Linear Motors are Designed for High Linear Velocities and High Acceleration

Baldor has a wide variety of linear motors, positioning stages and controls for your application needs. They provide direct linear motion without mechanical linkages, therefore no backlash. Standard and custom designs are available. Baldor also has drives and motion controllers for powering and positioning of linear motors and stages.

Advantages of Linear Motors

- High speeds – 200 in/sec [5 m/s] with encoder resolution > 1 micron
- High accelerations – up to 10 g's [98 m/s]
- Small, compact – fits into smaller spaces
- Unlimited strokes from 0.01 in [0.000254 m]
- Submicron positioning when coupled with appropriate feedback and bearings
- No backlash from gears or slippage from belts – provides smooth operation
- Reliability – non-contact operation reduces component wear and reduces maintenance

Types of Linear Motors

Baldor offers many types of linear motors to meet a variety of application requirements.

- Cog-free brushless
- Iron core brushless
- DC brushed linear
- AC induction
- AC polynoid
- DC non-commutated
- Single axis stepper
- Dual axis stepper

Linear Motor Design Characteristics

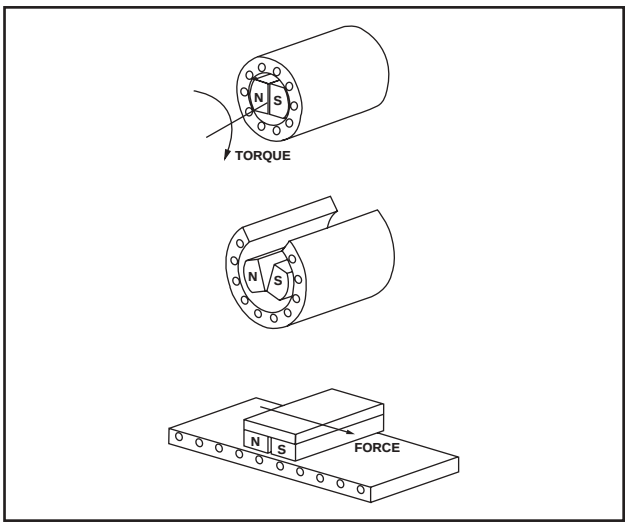
Specification	Description
Ratings	Models with peak forces up to 1530 lbs [6800 N] with 10% duty cycle
Acceleration	Standard and custom bearings available for up to 10 g's (9.8 m/s)
Accuracy	Up to 0.0001 in/ft (2.5 µm/300 mm)
Repeatability	High repeatability models to 0.00004 inches (1 µm)
Protection	Internal thermal switch

Linear Motor Technology

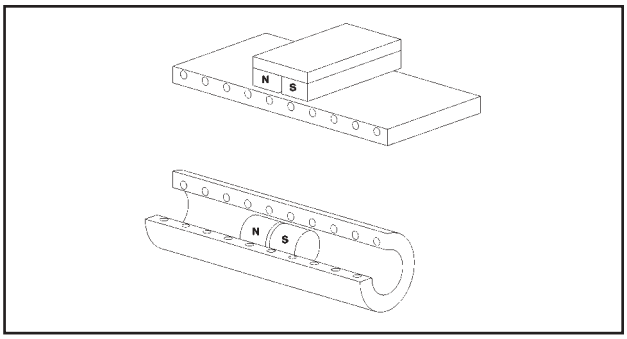
The same electromagnetic force that produces torque in a rotary motor also produces direct force in a linear motor. For example, a permanent magnet DC linear motor is similar to a permanent magnet DC rotary motor and an AC induction linear motor is similar to a squirrel cage induction motor.

Take a rotary motor, split it radially along its axis of rotation and flatten it out. The result is a flat linear motor that produces direct linear force instead of torque. Why? Torque is force at a distance. Removing the distance (axis of rotation) leaves direct linear force. It follows that linear motors utilize the same controls as rotary motors. And similar to a rotary motor with rotary encoders, linear motor positioning is provided by a linear encoder.

A variation of the linear motor is the tubular linear motor. This design rolls up the motor about an axis parallel to its length. This results in a "non-commutated" motor. Designs are available with either a moving coil or moving magnets.



Imaginary process of unrolling a rotary motor.



Tubular non-commutated DC Linear Motor.

Linear Motor Performance

Linear motor output is measured in Lbs. [N] of force or thrust:

- Linear motors provide force to 2000 Lbs. [8900N], and speeds to 200 in/sec [5 m/s] depending upon encoder resolution.
- Higher speeds are possible with special controls
- Unlimited strokes from 0.01 in [0.000254m]
- Submicron positioning when coupled with an appropriate feedback element and bearing system.
- Acceleration up to 10g's [98 m/s^2]

Linear motors are capable of force based on the following primary/secondary areas:

Linear Motor	F/A (Lb/in^2) [N/cm^2] at 100% Duty Cycle	F/A (Lb/in^2) [N/cm^2] at 10% Duty Cycle
Stepper	2.5 [1.75]	2.5 [1.75]
DC Brush and Brushless	2.5 [1.75]	7.5 [5.25]
AC Linear Induction	0.25 [0.18]	1.25 [0.88]

Linear Motor Product Characteristics Overview

Baldor offers the largest selection of linear motors and stages available to assure that you get the best linear motor solution for your application.

	Linear Motors							
	Cog-free Brushless	**Iron Core Brushless**	**Brush**	**AC Induction**	**AC Polynoid**	**DC Non Commutated**	**Single Axis Stepper**	**Dual Axis Stepper**
Motor Series	LMCF	LMBL	LMBR	LMAC	LMPY	LMNM	LMSS	LMDS
Continuous Force Lbs [N]	1-173 [4-250]	10-500 [44-2220]	4.2-55 [20-245]	15-100 [67-445]	1-20 [4-90]	0.5-50 [2-220]	2-50 [9-220]	2.5-30 [10-130]
Peak Force @ 10% Duty Lbs [N]	3-517 [13-750]	30-1530 [133-6800]	13-171 [60-760]	70-500 [310-2225] (15% duty)	5-54 [22-240]	1.58-150 [7-667]	2-50 [9-220] (static)	2.5-30 [10-130] (static)
Acceleration③ g's [m/s^2]	10 [98]	10 [98]	5 [49]	1 [9.8]	1 [9.8]	5 [49]	1 [9.8]	1 [9.8]
Maximum Speed in/sec [m/s]	200 [5]	200 [5]	75 [1.8]	270 [6.8] @ 60 Hz 2000 [50.8] @ 400 Hz	90 [2.3]	100 [2.5] @400Hz	890 [2]	60 [1.5]
Maximum Stroke in[m]	Unlimited	Unlimited	132 [3.2]	Unlimited	120 [3]	4 [0.10]	144 [3.7]	36 x 59 [0.914x1.498]
Accuracy① in/ft [µm/300mm] ④	0.0001 [25]	0.0001 [2.5]	0.0001 [2.5]	0.0001 [2.5]	N/A	0.0001 [2.5]	0.001 [2.5]	0.001 [25]
Repeatability① in [µm] ④	0.00004 [1]	0.00004 [1]	0.00004 [1]	0.00004 ② [1]	N/A	0.00004 [1]	0.0004 [10]	0.0002 [5.08]
Positioning Type	Closed Loop	Closed Loop	Closed Loop	Open or Closed Loop	Open or Closed Loop	Open or Closed Loop	Open Loop	Open Loop
Control	3-Phase Brushless Control	3-Phase Brushless Control	PWM DC Control	Single or 3 Phase AC Line or Adj. Speed	Single or 3 Phase AC Line	Linear or Brushless Control	Stepper Motor Driver	Stepper Motor Driver
Load Support	Customer Supplied Bearing	Customer Supplied Bearing	Customer Supplied Bearing	Customer Supplied Bearing	Rulon Bearing	Linear Recirculating Jewel Sapphire or Bronze Bearing	Roller or Air Bearing	Air Bearing

NOTES: All specifications are for reference only.
① Encoder dependent
② Vector control required, and encoder dependent
③ Acceleration is dependant on amount of mass attached.
④ Accuracy and repeatability are referenced against a laser interferometer. Tighter tolerances are available.

Cog-free Brushless Servo Motor

The Cog-free brushless linear motor is designed for unlimited stroke (travel) servo applications that require smooth operation without cogging. These motors are supplied in kit form to be integrated into a customer's machine. They are used in closed-loop servo systems and provide optimum performance.

Design Specifications

- Peak forces to 517 Lbs [2300 N]
- High acceleration to 10g's [98m/s^2]
- High speeds to 200 in/sec [5m/s] with encoder resolution > 1 micron
- Speeds to 100 in/sec with encoder resolutions ≤ 1 micron
- High accuracy ±0.0001 in/ft [2.5µm/300m] (encoder dependent)
- High repeatability 0.00004 in [1µm] (encoder dependent)

Features

- Unlimited stroke length
- Independent multiple coil operation with overlapping trajectories
- No metal-to-metal contact, virtually maintenance free
- Modular magnet tracks for ready shipment
- Use with: Trapezoidal or sinusoidal 3-phase brushless control (refer to Baldor AC controls Flex/Flex+ Series).

