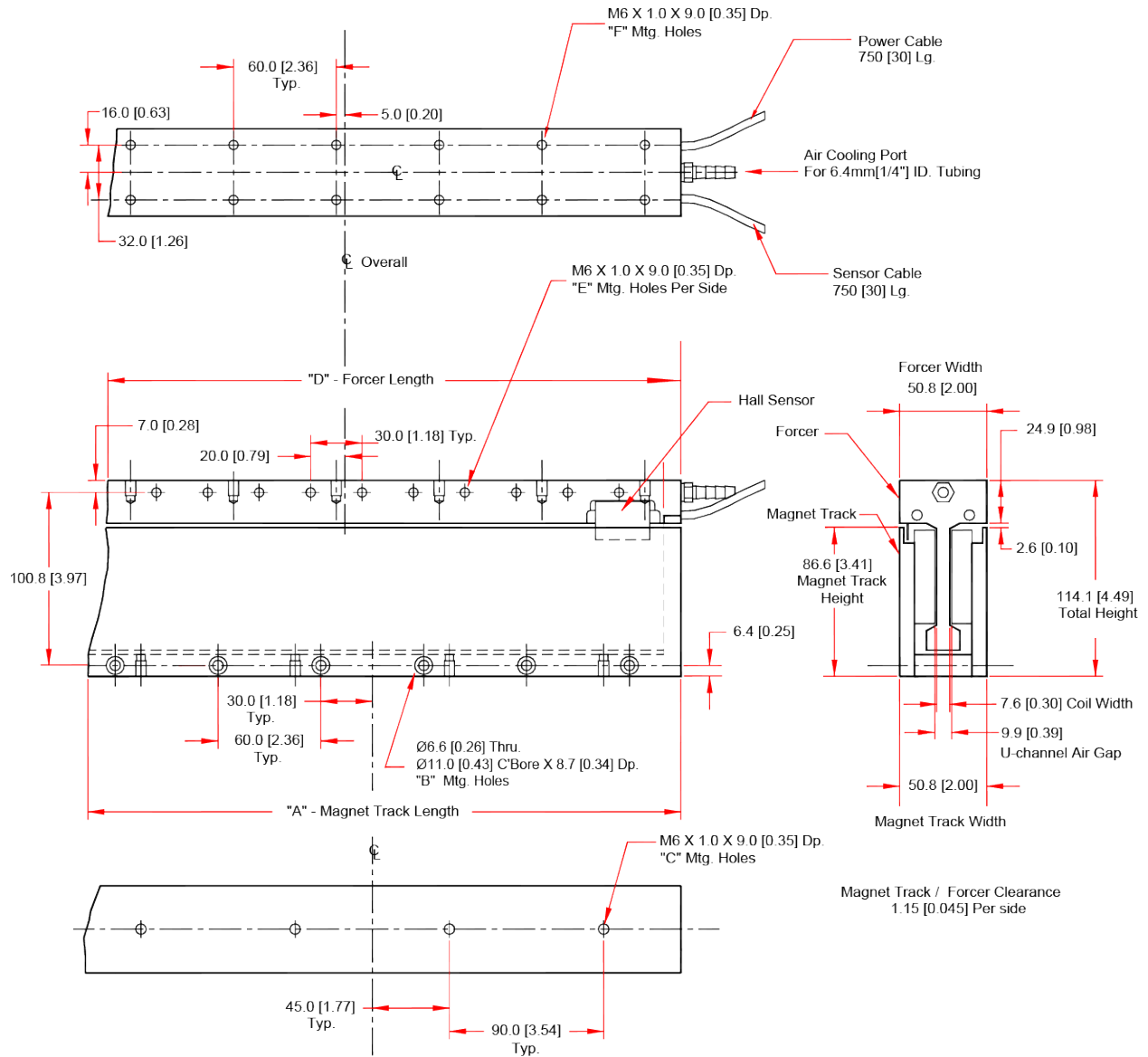


Figure 1-4: BLM Model Dimensions



Magnet Track

Model No.	A	B	C
MTH240	240.0 [9.45]	4	2
MTH300	300.0 [11.81]	5	4
MTH360	360.0 [14.17]	6	4
MTH480	480.0 [18.90]	8	4
MTH600	600.0 [23.63]	10	6
MTH720	720.0 [28.35]	12	8

Forcer

Model No.	D	E	F
BLMH-142	152.0 [5.98]	4	6
BLMH-202	212.0 [8.35]	6	6
BLMH-262	272.0 [10.71]	8	10
BLMH-322	332.0 [13.07]	10	10
BLMH-382	392.0 [15.43]	12	14

