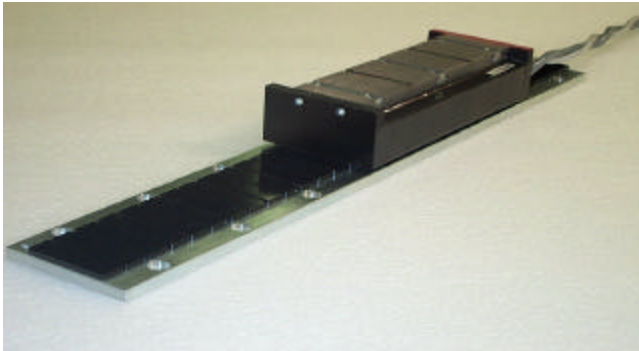


# High Force Brushless Linear Motor



<b>Travel</b>	Unlimited	Unlimited
<b>Velocity</b>	240 inches / sec	[6 m/s]
<b>Acceleration</b>	12 G's	12 G's
<b>Peak Force</b>	2214 lbs	[9839 N]
<b>Continuous Force</b>	631 lbs	[2805 N]

The 3 phase brushless (or AC servo) linear motor is ideal for high force, long stroke, closed loop servo, linear motion applications. They can be used at speeds up to 240 in / sec [6 m / sec]. They are capable of very precise position, velocity and acceleration control when coupled with a linear encoder.

The 3-phase coil assembly can be commutated trapezoidally using optional Hall Effects or sinusoidally using software commutation in conjunction with the appropriate motion controller and sinusoidal amplifier.

The short laminated moving coil assembly moves over the top of a magnet assembly. A customer supplied bearing system is required to guide the

moving coil assembly and to maintain a .030" [0.75 mm] clearance between the magnet and the coil assembly.

There is a large magnetic attractive force between the coil and magnet assembly. The bearing system must be able withstand this force in addition to whatever payload is being carried.

The power to the motor (from a customer supplied PWM 3 phase brushless servo amplifier) is supplied to the moving coil via a power cable.

The motors are available in 6 different widths and 4 different coil assembly lengths.

#### Advantages:

- Very low cogging
- High speed and accelerations of heavy payloads
- Capable of high forces
- Uses standard 3 phase brushless amplifier

#### Applications:

- Machine Tool
- Automotive
- Laser and Water jet cutters
- Gantry Systems

#### The Brushless Linear Motor consists of 2 main parts

- **Long Stationary Magnet Assembly:** The flat single sided magnet assembly is made up of nickel-plated steel back iron and Neodymium permanent magnets. The magnets are bonded to the steel plate. The magnets are not skewed on the steel plate, which provides a higher force per unit area than skewed magnet assemblies. Counter bored thru holes are available in the steel back iron for mounting the magnet assembly to the customer supplied base plate. The magnet assembly is available in widths from 2.40" to 9.10" [61 mm to 231 mm]. The length of the magnet assembly is a function of the stroke. The magnet assemblies are available in 4 modular lengths of 2.52" [64 mm], 5.04" [128 mm], 10.08" [256 mm], and 20.16" [512 mm].
- **Short Moving Coil Assembly:** The coil assembly is comprised of a 3 phase winding and 3 thermistors that are inserted into a laminated stack. The entire assembly is then encapsulated with thermally conductive epoxy. An optional, externally mounted Hall Effect board is available. T-slots along with T-nuts in the lamination stack are provided for mounting the coil assembly to the moving member of the customer supplied table assembly. The coil assembly is available in many different widths and lengths, to meet the customers force and packaging requirements. Multiple coils can be supplied with a single magnet assembly to allow for independent moving heads or they can be coupled together to produce larger forces. The standard lengths for the coil assemblies are from 7.88" [200 mm] to 28.7" [728 mm].