The linear brushless AC Cog-free servo motor consists of a stationary magnet track and a moving coil assembly. The U-shaped, multi-pole magnet track is comprised of alternating polarity rare-earth magnets bonded to a hard-chrome plated, cold-rolled steel plate. Modular track assemblies stack end to end to provide the length of stroke required. The coil assembly must be centered within the U-shaped magnet track and guided by customer supplied bearings. Individual coil assemblies can be mounted in series (as a single unit) to increase force. Multiple coil assemblies having independent operation and overlapping trajectories can also be mounted on a single magnet track.

The moving primary is a three-phase ironless core coil. The winding is encapsulated in thermally conductive epoxy. The ironless core eliminates the magnetic-attractive force between the coil assembly and the magnet track. A twisted shielded four conductor high flex cable supplies power to the coil assembly. The standard coil assembly is provided with Hall sensors for sinewave commutation alignment, trapezoidal commutation, and crash recovery. Custom designs without Hall sensors are available. An aluminum mounting bracket is integrated with the coil assembly. For improved heat dissipation and increased force, a water cooling option is available on some models.

Cog-free Brushless Servo Motor Technical Data

		Catalog Number						
Parameter	**Units**	**LMCF 02A-HC0**	**LMCF 02B-HC0**	**LMCF 04B-HC0**	**LMCF 02C-HC0**	**LMCF 04C-HC0**	**LMCF 06C-HC0**	**LMCF 08C-HC0**
General:								
Continuous Force ①②③	Lbs [N]	1.2 [5.3]	3.1 [13.8]	6.2 [27.8]	6.5 [29]	13 [58]	19.5 [87]	26 [115.6]
Continuous Current	Amps	1.7	2.1	2.1	1.9	1.9	1.9	1.9
Peak Force @ 10% Duty	Lbs [N]	3.6 [16]	9.4 [41.8]	18.7 [83.3]	19.5 [86.8]	39 [173]	58 [260]	78.2 [347]
Peak Current @ 10% Duty	Amps	5.1	6.3	6.3	5.7	5.7	5.7	5.7
Continuous Power	Watts	11.0	19.6	39.3	24.8	49.5	74.3	99.0
Mechanical:								
No. of Poles		2	2	4	2	4	6	8
Coil Assembly Length								
w/Hall Effect Sensors	in [mm]	3.45 [87.6]	3.45 [87.6]	5.85 [148.6]	3.45 [87.6]	5.85 [148.6]	8.25 [209.6]	10.65 [270.5]
w/o Hall Effect Sensors	in [mm]	2.9 [73.7]	2.9 [73.7]	5.3 [134.6]	2.9 [73.7]	5.3 [134.6]	7.7 [195.6]	10.1 [256.5]
Coil Assembly Weight	Lbs [kg]	0.17 [0.08]	0.25 [0.11]	0.49 [0.22]	0.39 [0.18]	0.7 [0.32]	1.25 [0.57]	1.64 [0.75]
Magnet Track Weight	Lbs/inch	0.2	0.31	0.31	0.45	0.45	0.45	0.45
	[kg/m]	[3.6]	[5.5]	[5.5]	[8.05]	[8.05]	[8.05]	[8.05]
Electrical:								
Force Constant	Lbs/Amp	0.7	1.5	3.0	3.4	6.8	10.3	13.7
Ph - Ph	[N/Amp]	[3.1]	[6.7]	[13.2]	[15.2]	[30.4]	[45.6]	[60.9]
Back EMF Constant	V/in/sec	0.08	0.17	0.34	0.39	0.77	1.16	1.55
Ph - Ph	[V/m/sec]	[3.1]	[6.7]	[13.2]	[15.2]	[30.4]	[45.6]	[60.9]
Ph-Ph Resistance @ 25°C	Ohms	2.7	3.2	6.4	5.3	10.6	15.9	21.1
Thermal Resistance	W/deg C	0.11	0.20	0.39	0.33	0.66	0.99	1.32
Inductance Ph - Ph	mH	3.2	15.9	4.0	12.1	10.6	15.9	21.2
Electrical Time Constant	msec	0.2	1.0	1.0	1.3	1.0	1.0	1.0
Km Motor Constant	Lb/$\sqrt{W}$	0.43	0.84	1.17	1.49	2.1	2.6	2.97
	[N/$\sqrt{W}$]	[1.9]	[3.7]	[5.2]	[6.6]	[9.4]	[11.5]	[13.3]

NOTES: All specifications are for reference only.
Technical data at 75°C rise over 25°C ambient.
① Addition of 10 in x 10 in x 1 in aluminum heat sink increases continuous force by 20%.
② Addition of forced air cooling increases continuous force 12%.
③ Liquid cooling option increases continuous forces by 25% and power dissipation by 50%. Available on D, E and F series motors only.

Cog-free Brushless Servo Motor Technical Data

		Catalog Number					
Parameter	**Units**	**LMCF 02D-HC0**	**LMCF 04D-HC0**	**LMCF 06D-HC0**	**LMCF 08D-HC0**	**LMCF 10D-HC0**	**LMCF 12D-HC0**
General:							
Continuous Force ①②③	Lbs [N]	8.3 [36.8]	16.5 [73.6]	24.8 [110]	33 [147]	41.3 [183.6]	49.6 [220.3]
Continuous Current	Amps	1.5	1.5	1.5	1.5	3.0	3.0
Peak Force @ 10% Duty	Lbs [N]	24.8 [110]	49.5 [220]	74.5 [331]	99 [441]	123 [550]	148 [660]
Peak Current @ 10% Duty	Amps	4.4	4.4	4.4	4.4	8.9	8.9
Continuous Power	Watts	25.9	51.8	77.6	103.5	129.4	155.3
Mechanical:							
No. of Poles		2	4	6	8	10	12
Coil Assembly Length w/Hall Effect Sensor	in [mm]	3.45 [87.6]	5.85 [148.6]	8.25 [209.6]	10.65 [270.5]	13.05 [331.5]	15.45 [392.4]
w/o Hall Effect Sensor	in [mm]	2.9 [74]	5.3 [135]	7.7 [196]	10.1 [257]	12.5 [318]	14.9 [378]
Coil Assembly Weight	Lbs [kg]	0.76 [0.35]	1.38 [0.6]	2 [0.9]	2.6 [1.2]	3.2 [1.5]	3.9 [1.8]
Magnet Track Weight	Lbs/inch	0.65	0.65	0.65	0.65	0.65	0.65
	[kg/m]	[11.63]	[11.63]	[11.63]	[11.63]	[11.63]	[11.63]
Electrical:							
Force Constant	Lbs/Amp	5.6	11.2	16.7	22.3	13.9	16.7
Ph - Ph	[N/Amp]	[24.8]	[49.6]	[74.4]	[99.3]	[61.8]	[74.2]
Back EMF Constant	V/in/sec	0.63	1.26	1.89	2.52	1.57	1.88
Ph - Ph	[V/m/sec]	[24.8]	[49.6]	[74.4]	[99.3]	[61.8]	[74.16]
Ph-Ph Resistance @ 25°C	Ohms	9.1	18.2	27.3	36.4	11.3	13.6
Thermal Resistance	W/deg C	0.35	0.69	1.04	1.38	1.73	2.07
Inductance Ph - Ph	mH	12.1	24.2	36.2	48.3	15.0	18.0
Electrical Time Constant	msec	1.3	1.3	1.3	1.3	1.3	1.3
Km Motor Constant	Lbs/$\sqrt{W}$	1.85	2.61	3.2	3.7	4.1	4.51
	[N/$\sqrt{W}$]	[8.2]	[11.6]	[14.2]	[16.4]	[18.3]	[20.1]

NOTES: All specifications are for reference only.
Technical data at 75°C rise over 25°C ambient.
① Addition of 10 in x 10 in x 1 in aluminum heat sink increases continuous force by 20%.
② Addition of forced air cooling increases continuous force 12%.
③ Liquid cooling option increases continuous forces by 25% and power dissipation by 50%. Available on D, E and F series motors only.

Cog-free Brushless Linear Motor Technical Data

		Catalog Number					
Parameter	**Units**	**LMCF 04E-HC0**	**LMCF 06E-HC0**	**LMCF 08E-HC0**	**LMCF 10E-HC0**	**LMCF 12E-HC0**	**LMCF 14E-HC0**
General:							
Continuous Force ①②③	Lbs [N]	28 [124]	42 [185]	56 [251]	70 [314]	85 [377]	99 [440]
Continuous Current	Amps	1.6	3.1	3.1	3.1	3.1	3.1
Peak Force @ 10% Duty	Lbs [N]	84 [372]	125 [556]	169 [753]	212 [942]	254 [1132]	297 [1321]
Peak Current @ 10% Duty	Amps	4.7	9.3	9.2	9.2	9.2	9.2
Continuous Power	Watts	71.3	106.9	142.1	178.1	214.1	250.1
Mechanical:							
No. of Poles		4	6	8	10	12	14
Coil Assembly Length w/Hall Effect Sensor	in [mm]	5.85 [148.6]	8.25 [209.6]	10.65 [270.5]	13.05 [331.5]	15.45 [392.4]	17.9 [453]
w/o Hall Effect Sensor	in [mm]	5.3 [135]	7.7 [196]	10.1 [257]	12.5 [318]	14.9 [378]	17.3 [439]
Coil Assembly Weight	Lbs [kg]	1.7 [0.77]	2.47 [1.12]	3.24 [1.47]	4.01 [1.82]	4.78 [2.17]	5.55 [2.52]
Magnet Track Weight	Lbs/inch	0.96	0.96	0.96	0.96	0.96	0.96
	[kg/m]	[17.2]	[17.2]	[17.2]	[17.2]	[17.2]	[17.2]
Electrical:							
Force Constant	Lbs/Amp	18	13.4	18.4	23.0	27.7	32.3
Ph - Ph	[N/Amp]	[79.9]	[59.7]	[82]	[102.5]	[123]	[143.5]
Back EMF Constant	V/in/sec	2.03	1.52	2.08	2.6	3.12	3.64
Ph - Ph	[V/m/sec]	[79.9]	[59.7]	[82]	[102.5]	[123]	[143.5]
Ph-Ph Resistance @ 25°C	Ohms	23	8.6	11.7	14.7	17.6	20.5
Thermal Resistance	W/deg C	0.95	1.43	1.90	2.38	2.86	3.34
Inductance Ph - Ph	mH	34.9	13.0	18.4	23.0	27.6	32.2
Electrical Time Constant	msec	1.5	1.5	1.6	1.6	1.6	1.6
Km Motor Constant	Lbs/$\sqrt{W}$	3.7	4.6	5.4	6.0	6.6	7.1
	[N/$\sqrt{W}$]	[16.7]	[20.4]	[23.9]	[26.7]	[29.3]	[31.7]