Figure 1-5: BLMH Model Dimensions

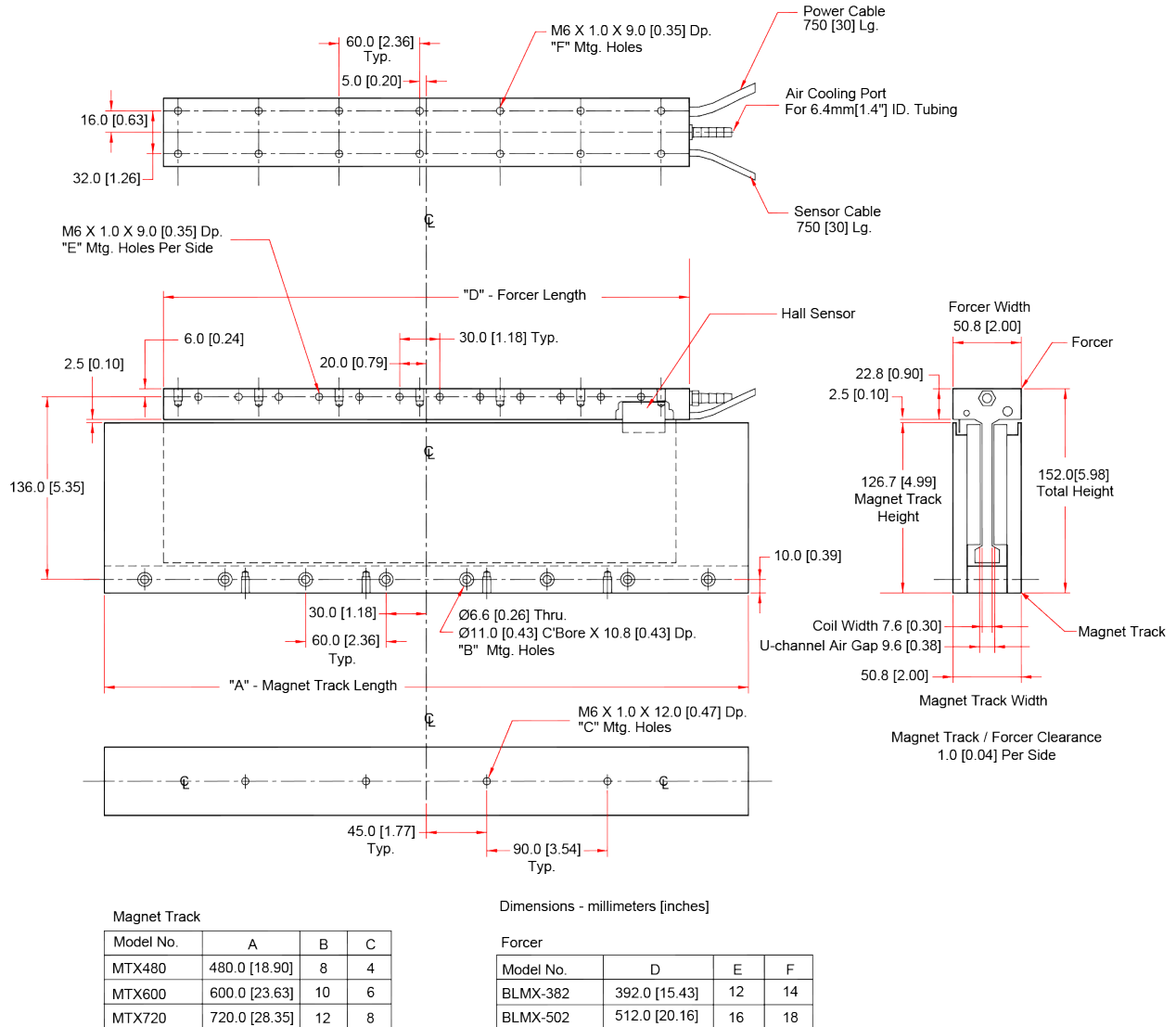


Figure 1-6: BLMX Model Dimensions

1.3. Environmental Specifications



WARNING: Do not expose this product to environments or conditions outside of the listed specifications. Exceeding environmental or operating specifications can cause damage to the equipment.

Table 1-19: Environmental Specifications

Ambient Temperature	Operating: 0° to 25° C (32° to 77° F) Contact Aerotech for information regarding your specific application and environment.
	Storage: -10° to 85° C (14° to 185° F) in original shipping packaging
Humidity	Operating: 20% to 60% RH
	Storage: 10% to 70% RH, non-condensing in original packaging.
	Ambient conditions need to be such that condensation on the motor does not occur. The motors are not to be used in wash-down environments.
Altitude	Operating: 0 m to 1,000 m (0 ft to 3280 ft) above sea level
	Contact Aerotech if your specific application involves use above 1000 m or below sea level.
Atmosphere	Not to be used in a hydrogen atmosphere.
Use	Indoor use only

1.4. Air Requirements

It is important to the operation of the U Channel Linear Motors that the air supply meets Aerotech specifications. The air must be filtered to 0.25 microns, dry to 0°F dew point, and oil free (nitrogen at 99.99% purity is recommended). Filtration is required to prevent particles from clogging internal components of the U Channel Linear Motors.

Chapter 2: Assembly and Installation

A linear motor consists of two main components, a forcer and a magnet track. Interaction between the forcer and magnet track produce a force to cause linear motion. The controller, amplifier, and position feedback devices provide for proper commutation and positioning of the motor.

The linear motor can be configured in two different ways. The magnet track can be held stationary while the forcer moves or the forcer can be held stationary while the magnet track moves.

NOTE: Devices need to be in place so that intentional or unintentional disruption of electrical power doesn't result in unexpected motion. The motion could possibly result in bodily injury or damage to equipment. This is especially important in vertical applications where the use of a fail-safe brake needs to be incorporated in the event of a power disruption.

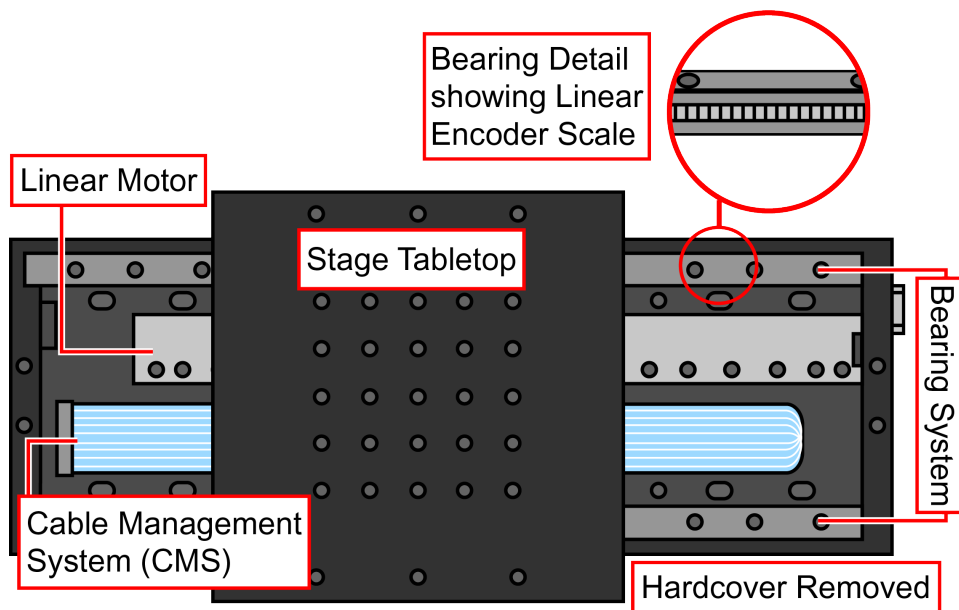


Figure 2-1: Motor Assembled in a Linear Stage

2.1. Bearing System

Like a ball screw carriage, the linear forcer assembly must be supported by a linear bearing system (refer to [Figure 2-1](#)). The linear bearing system must be capable of supporting the load/heat sink and the forcer. The forcer is constructed of non-ferrous materials, and, consequently, the forcer is not attracted to the magnet track.

2.2. Position Transducer Resolution

The motion controller requires a position transducer for all forms of motion control (typically a linear encoder, refer to Encoder Scale example in [Figure 2-1](#)).

2.3. Cable Management

Due to the continuous flexing of the motor power and position feedback cables, motor cooling lines, and any other process or control cabling, a high-flex cable management system must be used. Termination of the forcer and encoder cables in most cases is through a standard D-shell connector. A mating connector is attached to the high-flex cable in the cable management track. Standard motor cabling can be ordered to be made of high flex materials that can be run through a cable management system. Refer to [Table 2-1](#) for required bend radius for a given high flex cable forcer. If non-high-flex cabling is used, cable termination is required before entering the cable management system.