#### Required Electronics:

The motor requires either a trapezoidal or sinusoidal 3 phase brushless amplifier with power supply that is rated with sufficient current and voltage to meet the motion requirements. The back emf that is generated by the coil assembly must be taken into account when sizing the amplifier.

#### Environmental Considerations:

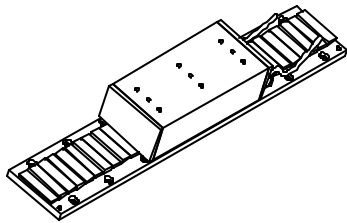
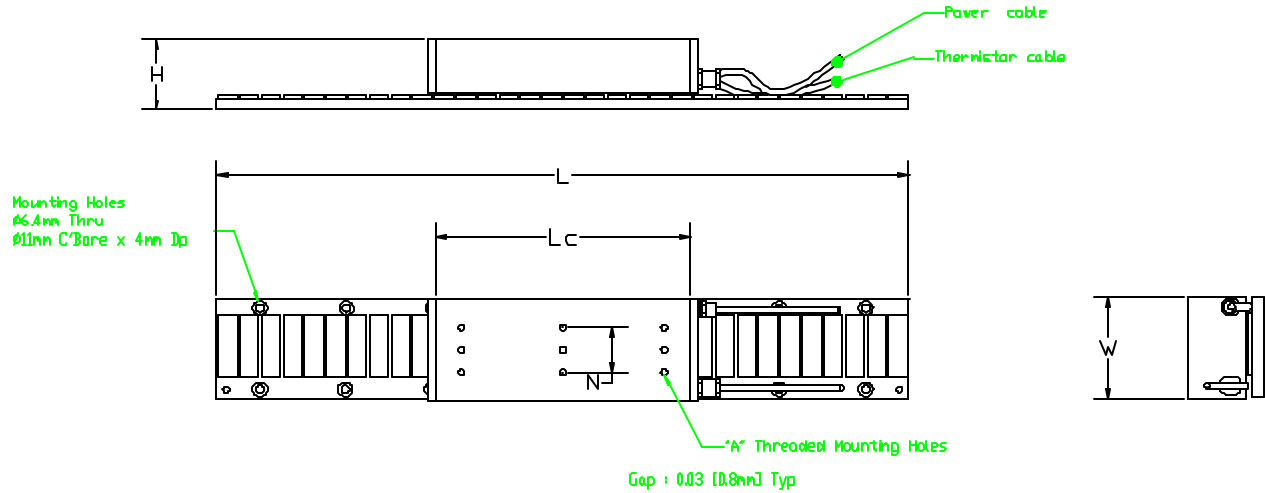
The brushless motor is an open type motor and should not be mounted in an environment that is wet or excessively dirty. It should be protected with some type of bellows or cover when installed by the customer.

#### Mounting:

The brushless linear motor should be mounted to flat (better than .003"/ft [246 microns / m]) and stiff surface. Thru holes in the magnet assembly and threaded holes in the coil assembly are present for mounting the linear motor to the customers system. A cable carrier must be provided by the customer to route the motor, thermistor and Hall Effect cables. The motor may be mounted in any orientation.

#### Ordering Info:

DC brushless motors can be ordered for any stroke and any peak force up to 2214 lbs [9839 N]. Higher forces can be achieved by adding additional coil assemblies in series (consult factory for more information)



Model #	Coil in	Length [mm]
BLSX-06	7.88	[200.2]
BLSX-11	14.8	[376.2]
BLSX-17	21.7	[552.2]
BLSX-22	28.7	[728.2]