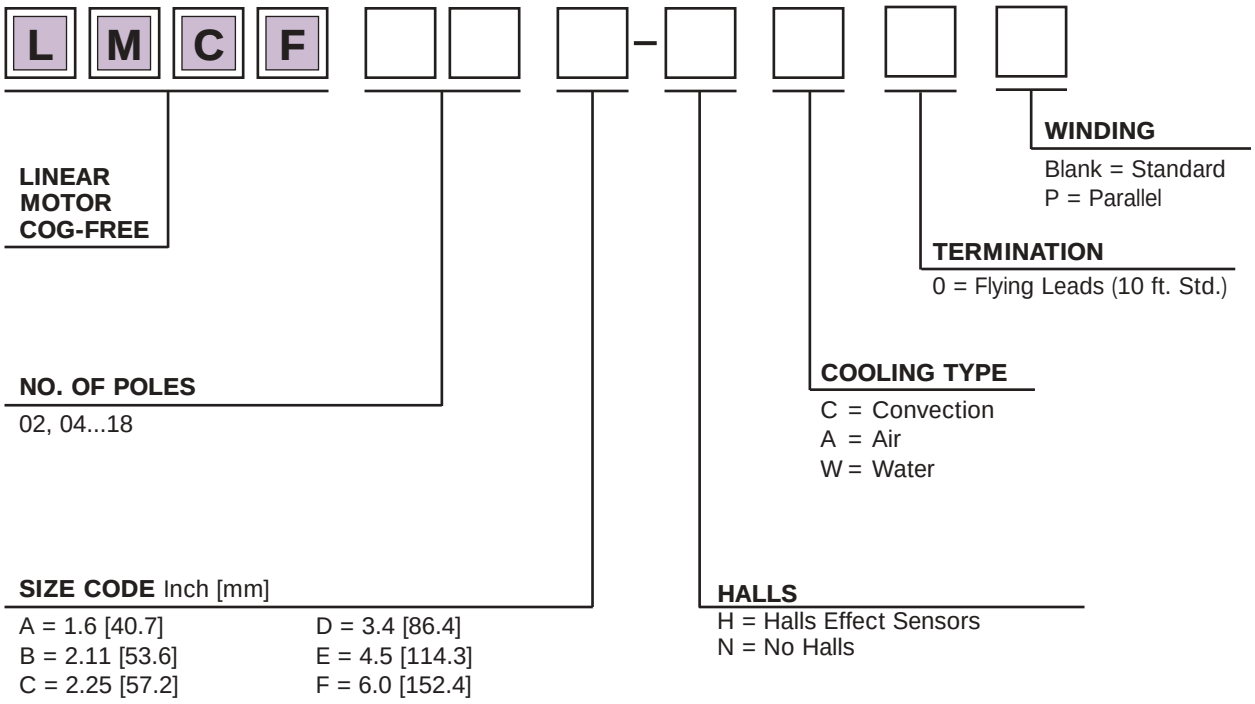
NOTES: All specifications are for reference only.
Technical data at 75°C rise over 25°C ambient.
① Addition of 10 in x 10 in x 1 in aluminum heat sink increases continuous force by 20%.
② Addition of forced air cooling increases continuous force 12%.
③ Liquid cooling option increases continuous forces by 25% and power dissipation by 50%. Available on D, E and F series motors only.

Cog-free Brushless Servo Motor Technical Data

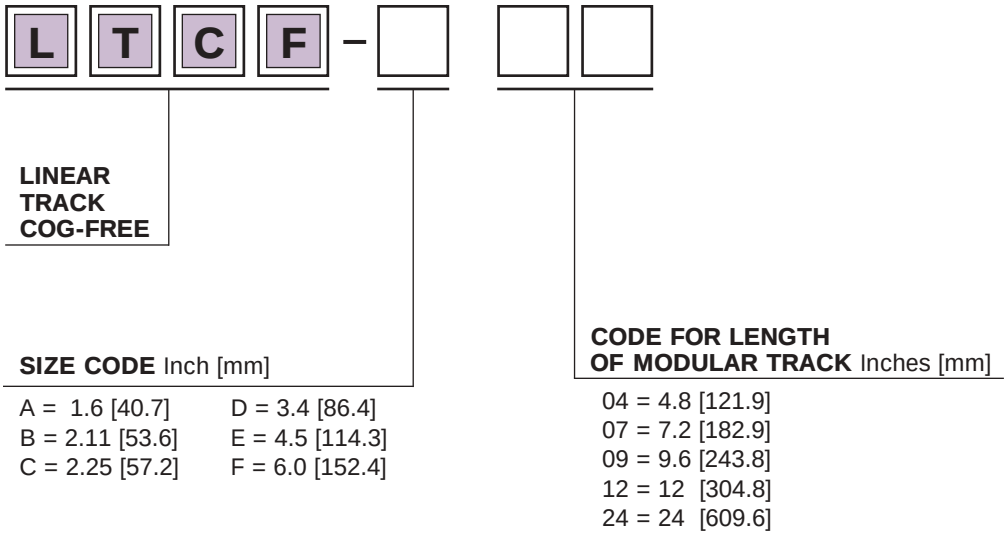
		Catalog Number			
Parameter	**Units**	**LMCF 04F-HC0**	**LMCF 08F-HC0**	**LMCF 12F-HC0**	**LMCF 16F-HC0**
General:					
Continuous Force ①②③	Lbs [N]	43 [191]	87 [387]	130 [578]	173 [771]
Continuous Current	Amps	2.6	2.6	3.9	5.2
Peak Force @ 10% Duty	Lbs [N]	130 [578]	256 [1152]	338 [1726]	517 [2300]
Peak Current @ 10% Duty	Amps	7.8	7.8	11.6	15.6
Continuous Power	Watts	91	182	273	364
Mechanical:					
No. of Poles		4	8	12	16
Coil Assembly Length*					
w/Hall Effect Sensor	in [mm]	6.15 [156.2]	10.95 [278.1]	15.75 [400]	20.55 [522]
w/o Hall Effect Sensor	in [mm]	5.6 [142.2]	10.4 [264.2]	15.2 [386.1]	20 [508]
Coil Assembly Weight	Lbs [kg]	3.64 [1.65]	6.76 [3.07]	9.88 [4.49]	13 [5.91]
Magnet Track Weight	Lbs/inch	1.9	1.9	1.9	1.9
	[kg/m]	[0.034]	[0.034]	[0.034]	[0.034]
Electrical:					
Force Constant	Lbs/Amp	16.72	33.44	33.34	33.24
Ph - Ph	[N/Amp]	[74.4]	[148.8]	[148.4]	[148.0]
Back EMF Constant	V/in/sec	1.89	3.78	3.77	3.76
Ph - Ph	[V/m/sec]	[74.4]	[148.4]	[148.4]	[148.0]
Ph-Ph Resistance @ 25°C	Ohms	10.5	21.0	14.0	10.4
Hot Resistance	Ohms	13.6	27.1	18.0	13.5
Thermal Resistance	W/deg C	1.2	2.4	3.6	4.9
Inductance Ph - Ph	mH	13.6	27.2	18.0	13.4
Electrical Time Constant	msec	1.3	1.3	1.3	1.3
Km Motor Constant	Lbs/$\sqrt{W}$	5.15	7.3	8.93	10.29
	[N/$\sqrt{W}$]	[22.9]	[32.5]	[39.7]	[45.8]

NOTES: All specifications are for reference only.
Technical data at 75°C rise over 25°C ambient.
① Addition of 10 in x1 0 in x 1 in aluminum heat sink increases continuous force by 20%.
② Addition of forced air cooling increases continuous force 12%.
③ Liquid cooling option increases continuous forces by 25% and power dissipation by 50%. Available on D, E and F series motors only.