Table 2-1: Bend Radius

Motor	Bend Radius
BLMSC, BLMUC, BLMC, BLM	47 mm [1.9 "]
BLMH	82 mm [3.2 "]
BLMX	105 mm [4.1 "]

2.4. Mechanical Arrangement of the Magnet Track

The user can mount the magnet track with the opening up, down, left, or right based on the machine design.

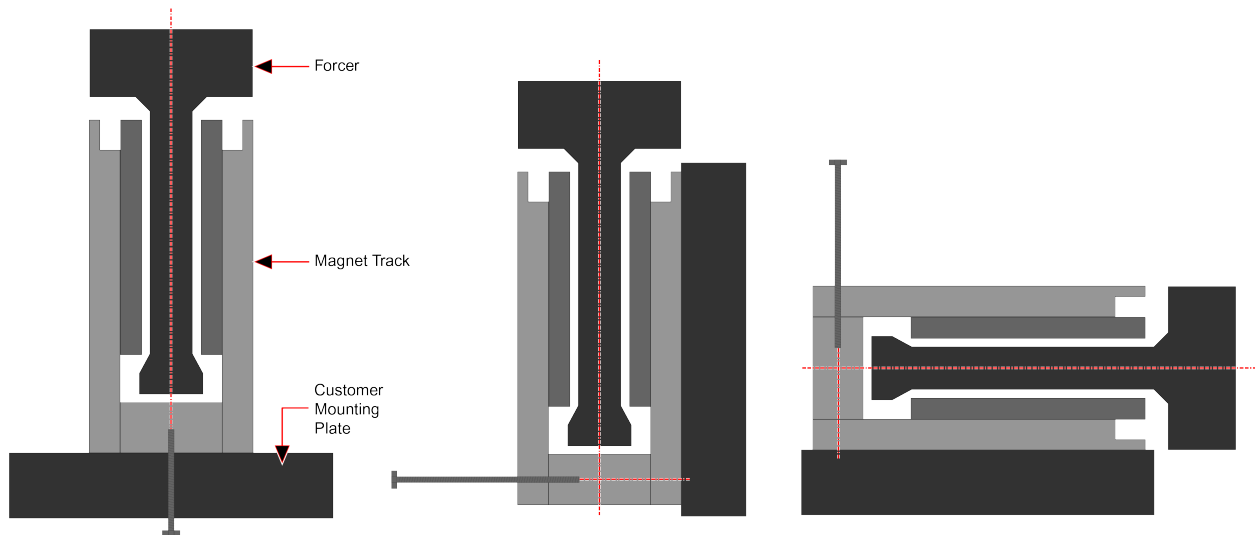


Figure 2-2: Linear Motor Mounting Configurations (end view)

2.5. Track Stacking

To increase the linear motor travel distance, magnet tracks can be stacked end-to-end (Figure 2-3). Align the labels as shown to correctly install the tracks.

NOTE: When mounting, tracks should be aligned using a reference edge or alignment fixture and mounting hole pattern (see catalog drawings for details on specific mounting hole patterns). Small gaps (up to 0.5 mm [.020"]) between adjacent tracks is allowable and will not adversely effect forcer performance.

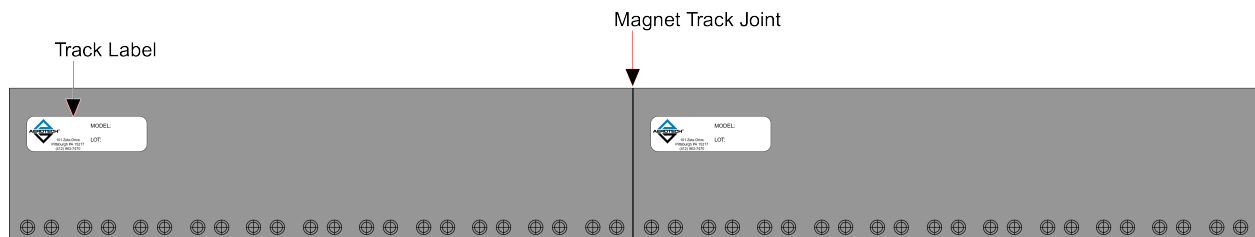


Figure 2-3: Stacking Tracks

2.6. Straightness and Flatness Tolerance

In order for the linear motor system (forcer and magnet track) to operate correctly, it must be properly aligned to the bearing system travel. This section outlines the maximum permissible deviation the motor can see during motion and still operate properly.

The straightness and flatness tolerances are the deviations from a straight line in two dimensions during travel. There are two separate alignment tolerances: straightness (side-to-side) and flatness (in-and-out).

2.6.1. BLMSC Tolerances

With the forcer aligned as in Figure 2-4, the air gap in the magnet track is 0.030 in (0.76 mm) on either side of the forcer. The straightness can deviate left or right ± 0.015 in (0.38 mm) from the centerline, i.e., a resultant 0.015 in (0.38 mm) air gap on one side and 0.045 in (1.14 mm) on the other side.

The nominal forcer height out of the track is 0.051 in (1.3 mm). The flatness can deviate up an additional 0.010 in (0.25 mm) for a total of 0.089 in (2.26 mm) from the track edge to the forcer edge. The flatness can also deviate down 0.010 in (0.25 mm) for a total of 0.069 in (1.75 mm) from the track edge to the forcer edge.

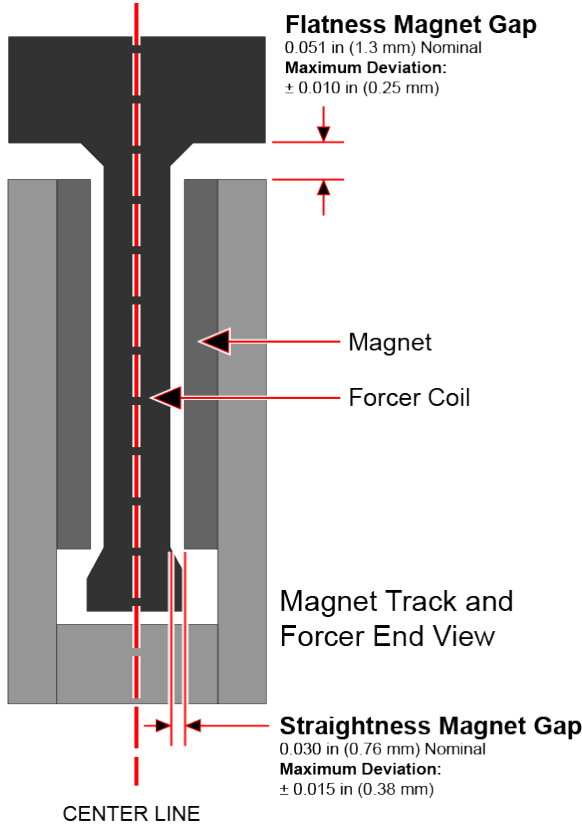


Figure 2-4: BLMSC Straightness and Flatness Tolerances

2.6.2. BLMUC Tolerances

With the forcer aligned as in [Figure 2-5](#), the air gap in the magnet track is 0.030 in (0.76 mm) on either side of the forcer. The straightness can deviate left or right ± 0.015 in (0.38 mm) from the centerline, i.e., a resultant 0.015 in (0.38 mm) air gap on one side and 0.045 in (1.14 mm) on the other side.