Model #	H	W	A	N
BLSA	54	61	M5	1
BLSB	56	81	M5	1
BLSC	56	101	M5	2
BLSD	58	131	M5	2
BLSE	60	181	M5	3
BLSF	60	231	M5	5

Model #	Kp lbs/amp [N/amp]	Fc lbs [N]	Fp lbs [N]	Ic amps	Ip amps	Ve V/in/s [V/m/s]	Rc ohms	L mHenry	Coil Weight lbs [Kg]
BLSA-06	10.4 [46]	29 [128]	83 [369]	2.8	11	1.0 [37]	2.7	18	4.9 [2.2]
BLSB-06	17.3 [77]	46 [204]	138 [615]	2.7	11	1.6 [62]	3.8	29	7.5 [3.4]
BLSC-06	24.1 [107]	63 [278]	194 [861]	2.7	11	2.2 [87]	4.8	40	10.2 [4.6]
BLSD-06	34.4 [153]	87 [386]	277 [1229]	2.6	11	3.2 [124]	6.4	55	14.1 [6.4]
BLSE-06	51.8 [230]	127 [565]	415 [1844]	2.5	11	4.9 [187]	9.0	82	20.6 [9.3]
BLSF-06	69.1 [307]	168 [741]	533 [2459]	2.5	11	6.3 [249]	11.6	109	27.2 [12.3]
BLSA-11	20.7 [92]	56 [251]	166 [738]	2.8	11	1.9 [75]	5.4	36	9.7 [4.4]
BLSB-11	34.7 [154]	90 [399]	277 [1230]	2.7	11	3.2 [124]	7.5	57	14.6 [6.6]
BLSC-11	48.4 [215]	122 [541]	388 [1722]	2.6	11	4.4 [174]	9.6	79	19.7 [8.9]
BLSD-11	69.1 [307]	169 [749]	554 [2460]	2.5	11	6.3 [249]	12.7	111	27.2 [12.3]
BLSE-11	104.0 [461]	246 [1091]	830 [3689]	2.4	11	9.5 [373]	18.0	164	39.6 [17.9]
BLSF-11	138.0 [614]	322 [1430]	1107 [4919]	2.4	11	12.6 [498]	23.2	218	52.4 [23.7]
BLSA-17	31.1 [138]	84 [374]	249 [1107]	2.8	11	2.8 [112]	8.2	54	14.4 [6.5]
BLSB-17	51.8 [230]	133 [593]	415 [1845]	2.6	11	4.8 [187]	11.3	86	21.7 [9.8]
BLSC-17	72.5 [322]	181 [803]	581 [2583]	2.6	11	6.6 [261]	14.4	118	29.2 [13.2]
BLSD-17	104.0 [461]	250 [1112]	830 [3689]	2.5	11	9.5 [373]	19.1	166	40.4 [18.3]
BLSE-17	156.0 [691]	364 [1617]	1245 [5534]	2.4	11	14.2 [560]	27.0	246	58.8 [26.6]
BLSF-17	207.0 [921]	477 [2118]	1660 [7379]	2.4	11	18.9 [746]	34.8	326	77.8 [35.2]
BLSA-22	20.7 [92]	112 [498]	332 [1476]	5.6	22	1.9 [75]	2.7	18	19.0 [8.6]
BLSB-22	34.7 [154]	177 [787]	554 [2460]	5.2	22	3.5 [124]	3.8	29	29.0 [13.1]
BLSC-22	48.4 [215]	240 [1066]	775 [3444]	5.0	22	4.4 [174]	4.8	39	38.7 [17.5]
BLSD-22	69.1 [307]	332 [1474]	1107 [4920]	5.0	22	6.3 [249]	6.4	56	53.5 [24.2]
BLSE-22	104.0 [461]	482 [2143]	1660 [7379]	4.8	22	9.5 [373]	9.0	82	77.8 [35.2]
BLSF-22	138.0 [614]	631 [2805]	2214 [9839]	4.8	22	12.6 [498]	11.6	109	103.0 [46.6]

Fc= Continuous Force, Fp = Peak Force @ 10% Duty  
 Kp = Force Constant, Ic = Continuous Current, Ip = Peak Current @ 10 % Duty  
 Required DC Bus Voltage for Amplifier; V required = (Ip x Rc x 1.4) +(Ve x Velocity)