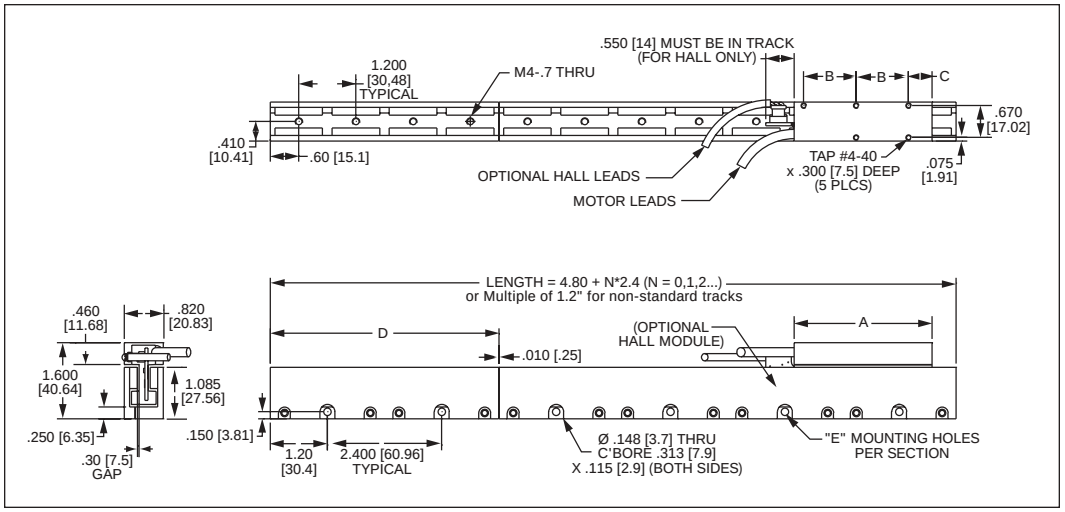
Cog Free Brushless Servo Identification Matrix



Cog Free Magnet Track Identification Matrix



Size A Cog-free Brushless Motor Dimensions (Inches [mm])



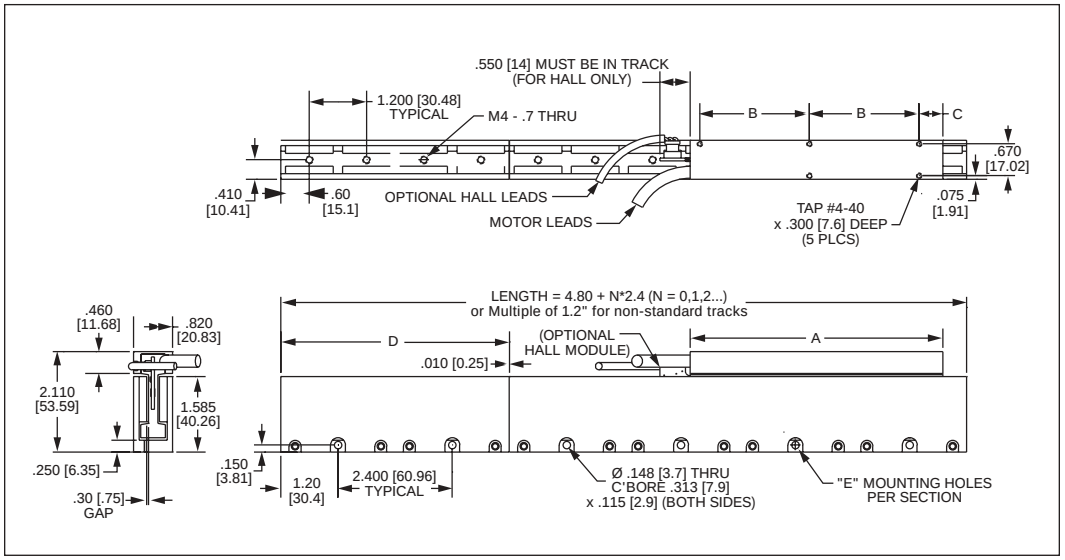
LMCF Size A Brushless 3 ϕ Coil Assembly (inches [mm])

Catalog Number	A	B	C
LMCF02A-HC0	2.90 [73.7]	1.1 [27.94]	.50 [12.7]

LMCF Size A Magnet Track Assembly (inches [mm]) *

Catalog Number	D	E
LTCF-A04	4.8 [121.9]	2
LTCF-A07	7.2 [182.9]	3
LTCF-A09	9.6 [243.8]	4
LTCF-A12	12.0 [304.8]	5
LTCF-A24	24.0 [609.6]	10

Size B Cog-free Brushless Motor Dimensions (Inches [mm])



LMCF Size B Brushless 3ϕ Coil Assembly (inches [mm])

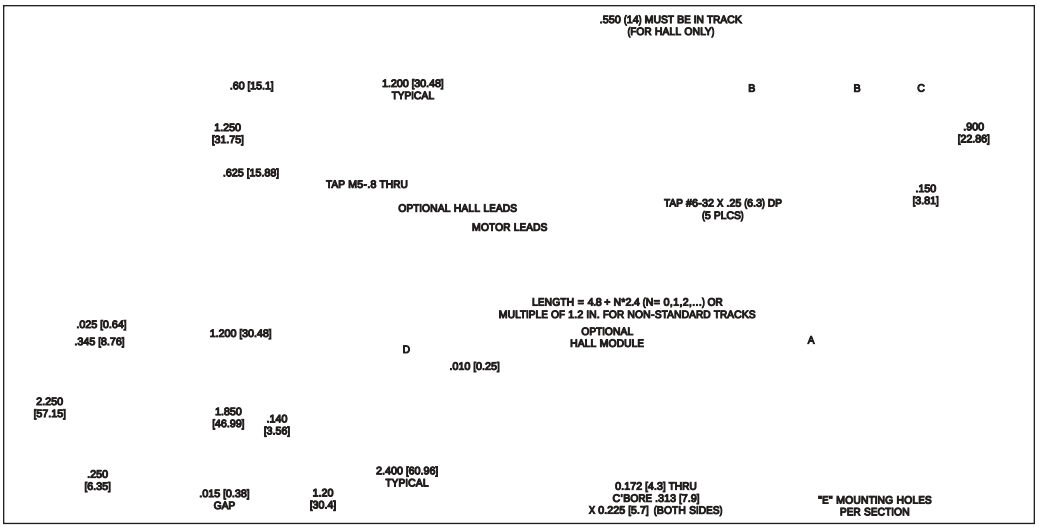
Catalog Number	A	B	C
LMCF02B-HC0	2.90 [73.7]	1.100 [27.94]	.50 [12.7]
LMCF04B-HC0	5.30 [134.6]	2.300 [58.42]	.50 [12.7]

LTCF Size B Magnet Track Assembly (inches [mm]) *

Catalog Number	D	E
LTCF-B04	4.80 [121.9]	2
LTCF-B07	7.20 [182.9]	3
LTCF-B09	9.60 [243.8]	4
LTCF-B12	12.00 [304.8]	5
LTCF-B24	24.00 [609.6]	10

NOTES: All specifications are for reference only.
***** Magnet tracks are modular and may be placed end to end to create longer track lengths.
Minimum track length must be equal to stroke plus length of coil assembly. See "Sizing Track Length" in Application section.
Maximum length (stroke plus coil) is 48 inches [1.22 meters] for single track piece.

Size C Cog-free Brushless Motor Dimensions (Inches [mm])



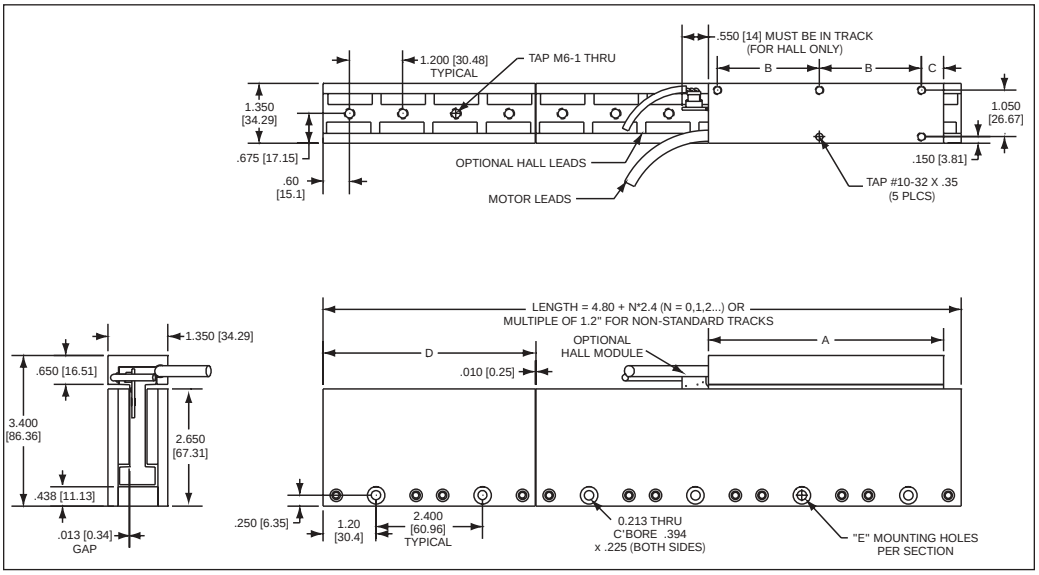
LMCF Size C Brushless 3ϕ Coil Assembly (inches [mm])

Catalog Number	A	B	C
LMCF02C-HC0	2.9 [73.66]	1.1 [27.94]	0.50 [12.7]
LMCF04C-HC0	5.3 [134.62]	2.3 [58.42]	0.50 [12.7]
LMCF06C-HC0	7.7 [195.58]	3.5 [88.90]	0.50 [12.7]
LMCF08C-HC0	10.1 [256.54]	4.7 [119.38]	0.50 [12.7]