The nominal forcer height out of the track is 0.079 in (2.0 mm). The flatness can deviate up an additional 0.010 in (0.25 mm) for a total of 0.089 in (2.26 mm) from the track edge to the forcer edge. The flatness can also deviate down 0.010 in (0.25 mm) for a total of 0.069 in (1.75 mm) from the track edge to the forcer edge.

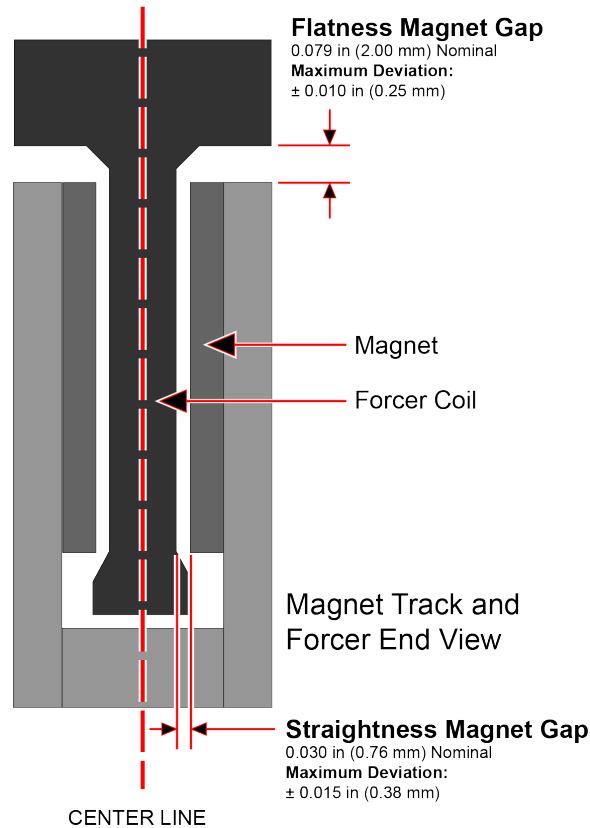


Figure 2-5: BLMUC Straightness and Flatness Tolerances

2.6.3. BLMC Tolerances

With the forcer aligned as in [Figure 2-6](#), the air gap in the magnet track is 0.030 in (0.76 mm) on either side of the forcer. The straightness can deviate left or right ± 0.015 in (0.38 mm) from the centerline, i.e., a resultant ± 0.015 in (0.38 mm) air gap on one side and a 0.045 in (1.14 mm) on the other side.

The nominal forcer height out of the track is 0.050 in (1.3 mm). The flatness can deviate up an additional 0.015 in (0.38 mm) for a total of 0.065 in (1.65 mm) from the track edge to the forcer edge. The flatness can also deviate down 0.015 in (0.38 mm) for a total of 0.035 in (0.89 mm) from the track edge to the forcer edge.

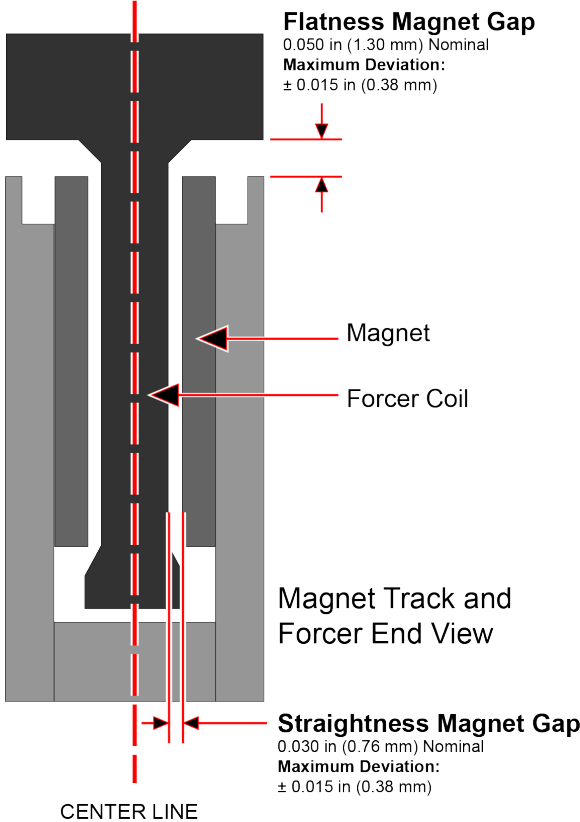


Figure 2-6: BLMC Straightness and Flatness Tolerances

2.6.4. BLM Tolerances

With the forcer aligned as in [Figure 2-7](#), the air gap in the magnet track is 0.025 in (0.64 mm) on either side of the forcer. The straightness can deviate left or right ± 0.010 in (0.25 mm) from the centerline, i.e., a resultant 0.015 in (0.38 mm) air gap on one side and 0.035 in (0.89 mm) on the other side.

The nominal forcer height out of the track is 0.10 in (2.5 mm). The flatness can deviate up an additional 0.020 in (0.51 mm) for a total of 0.120 in (3.05 mm) from the track edge to the forcer edge. The flatness can also deviate down 0.020 in (0.51 mm) for a total of 0.080 in (2.0 mm) from the track edge to the forcer edge.