LTCF Size C Magnet Track Assembly (inches [mm]) *

Catalog Number	D	E
LTCF-C04	4.8 [121.92]	2
LTCF-C07	7.2 [182.88]	3
LTCF-C09	9.6 [243.84]	4
LTCF-C12	12.0 [304.80]	5
LTCF-C24	24.0 [609.60]	10

Size D Cog-free Brushless Motor Dimensions (Inches [mm])



LMCF Size D Brushless 3ϕ Coil Assembly (inches [mm])

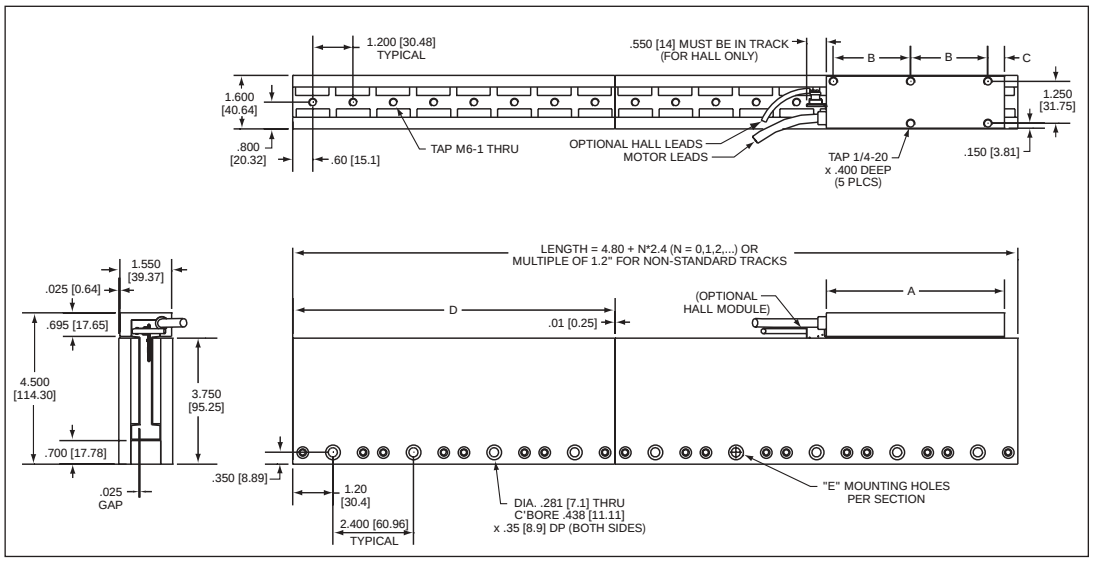
Catalog No.	A	B	C
LMCF02D-HC0	2.9 [73.66]	1.1 [27.94]	0.50 [12.7]
LMCF04D-HC0	5.3 [134.62]	2.3 [58.42]	0.50 [12.7]
LMCF06D-HC0	7.7 [195.58]	3.5 [88.9]	0.50 [12.7]
LMCF08D-HC0	10.1 [256.54]	4.7 [119.38]	0.50 [12.7]
LMCF10D-HC0	12.5 [317.5]	5.9 [149.86]	0.50 [12.7]
LMCF12D-HC0	14.9 [378.46]	5.9 [149.86]	1.70 [43.2]

LTCF Size D Magnet Track Assembly (inches [mm]) *

Catalog No.	D	E
LTCF-D04	4.8 [121.92]	2
LTCF-D07	7.2 [182.88]	3
LTCF-D09	9.6 [243.84]	4
LTCF-D12	12.0 [304.80]	5
LTCF-D24	24.0 [609.60]	10

NOTES: All specifications are for reference only.
* Magnet tracks are modular and may be placed end to end to create longer track lengths.
Minimum track length must be equal to stroke plus length of coil assembly. See "Sizing Track Length" in Application section.
Maximum length (stroke plus coil) is 48 inches [1.22 meters] for single track piece.

Size E Cog-free Brushless Motor Dimensions (Inches [mm])



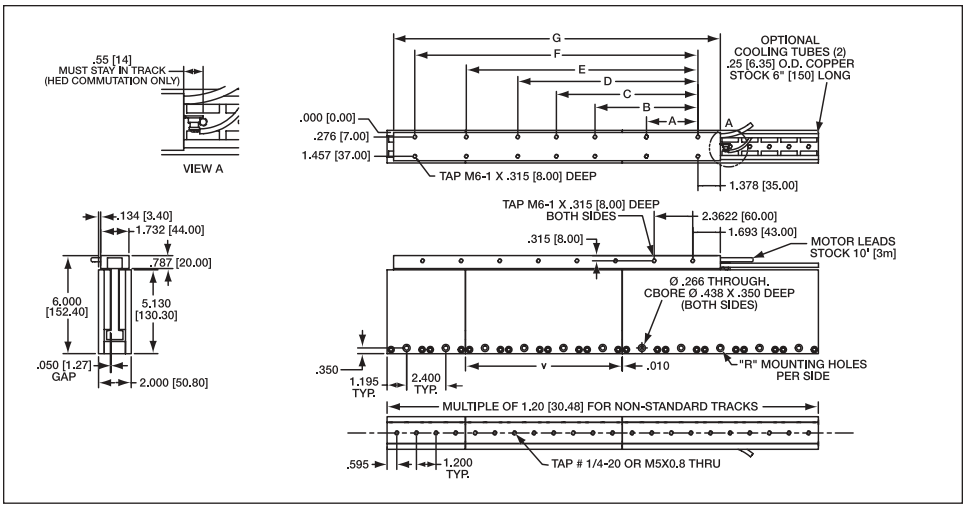
LMCF Size E Brushless 3ϕ Coil Assembly (inches [mm])

Catalog No.	A	B	C
LMCF04E-HC0	5.3 [134.62]	2.3 [58.42]	0.50 [12.7]
LMCF06E-HC0	7.7 [195.58]	3.5 [88.90]	0.50 [12.7]
LMCF08E-HC0	10.1 [256.54]	4.7 [119.38]	0.50 [12.7]
LMCF10E-HC0	12.5 [317.50]	5.9 [149.86]	0.50 [12.7]
LMCF12E-HC0	14.9 [378.46]	5.9 [149.86]	2.9 [73.66]
LMCF14E-HC0	17.3 [439.42]	5.9 [149.86]	5.3 [134.62]

LTCF Size E Magnet Track Assembly (inches [mm]) *

Catalog No.	D	E
LTCF-E04	4.8 [121.92]	2
LTCF-E07	7.2 [182.88]	3
LTCF-E09	9.6 [243.84]	4
LTCF-E12	12.0 [304.80]	5
LTCF-E24	24.0 [609.60]	10

Size F Cog-free Brushless Motor Dimensions (Inches [mm])



LTCF Size E Magnet Track Assembly (inches [mm]) *

Catalog No.	V	R
LTCF-E04	4.8 [121.92]	2
LTCF-E07	7.2 [182.88]	3
LTCF-E09	9.6 [243.84]	4
LTCF-E12	12.0 [304.80]	5
LTCF-E24	24.0 [609.60]	10

LMCF Size F Brushless 3ϕ Coil Assembly (inches [mm])

Catalog No.	A	B	C	D	E	F	G
LMCF04F-HC0	3.150 [80.00]	—	—	—	—	—	5.60 [142.2]
LMCF08F-HC0	2.362 [60.00]	5.512 [140.00]	7.874 [200.00]	—	—	—	10.40 [264.2]
LMCF12F-HC0	3.150 [80.00]	6.299 [160.00]	9.449 [240.00]	12.598 [320.00]	—	—	15.20 [386.1]
LMCF16F-HC0	3.150 [80.00]	6.299 [160.00]	8.661 [220.00]	11.024 [280.00]	14.173 [360]	17.323 [440]	20.00 [508.0]

NOTES: All specifications are for reference only.
* Magnet tracks are modular and may be placed end to end to create longer track lengths.
Size F CogFree brushless motor magnet tracks must be ordered as custom.
Minimum track length must be equal to stroke plus length of coil assembly. See "Sizing Track Length" in Application section.
Maximum length (stroke plus coil) is 48 inches [1.22 meters] for single track piece.

Iron Core Brushless Linear Servo Motor

The BL Series brushless linear motors are designed for unlimited stroke (travel) linear positioning applications. This motor is supplied in kit form, designed to be integrated into a customer's machine. They are used in closed-loop servo systems and provide high forces.

Design Specifications

- High forces to 1530 Lbs. [6800 N]
- High acceleration to 10g's [98 m/s^2]
- High speeds to 200 in/sec [5 m/s] with encoder resolution > 1 micron
- Speeds to 100 in/sec. [2.5 m/sec] with encoder resolution ≤ 1 micron
- High accuracy ±0.0001 in/ft [2.5 µm/300mm] (encoder dependent)
- High repeatability ±0.00004 in [1µm] (encoder dependent)

Features

- Unlimited stroke length
- Magnetic-attractive force between coil assembly and magnet track used as preload for bearing system
- Magnets skewed to reduce cogging
- Coil features reduce cogging
- Multiple coil independent operation with overlapping trajectories
- Non-contact, virtually maintenance free
- Lowest cost per pound of thrust brushless linear motor
- Use with trapezoidal or sinusoidal 3-phase brushless control (refer to Baldor's AC Controls – Flex/Flex+ Series)

The iron core brushless servomotors consist of stationary magnet track and a moving coil assembly supported by customer-supplied bearings. The stationary magnet track is comprised of multi-pole alternating polarity rare earth permanent magnets bonded to a hard-chromed cold-rolled steel plate. An air gap of 0.025 in [0.635 mm] must be maintained for proper motor operation. Mounting holes are provided in the magnet track for secure installation.

The moving coil consists of a steel laminated coil assembly encapsulated in thermally conductive epoxy. The standard coil assembly is provided with hall effect sensors for sinewave commutation alignment, crash recovery and when trapezoidal commutation is used. Custom designs without hall effect sensors are available. The moving coil assembly has mounting holes provided.

Iron Core Brushless Motor Technical Data

		Catalog Number					
Parameter	**Units**	**LMBL 02A-HC0**	**LMBL 04A-HC0**	**LMBL 06A-HC0**	**LMBL 06B-HC0**	**LMBL 08A-HC0**	**LMBL 08B-HC0**
General:							
Continuous Force	Lbs [N]	10 [44.5]	15.0 [66.8]	20 [89]	30 [133.4]	30 [133.4]	45 [200]
Continuous Current	Amps	1.0	1.6	1.7	3.6	2.6	5.5
Peak Force @ 10% Duty	Lbs [N]	30 [133.5]	45 [200.3]	60 [267]	90 [400]	90 [400]	135 [600]
Peak Current @ 10% Duty	Amps	3	4.8	5.1	10.8	7.8	16.5
Continuous Power	Watts	27	54	57	86	110	165
Attractive Force	Lbs [N]	200 [900]	300 [1330]	400 [1780]	600 [2670]	500 [2220]	750 [3340]
Mechanical:							
No. of Poles		2	4	6	6	8	8
Coil Assembly Length①	in [mm]	4.55 [116]	6.35 [161]	8.15 [207]	8.15 [207]	9.95 [253]	9.95 [253]
Coil Assembly Weight	Lbs [kg]	2.0 [0.91]	2.5 [1.14]	3.8 [1.7]	4.45 [2.02]	4.7 [2.2]	5.94 [2.7]
Magnet Track Weight	Lbs/inch	0.27	0.27	0.27	0.40	0.27	0.40
	[kg/m]	[4.8]	[4.8]	[4.8]	[7.2]	[4.8]	[7.2]
Electrical:							
Force Constant	Lbs/Amp	10	9.4	11.7	8.3	11.5	8.2
Ph - Ph	[N/Amp]	[44.5]	[41.8]	[52]	36.9	[51.2]	[36.5]
Back EMF Constant	V/in/sec	1.13	1.06	1.32	0.94	1.30	0.92
Ph - Ph	[V/m/sec]	[44.5]	[41.8]	[52]	36.9	[51.2]	[36.5]
Ph-Ph Resistance @ 25°C	Ohms	19	15	14	4.7	11.6	3.9
Ph-Ph Resistance @ 125°C		26.5	20.9	19.5	6.5	16.2	5.4
Thermal Resistance	W/deg C	0.27	0.54	0.57	0.86	1.10	1.65
Inductance Ph - Ph	mH	53	62	59	23.2	46.8	18.7
Electrical Time Constant	msec	2.79	4.13	4.21	4.94	4.03	4.79
Km Motor Constant	Lbs/$\sqrt{W}$	1.94	2.05	2.64	3.24	2.86	3.50
	[N/$\sqrt{W}$]	8.63	9.12	11.76	14.43	12.74	15.58

NOTES: All specifications are for reference only.
Technical data at 100°C rise over 25°C ambient.
① Coil Assembly Length is same with or without Hall Effect Sensors.
Water cooling option available for higher forces.

Iron Core Brushless Motor Technical Data

		Catalog Number							
Parameter	**Units**	**LMBL 10A-HC0**	**LMBL 10B-HC0**	**LMBL 12A-HC0**	**LMBL 12B-HC0**	**LMBL 14A-HC0**	**LMBL 14B -HC0**	**LMBL 16A-HC0**	**LMBL 16B-HC0**
General:									
Continuous Force	Lbs [N]	40 [177.9]	60 [270]	50 [222]	75 [330]	60 [267]	90 [400]	70 [311.5]	105 [470]
Continuous Current	Amps	3.3	6.9	4.5	7.6	4.2	6.0	6.1	6.5
Peak Force @ 10% Duty	Lbs [N]	120 [533]	180 [800]	150 [667]	225[1000]	180 [800]	270 [1200]	210 [934]	315 [1400]
Peak Current @ 10% Duty	Amps	9.9	20.8	13.5	22.7	12.5	18.0	18.3	19.4
Continuous Power	Watts	139	209	122	183	140	210	186	279
Attractive Force	Lbs [N]	600 [2700]	900 [4000]	700 [3100]	1050 [4670]	800 [3560]	1200 [5340]	900 [4000]	1350 [6000]
Mechanical:									
No. of Poles		10	10	12	12	14	14	16	16
Coil Assembly Length①	in [mm]	11.75 [299]	11.75 [299]	13.55 [345]	13.55 [345]	15.35 [390]	15.35 [390]	17.15 [436]	17.15 [436]
Coil Assembly Weight	Lbs [kg]	5.5 [2.5]	7.43 [3.37]	6.5 [2.9]	8.78 [3.98]	7.7 [3.5]	10.13 [4.6]	8.5 [3.86]	11.48 [5.21]
Magnet Track Weight	Lbs/inch	0.27	0.40	0.27	0.40	0.27	0.40	0.27	0.40
	[kg/m]	[4.8]	[7.2]	[4.8]	[7.2]	[4.8]	[7.2]	[4.8]	[7.2]
Electrical:									
Force Constant	Lbs/Amp	12.1	8.10	11.1	9.9	14.4	15.0	11.5	16.3
Ph - Ph	[N/Amp]	[53.8]	[38.3]	[49.4]	[44.0]	[64.1]	[66.7]	[51.2]	[72.5]
Back EMF Constant	V/in/sec	1.37	0.98	1.25	1.12	1.63	1.7	1.30	1.84
Ph - Ph	[V/m/sec]	[53.8]	[38.3]	[49.4]	[44.0]	[64.1]	[66.7]	[51.2]	[72.5]
Ph-Ph Resistance @ 25°C	Ohms	10.2	3.1	4.3	2.3	5.8	4.2	3.6	4.8
Ph-Ph Resistance @ 125°C		14.3	4.3	6.0	3.2	8.1	5.9	5.0	6.7
Thermal Resistance	W/deg C	1.39	2.09	1.22	1.83	1.4	2.10	1.86	2.79
Inductance Ph - Ph	mH	20.0	15.8	17.9	11.6	20.8	20.2	14.7	23.1
Electrical Time Constant	msec	1.96	5.10	4.16	5.04	3.59	4.81	4.08	4.81
Km Motor Constant	Lbs/$\sqrt{W}$	3.2	4.16	4.53	5.54	5.07	6.21	5.13	6.29
	[N/$\sqrt{W}$]	[14.25]	[18.48]	[20.16]	[24.66]	[22.56]	[27.62]	[22.84]	[27.96]

NOTES: All specifications are for reference only.
Technical data at 100°C rise over 25°C ambient.
① Coil Assembly Length is same with or without Hall Effect Sensors.
Water cooling options available for higher forces.

Iron Core Brushless Motor Technical Data

Catalog Number			
Parameter	**Units**	**LMBL 18A-HC0**	**LMBL 18B-HC0**
General:			
Continuous Force	Lbs [N]	80 [356]	120 [530]
Continuous Current	Amps	4.8	5.1
Peak Force @ 10% Duty	Lbs [N]	240 [1070]	360 [1602]
Peak Current @ 10% Duty	Amps	14.5	15.4
Continuous Power	Watts	210	315
Attractive Force	Lbs [N]	1000 [4450]	1500 [6670]
Mechanical:			
No. of Poles		18	18
Coil Assembly Length①	in [mm]	18.95 [482]	18.95 [482]
Coil Assembly Weight	Lbs [kg]	9.3 [4.2]	12.55 [5.7]
Magnet Track Weight	Lbs/inch	0.27	0.40
	[kg/m]	[4.83]	[7.2]
Electrical:			
Force Constant	Lbs/Amp	16.6	23.4
Ph - Ph	[N/Amp]	[73.8]	[104.1]
Back EMF Constant	V/in/sec	1.88	2.64
Ph - Ph	[V/m/sec]	[73.8]	[104.1]
Ph-Ph Resistance @ 25°C	Ohms	6.5	8.6
Ph-Ph Resistance @ 125°C		9.1	12.0
Thermal Resistance	W/deg C	2.10	3.15
Inductance Ph - Ph	mH	26.8	42.1
Electrical Time Constant	msec	4.12	4.9
Km Motor Constant	Lbs/$\sqrt{W}$	5.52	6.76
	[N/$\sqrt{W}$]	[24.53]	[30.07]

NOTES: All specifications are for reference only.
Technical data at 100°C rise over 25°C ambient.
① Coil Assembly Length is same with or without Hall Effect Sensors.
Water cooling option available for higher forces.