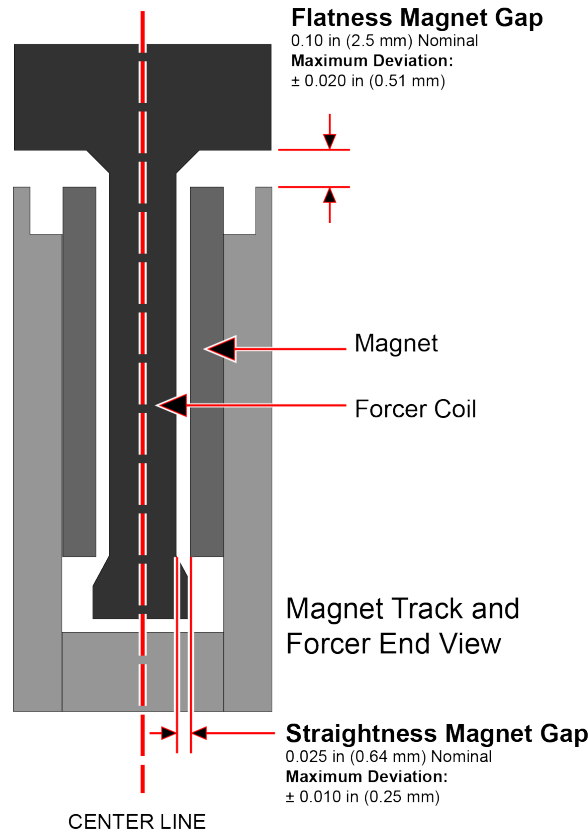


Figure 2-7: BLM Straightness and Flatness Tolerances

2.6.5. BLMH Tolerances

With the forcer aligned as in [Figure 2-8](#), the air gap in the magnet track is 0.045 in (1.1 mm) on either side of the forcer. The straightness can deviate left or right to ± 0.025 in (0.64 mm) from the centerline, i.e., a resultant 0.020 in (0.51 mm) air gap on one side and 0.070 in (1.79 mm) on the other side.

The nominal forcer height out of the track is 0.10 in (2.5 mm). The flatness can deviate up an additional 0.020 in (0.51 mm) for a total of 0.120 in (3.1 mm) from the track edge to the forcer edge. The flatness can also deviate down 0.020 in (0.51 mm) for a total of 0.080 in (2.0 mm) from the track edge to the forcer edge.

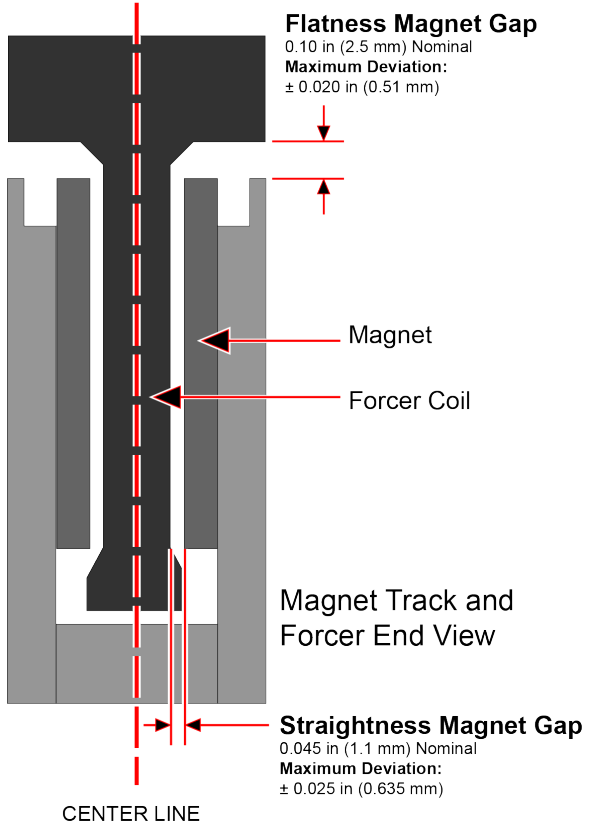


Figure 2-8: BLMH Straightness and Flatness Tolerances

2.6.6. BLMX Tolerances

With the forcer aligned as it is in [Figure 2-9](#), the air gap in the magnet track is 0.040 in (1.0 mm) on either side of the forcer coil. The straightness can deviate left or right to ± 0.020 in (0.51 mm) from the centerline, i.e., a resultant 0.020 in (0.51 mm) air gap on one side and 0.060 in (1.52 mm) on the other side.

The nominal forcer height out of the track is 0.10 in (2.5 mm). The flatness can deviate up an additional 0.015 in (0.38 mm) for a total of 0.115 in (2.92 mm) from the track edge to the forcer coil. The flatness can also deviate down 0.015 in (0.38 mm) for a total of 0.085 in (2.2 mm) from the track edge to the forcer edge.

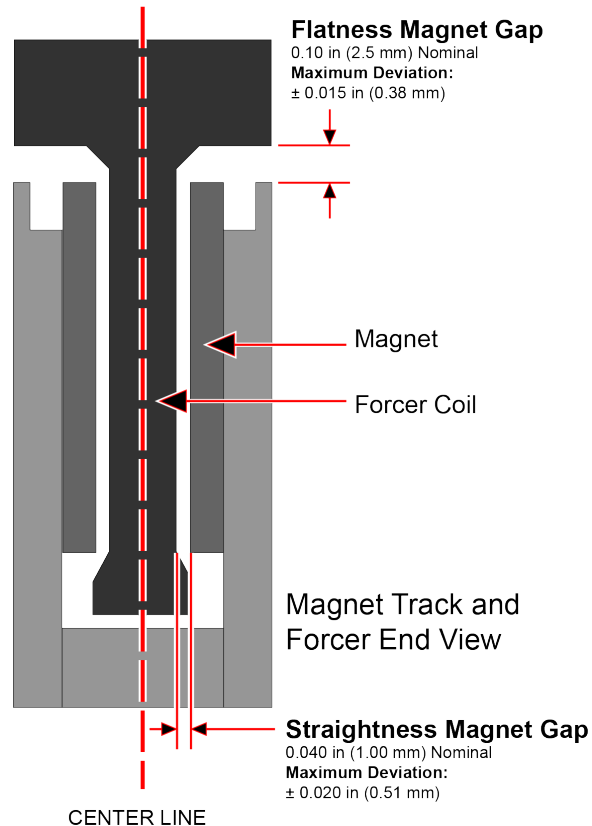


Figure 2-9: BLMX Straightness and Flatness Tolerances

2.7. Motor Wiring

The forcer is supplied with flying leads for the motor winding, Hall effect devices, and thermal overload sensor. The customer supplies all external wiring to interface with these devices. This supplied wiring must meet certain requirements to provide for safe and reliable operation. Guidelines are given below to help with the selection and installation of the wiring.

The wiring must be able to supply the rated current without overheating. The wire insulation must be rated for the voltage and temperature at which the motor is operating. And, efforts must also be made to reduce EMI emissions and to increase EMI immunity through proper cable selection and installation. In addition to supplying the external wiring the customer is also responsible for providing over current protection for the motor.