Iron Core Brushless Motor Technical Data

Parameter	Units	Catalog Number LMBL 08E-HC0	Catalog Number LMBL 17E-HC0
General:			
Continuous Force	Lbs [N]	250 [1110]	500 [2224]
Continuous Current	Amps	6.6	14.7
Peak Force @ 10% Duty	Lbs [N]	790 [3520]	1530 [7030]
Peak Current @ 10% Duty	Amps	19.8	44.1
Continuous Power	Watts	1394	3000
Attractive Force	Lbs [N]	3645 [16213]	7290 [32426]
Mechanical:			
No. of Poles		8	17
Coil Assembly Length①	in [mm]	16.6 [421.64]	32.8 [833.12]
Coil Assembly Weight	Lbs [kg]	45 [20]	80 [36]
Magnet Track Weight	Lbs/inch	1.1	1.1
	[kg/m]	[19.7]	[19.7]
Electrical:			
Force Constant	Lbs/Amp	38	34
Ph - Ph	[N/Amp]	[169]	[151]
Back EMF Constant	V/in/sec	4.3	3.8
Ph - Ph	[V/m/sec]	[169]	[150]
Ph-Ph Resistance @ 75°C	Ohms	23	10
Ph-Ph Resistance @ 125° C		32.0	13.9
Thermal Resistance	W/deg C	13.9	30.0
Inductance Ph - Ph	mH	94	42
Electrical Time Constant	msec	4.1	4.2
Km Motor Constant	Lbs/$\sqrt{W}$	7.9	10.76
	[N/$\sqrt{W}$]	[35.16]	[47.88]

NOTES: All specifications are for reference only.
Technical data at 100°c rise over 25°C ambient.
① Coil Assembly length is same with or without Hall Effect Sensors.

Brushless Catalog Identification Matrix

L M B L [ ][ ] [ ] - [ ] [ ] [ ]

LINEAR MOTOR BRUSHLESS

NO. OF POLES
02, 04, 06...18

SIZE CODE FOR WIDTH OF COIL ASSEMBLY
inch [mm]
A = 3 [76.2]
B = 4 [101.6]
E = 8.25 [209.55]

HALLS
H = Halls Effect Sensors
N = No Halls

COOLING TYPE
C = Convection
A = Air
W = Water

TERMINATION
0 = Flying Leads (10 ft. Std)

Brushless Magnet Track Catalog Identification Matrix

L T B L - [ ] [ ] [ ]

LINEAR TRACK BRUSHLESS

SIZE CODE FOR WIDTH OF COIL ASSEMBLY
Inch [mm]
A = 3 [76.2]
B = 4 [101.16]
E = 8.25 [209.55]

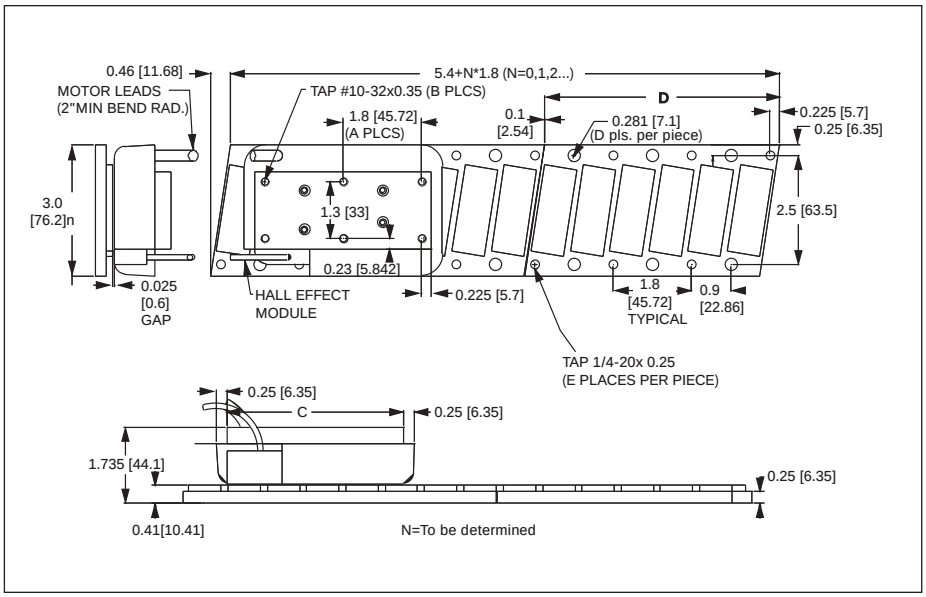
CODE FOR LENGTH OF MODULAR TRACK
Inch [mm]

For Sizes A & B:
05 = 5.4 [137.16]
07 = 7.2 [182.63]
18 = 18 [457.2]

For Size E:
07 = 7.2 [182.63]
10 = 10.8 [274.32]
25 = 25.2 [640.08]

"A" Width Iron Core Brushless Motor Dimensions

(Inches [mm])



LMBL SizeA 3ϕ Coil Assembly (inches [mm])

Catalog Number	A	B	C
LMBL02A-HC0	2	6	4.05 [102.87]
LMBL04A-HC0	3	8	5.85 [148.59]
LMBL06A-HC0	4	10	7.65 [194.31]
LMBL08A-HC0	5	12	9.45 [240.03]
LMBL10A-HC0	6	14	11.25 [285.75]
LMBL12A-HC0	7	16	13.05 [331.47]
LMBL14A-HC0	8	18	14.85 [377.19]
LMBL16A-HC0	9	20	16.65 [422.91]
LMBL18A-HC0	10	22	18.45 [468.63]

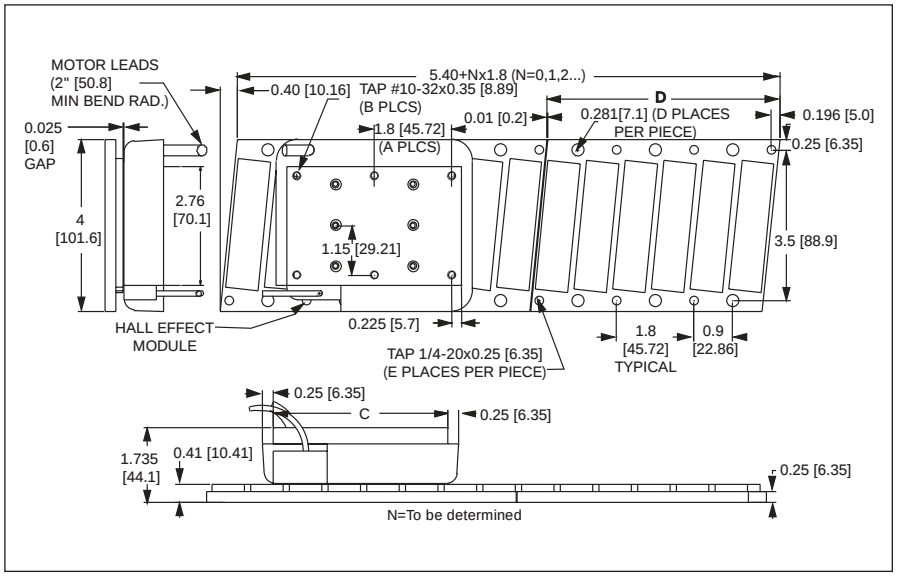
LTBL Size A Magnet Track Assembly (inches [mm]) ①

Catalog Number	D	E
LTBL-A05	5.4 [137.16]	6
LTBL-A07	7.2 [182.98]	8
LTBL-A18	18.0 [457.20]	20

NOTES: All specifications are for reference only.
① Modular magnet tracks may be placed end to end to create longer track lengths.

"B" Width Iron Core Brushless Motor Dimensions

(Inches [mm])

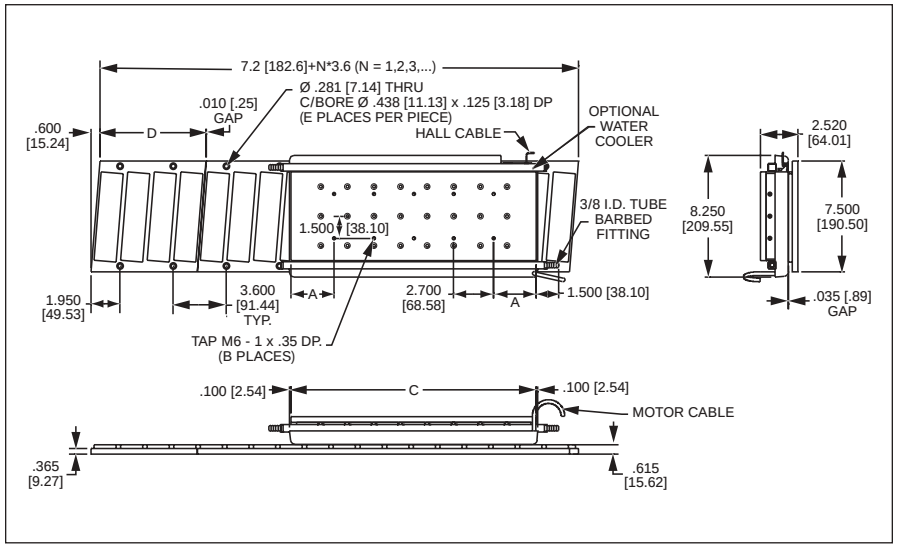


LMBL Size B 3ϕ Coil Assembly (inches [mm])			
Catalog Number	**A**	**B**	**C**
LMBL06B-HC0	4	10	7.65 [194.31]
LMBL08B-HC0	5	12	9.45 [240.03]
LMBL10B-HC0	6	14	11.25 [285.75]
LMBL12B-HC0	7	16	13.05 [331.47]
LMBL14B-HC0	8	18	14.85 [377.19]
LMBL16B-HC0	9	20	16.65 [422.91]
LMBL18B-HC0	10	22	18.45 [468.63]