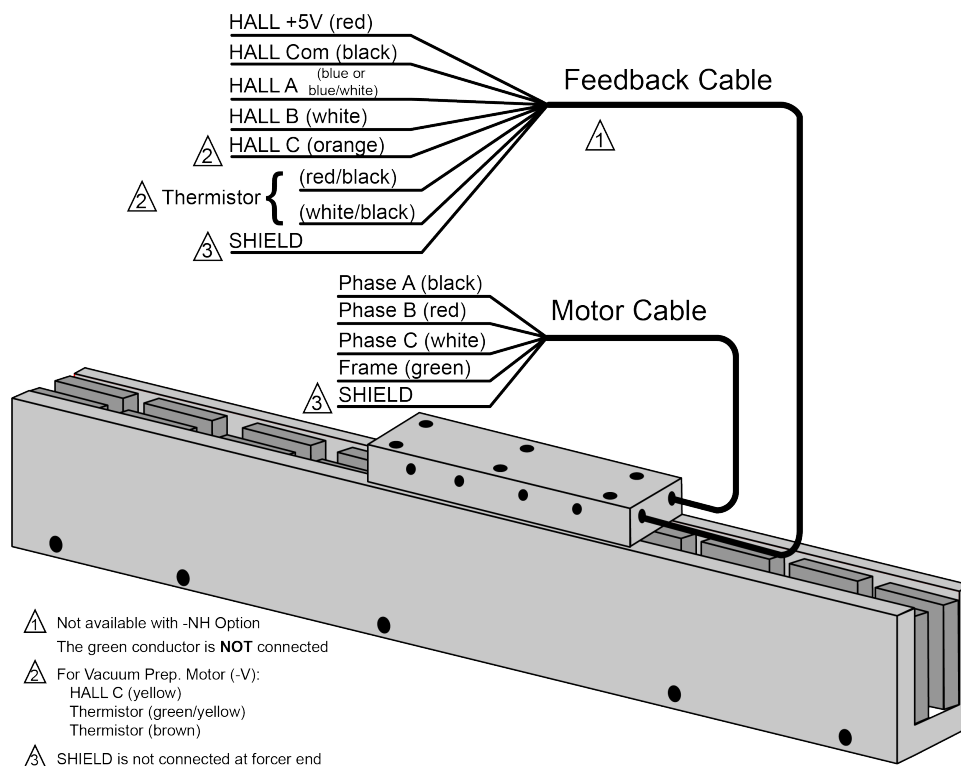


Figure 2-10: Motor Wiring with Flying Leads

Table 2-2: Cable Diameter and Wire Gauge

Motor (Standard Preparation)	Motor		Feedback	
	Cable Diameter mm [in]	Wire Gauge AWG [mm ²]	Cable Diameter mm [in]	Wire Gauge AWG [mm ²]
BLMSC, BLMUC, BLMC, BLM	4.7 [0.19]	22 [0.33]	4.7 [0.19]	26 [0.13]
BLMH	8.2 [0.32]	16 [1.31]	4.7 [0.19]	26 [0.13]
BLMX	10.4 [0.41]	14 [2.08]	4.7 [0.19]	26 [0.13]

2.7.1. Motor Power Conductors

The motor power conductors must be sized to handle the electrical current requirements of the motor. The motor data sheets list the required values for the various motors. The wire insulation voltage rating is chosen based on the maximum voltage that will be applied to the motor.

2.7.2. Protective Ground

The protective ground is a safety conductor used to ground the motor case. The protective ground conductor must have a current carrying capacity at least equal to that of the motor wires. The insulation is standard Green/Yellow and must be rated for the maximum voltage applied to the motor winding. The protective ground wire is usually bundled along with the motor wires, but system requirements may be that a separate protective ground wire is needed.

2.7.3. Over Current Protection

Motors need to be provided with over current protection to prevent motor overheating. Over current protection can be accomplished using programmable current limits, traps, over current protection circuitry, or fusing. Fuse values should be selected according to the RMS current rating of the motor. For most applications slow-blow type fuses should be used.

When the motor is part of an Aerotech system using an Aerotech controller and drive, the “Apk” continuous current rating of the motor must be used to set the motor overcurrent protection fault. If the motor is being installed in a system not configured by Aerotech, the customer is responsible for providing the necessary over current protection.

2.7.4. Hall Effect Device and Thermistor Wiring

The insulation of these wires should have a rating for at least the maximum voltage applied to the motor winding. The temperature rating of the wire insulation must also be sufficiently high to withstand the operating temperatures specific to the application.

2.7.5. Wiring Guidelines

The wiring guidelines given below can help to reduce EMI related problems which can result in poor overall system performance.

- Keep cable lengths as short as possible. Long cable runs are more susceptible to EMI pickup than short runs.
- Use grounded shielded cables for both the motor power and signal wiring
- The use of twisted pair shielded cabling can help reduce magnetically induced currents.
- Braided shield has a slightly better low frequency shielding capability than a foil shield. Foil is often used where RF shielding is necessary.
- Do not bundle signal, motor power cables, or ac power lines within the same protective shield or conduit. Rather use separate protective shields or conduits.
- Do not introduce multiple paths to ground from a grounding point. Multiple paths to ground can create ground loops within the system.
- The use of EMI suppression devices may be necessary where the EMI environment warrants their use.

2.7.6. Thermal Protective Device

U Channel Linear Motors motors incorporate a positive-temperature coefficient (PTC) thermistor as a thermal protection device. The nominal resistance of the thermistor is 100 ohms at 25°C. The thermistor exhibits a rapid increase in resistance to 1,000 ohms as the motor temperature approaches the thermistor’s transition temperature of 100°C [the transition temperature is 90°C for the BLMX].



WARNING: The thermal protective device used in the motor must be incorporated in an external shutdown circuit to provide protection to the motor.

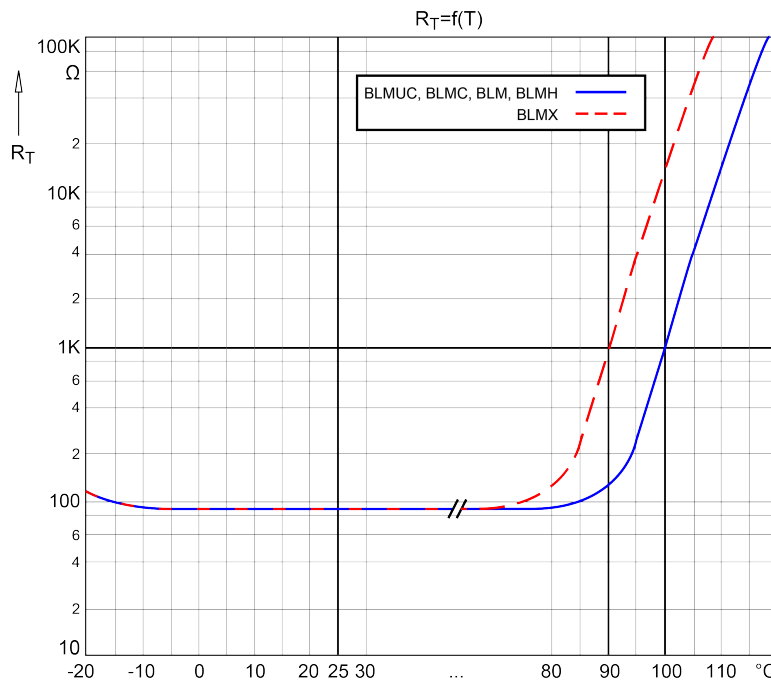


Figure 2-11: Thermal Sensor Resistance as a Function of Temperature

This thermistor can be used in a variety of different electronic interfaces. A precaution when using this type of device in an interface circuit is to avoid self-heating effects. An excessive amount of current through the thermistor will cause its temperature to rise and a false triggering will occur.

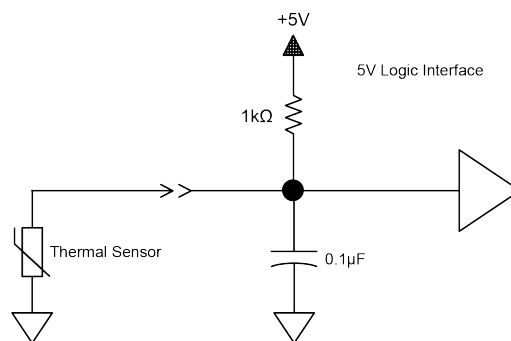
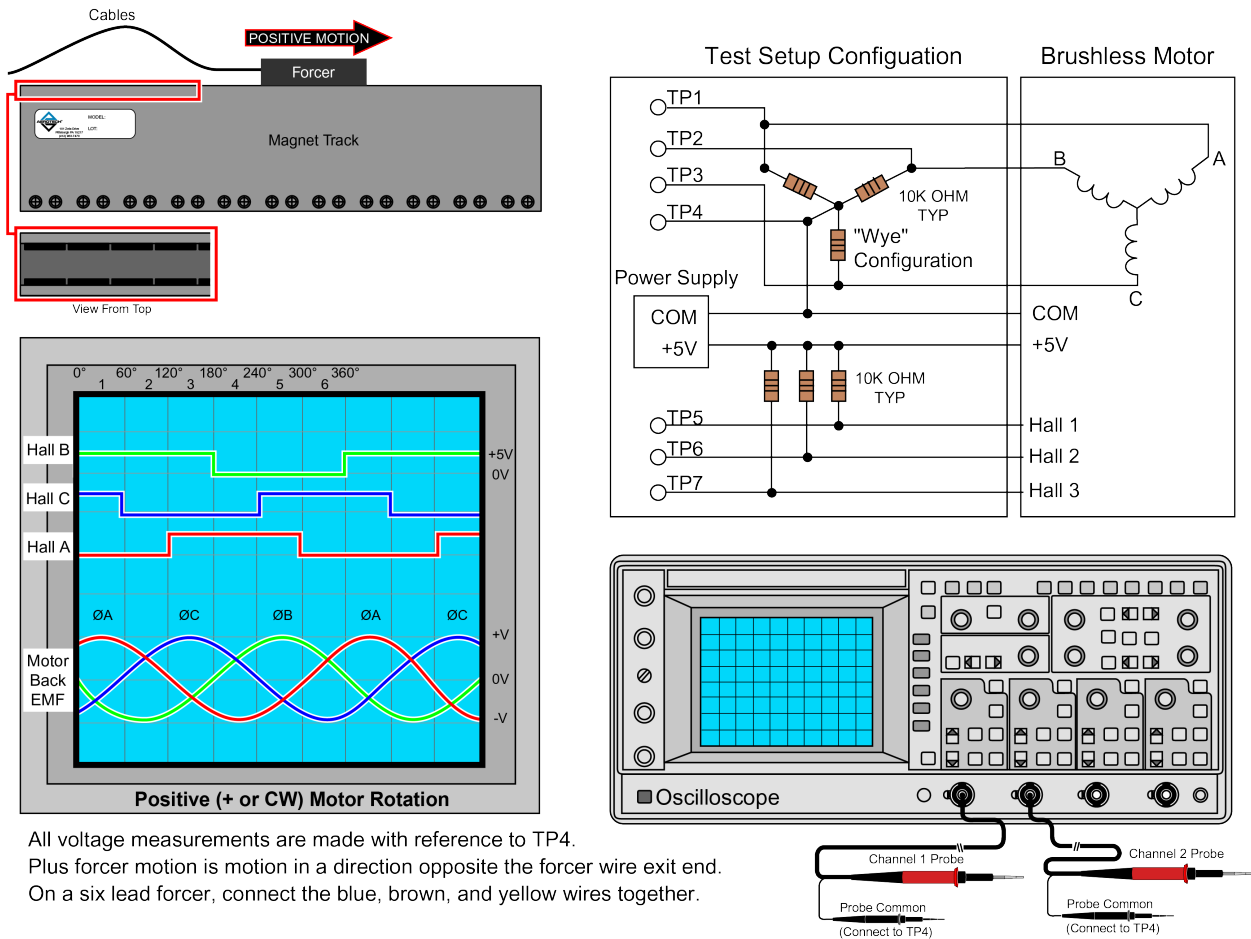


Figure 2-12: Typical Thermistor Interface Circuit

2.8. Hall Effect Operation and Motor Phasing

In linear servomotors, one popular method of commutation is with Hall-effect sensors. They sense the presence of a magnetic field and provide an output as a function of the forcer position. Aerotech linear motor Hall sensors provide a unique set of Hall sensor outputs every sixty electrical degrees. Therefore the forcer position can be resolved to any of six segments over 360 electrical degrees. The Hall sensors used in the linear motors have an open collector output. Figure 2-13 shows the motor BEMF versus Hall signal relationship if observed.



All voltage measurements are made with reference to TP4.
 Plus forcer motion is motion in a direction opposite the forcer wire exit end.
 On a six lead forcer, connect the blue, brown, and yellow wires together.

Figure 2-13: Linear Motor Phasing

2.9. Motor Heating

The motor's temperature rise above ambient establishes a limit on the amount of force producing current allowed through the motor winding. The thermal characteristics of the motor, the effectiveness of the surrounding medium to transfer heat away from the motor, and any supplemental cooling determine the operating conditions.

The motor specification tables give the continuous motor current that will result in a predetermined temperature rise of the motor. This temperature rise is based on a single set of operating conditions as noted on the motor specifications. The use of supplemental cooling allows for increases in continuous motor current and therefore increased force.

The motor's thermal limit will not be exceeded so long as the minimum environmental and thermal conditions exist. Poor heat transfer away from the motor, excessive loading, elevated ambient temperatures, etc. are conditions that will cause excessive motor heating and failure. The importance of motor overload and thermal protection devices as described in previous sections becomes apparent.

2.10. Maintenance

Regular preventative maintenance should include but is not limited to the following: make frequent checks for excessive or abnormal motor heating, excessive motor vibrations, loose motor to machine couplers, obstructed air flow to the motor, burning smells, an accumulation of debris on the motor, etc.

Motors should be wiped with a clean dry cloth to remove any grease, dirt, or other material that has accumulated on the motor. Fluids and sprays are not recommended for chance of internal motor contamination. Cleaning the motor labels should be avoided to prevent their removal.

Non-ferrous tools should be used when working around the magnet track.



DANGER: Do not attempt to disassemble the magnet track for cleaning or any other reason since this can result in serious injury.

Appendix A: Warranty and Field Service

Aerotech, Inc. warrants its products to be free from harmful defects caused by faulty materials or poor workmanship for a minimum period of one year from date of shipment from Aerotech. Aerotech's liability is limited to replacing, repairing or issuing credit, at its option, for any products that are returned by the original purchaser during the warranty period. Aerotech makes no warranty that its products are fit for the use or purpose to which they may be put by the buyer, whether or not such use or purpose has been disclosed to Aerotech in specifications or drawings previously or subsequently provided, or whether or not Aerotech's products are specifically designed and/or manufactured for buyer's use or purpose. Aerotech's liability on any claim for loss or damage arising out of the sale, resale, or use of any of its products shall in no event exceed the selling price of the unit.

THE EXPRESS WARRANTY SET FORTH HEREIN IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, BY OPERATION OF LAW OR OTHERWISE. IN NO EVENT SHALL AEROTECH BE LIABLE FOR CONSEQUENTIAL OR SPECIAL DAMAGES.

Return Products Procedure

Claims for shipment damage (evident or concealed) must be filed with the carrier by the buyer. Aerotech must be notified within thirty (30) days of shipment of incorrect material. No product may be returned, whether in warranty or out of warranty, without first obtaining approval from Aerotech. No credit will be given nor repairs made for products returned without such approval. A "Return Materials Authorization (RMA)" number must accompany any returned product(s). The RMA number may be obtained by calling an Aerotech service center or by submitting the appropriate request available on our website (www.aerotech.com). Products must be returned, prepaid, to an Aerotech service center (no C.O.D. or Collect Freight accepted). The status of any product returned later than thirty (30) days after the issuance of a return authorization number will be subject to review.

Visit <https://www.aerotech.com/global-technical-support.aspx> for the location of your nearest Aerotech Service center.

Returned Product Warranty Determination

After Aerotech's examination, warranty or out-of-warranty status will be determined. If upon Aerotech's examination a warranted defect exists, then the product(s) will be repaired at no charge and shipped, prepaid, back to the buyer. If the buyer desires an expedited method of return, the product(s) will be shipped collect. Warranty repairs do not extend the original warranty period.

Fixed Fee Repairs - Products having fixed-fee pricing will require a valid purchase order or credit card particulars before any service work can begin.

All Other Repairs - After Aerotech's evaluation, the buyer shall be notified of the repair cost. At such time the buyer must issue a valid purchase order to cover the cost of the repair and freight, or authorize the product(s) to be shipped back as is, at the buyer's expense. Failure to obtain a purchase order number or approval within thirty (30) days of notification will result in the product(s) being returned as is, at the buyer's expense.

Repair work is warranted for ninety (90) days from date of shipment. Replacement components are warranted for one year from date of shipment.

Rush Service

At times, the buyer may desire to expedite a repair. Regardless of warranty or out-of-warranty status, the buyer must issue a valid purchase order to cover the added rush service cost. Rush service is subject to Aerotech's approval.

On-site Warranty Repair

If an Aerotech product cannot be made functional by telephone assistance or by sending and having the customer install replacement parts, and cannot be returned to the Aerotech service center for repair, and if Aerotech determines the problem could be warranty-related, then the following policy applies:

Aerotech will provide an on-site Field Service Representative in a reasonable amount of time, provided that the customer issues a valid purchase order to Aerotech covering all transportation and subsistence costs. For warranty field repairs, the customer will not be charged for the cost of labor and material. If service is rendered at times other than normal work periods, then special rates apply.

If during the on-site repair it is determined the problem is not warranty related, then the terms and conditions stated in the following "On-Site Non-Warranty Repair" section apply.

On-site Non-Warranty Repair

If any Aerotech product cannot be made functional by telephone assistance or purchased replacement parts, and cannot be returned to the Aerotech service center for repair, then the following field service policy applies:

Aerotech will provide an on-site Field Service Representative in a reasonable amount of time, provided that the customer issues a valid purchase order to Aerotech covering all transportation and subsistence costs and the prevailing labor cost, including travel time, necessary to complete the repair.

Service Locations

<http://www.aerotech.com/contact-sales.aspx?mapState=showMap>

USA, CANADA, MEXICO	CHINA	GERMANY
Aerotech, Inc. Global Headquarters Phone: +1-412-967-6440 Fax: +1-412-967-6870	Aerotech China Full-Service Subsidiary Phone: +86 (21) 5508 6731	Aerotech Germany Full-Service Subsidiary Phone: +49 (0)911 967 9370 Fax: +49 (0)911 967 93720
JAPAN	TAIWAN	UNITED KINGDOM
Aerotech Japan Full-Service Subsidiary Phone: +81 (0)50 5830 6814 Fax: +81 (0)43 306 3773	Aerotech Taiwan Full-Service Subsidiary Phone: +886 (0)2 8751 6690	Aerotech United Kingdom Full-Service Subsidiary Phone: +44 (0)1256 855055 Fax: +44 (0)1256 855649

Have your customer order number ready before calling.

Appendix B: Revision History

Revision	Description
2.08.00	The following sections have been updated: <ul style="list-style-type: none">• EU Declaration of Conformity• Figure 1-1• Section 1.4. Air Requirements• Section 2.6.1. BLMSC Tolerances
2.07.00	Revision changes have been archived. If you need a copy of this revision, contact Aerotech Global Technical Support.
2.06.00	
2.05.00	
2.04.00	
2.03.00	
2.02.00	
2.01.00	
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1.04	
1.03a	
1.02	
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1.01a	

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