LTBL Size B Magnet Track Assembly (inches [mm]) *		
Catalog Number	**D**	**E**
LTBL-B05	5.4 [137.16]	6
LTBL-B07	7.2 [182.88]	8
LTBL-B18	18.0 [457.20]	20

"E" Width Iron Core Brushless Motor Dimensions

(Inches [mm])



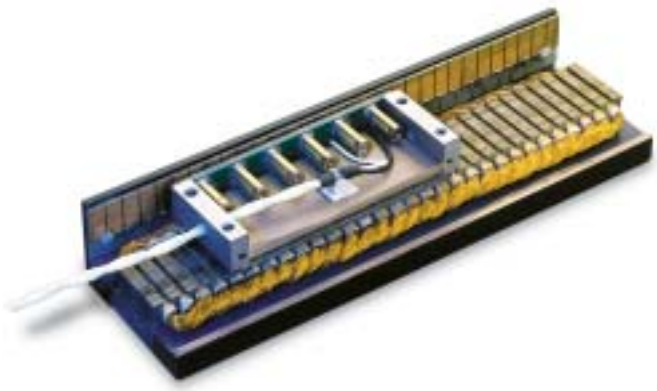
LMBL Size E Iron Core 3ϕ Coil Assembly (inches [mm])			
Catalog Number	**A**	**B**	**C**
LMBL08E-HC0	2.9 [73.66]	10	16.6 [421.64]
LMBL17E-HC0	2.9 [73.66]	22	32.8 [833.2]

LMBL Size E Magnet Track Assembly (inches [mm])①		
Catalog Number	**D**	**E**
LTBL-E07	7.2 [182.6]	4
LTBL-E10	10.8 [274.32]	6
LTBL-E25	25.2 [604.8]	14

NOTES: All specifications are for reference only.
① Modular magnet tracks may be placed end to end to create longer track lengths.

DC Brushed Linear Servo Motors

The brushed linear servo motor is designed for long stroke servo applications. It is ideal for direct linear motion without mechanical linkages in closed-loop position packages.



Design Specifications

- High forces to 171 Lbs. [1070 N]
- High acceleration to 5g's [49 m/s^2]
- High speeds to 75 in/sec [3.8 m/s]
- High accuracy ±0.0001 in/ft [8.3 µm/m] (encoder dependent)
- High repeatability 0.00004 in [1 µm] (encoder dependent)
- Stroke lengths to 11 ft. [3.2 m]

Features

- Multiple moving magnet assemblies with overlapping trajectories
- Self-commutation enables the use of low-cost brush-type amplifiers.
- Relatively low cost per pound of thrust compared to brushless linear motors
- Use with PWM brush-type servo control (refer to Baldor's DC Controls – LD Series)

The moving permanent magnet brush commutated DC linear motor consists of a stationary primary and a moving secondary. The stationary primary is a steel laminated core, with multiple coils inserted into insulated slots. The ends of each coil are connected to a commutator bar that is mounted on an aluminum angle.

The moving secondary features multiple permanent magnets and brushes for commutation. A cable supplies power to the moving secondary. Mounting holes are located on both the primary and secondary.

The magnetic-attractive force between the primary and secondary can be used as a magnetic preload for the bearing system. The customer-supplied bearing system must maintain an air gap of 0.025 inch [0.064 cm] between the primary and secondary. The brush linear motor is available in different cross sections to meet different force requirements.

DC Brushed Linear Motor Technical Data

		Catalog Number					
Parameter	Units	LMBR 06-20	LMBR 06-28	LMBR 06-33	LMBR 06-35	LMBR 06-43	LMBR 06-48
General:							
Continuous Force	Lbs [N]	4.2 [18.7]	11 [48.9]	15 [66.7]	17 [75.6]	24 [106]	29 [129]
Continuous Current	Amps	4.8	5	5	5	5.1	5.1
Peak Force @ 10% Duty	Lbs [N]	13 [57.8]	33 [146.8]	47 [209]	54 [240]	75 [333]	89 [395]
Peak Amps @ 10% Duty	Amps	15	16	16	16	16	16
Continuous Power	Watts	32	56	66	73	94	105
Attractive Force	Lbs [N]	45 [200]	110 [490]	160 [711]	180 [800]	250 [1112]	290 [1290]
Mechanical:							
Motor Width	in [mm]	2.0 [50.8]	2.8 [71.1]	3.3 [83.8]	3.5 [88.9]	4.3 [109.2]	4.8 [121.9]
Moving Secondary Length	in [mm]	4.38 [111.3]	4.38 [111.3]	4.38 [111.3]	4.38 [111.3]	4.38 [111.3]	4.38 [111.3]
Moving Secondary Weight	Lbs [kg]	1.05 [0.477]	1.33 [0.605]	1.90 [0.864]	2.02 [0.918]	2.38 [1.08]	2.63 [1.19]
Stationary Primary Weight	Lbs/Inch	0.25	0.43	0.53	0.59	0.75	0.86
	[kg/m]	[4.47]	[7.68]	[9.47]	[10.55]	[13.41]	[15.37]
Electrical:							
Force Constant	Lbs/Amp	0.9	2.2	3	3.5	4.8	5.6
Ph - Ph	[N/Amp]	[4.0]	[9.8]	[13.4]	[15.6]	[21.3]	[24.9]
Back EMF Constant	V/in/sec	0.1	0.2	0.3	0.4	0.5	0.6
Ph - Ph	[V/m/sec]	[3.9]	[7.9]	[11.8]	[15.7]	[19.7]	[23.6]
Ph-Ph Resistance @ 25°C	Ohms	1	1.6	1.9	2.1	2.6	2.9
Ph-Ph Resistance @ 125°C		1.4	2.2	2.6	2.9	3.6	4.0
Thermal Resistance	W/deg C	0.32	0.56	0.66	0.73	0.94	1.05
Inductance Ph - Ph	mH	1.2	2.9	4.1	4.7	6.5	7.7
Electrical Time Constant	msec	1.2	1.9	2.2	2.3	2.6	2.7
Km Motor Constant	Lbs/$\sqrt{W}$	.742	1.470	1.846	1.990	2.475	2.830
	[N/$\sqrt{W}$]	[3.302]	[6.538]	[8.213]	[8.850]	[11.011]	[12.588]

NOTE: All specifications are for reference only.

DC Brushed Linear Motor Technical Data

		Catalog Number					
Parameter	Units	LMBR 12-20	LMBR 12-28	LMBR 12-33	LMBR 12-35	LMBR 12-43	LMBR 12-48
Operating:							
Continuous Force	Lbs [N]	8.1 [36]	21 [93]	29 [129]	34 [151]	47 [209]	55 [244]
Continuous Current	Amps	9.4	9.6	9.7	9.8	9.8	9.8
Peak Force @ 10% Duty	Lbs [N]	25 [111]	65 [289]	91 [404]	104 [462]	144 [640]	171 [760]
Peak Current @ 10% Duty	Amps	29	29	30	30	30	31
Continuous Power	Watts	62	103	118	134	174	187
Attractive Force	Lbs [N]	90 [400]	225 [1000]	315 [1400]	360 [1600]	495 [2200]	585 [2600]
Mechanical:							
Motor Width	in [mm]	2.0 [50.8]	2.8 [71.1]	3.3 [83.8]	3.5 [88.9]	4.3 [109.2]	4.8 [121.9]
Moving Secondary Length	in [mm]	8.44 [214.4]	8.44 [214.4]	8.44 [214.4]	8.44 [214.4]	8.44 [214.4]	8.44 [214.4]
Moving Secondary Weight	Lbs [kg]	2.10 [0.25]	2.66 [1.20]	3.8 [1.72]	4.04 [1.83]	4.76 [2.16]	5.26 [2.40]
Stationary Primary Weight	Lbs/Inch	0.25	0.43	0.53	0.59	0.75	0.86
	[kg/m]	[4.47]	[7.68]	[9.47]	[10.54]	[13.4]	[15.37]
Electrical:							
Force Constant	Lbs/Amp	0.9	2.2	3	3.5	4.8	5.6
Ph - Ph	[N/Amp]	[4.0]	[9.8]	[13.4]	[15.6]	[21.3]	[24.9]
Back EMF Constant	V/in/sec	0.1	0.2	0.3	0.4	0.5	0.6
Ph - Ph	[V/m/sec]	[3.9]	[7.9]	[11.8]	[15.7]	[19.7]	[23.6]
Ph-Ph Resistance @ 25°C	Ohms	0.5	0.8	0.9	1	1.3	1.4
Ph-Ph Resistance @ 125°C		0.7	1.1	1.3	1.4	1.8	2.0
Thermal Resistance	W/deg C	0.62	1.03	1.18	1.34	1.74	1.87
Inductance Ph - Ph	mH	0.6	1.5	2.1	2.4	3.3	3.8
Electrical Time Constant	msec	1.2	1.9	2.2	2.3	2.6	2.7
Km Motor Constant	Lbs/$\sqrt{W}$	1.029	2.069	2.670	2.937	3.563	4.022
	[N/$\sqrt{W}$]	[4.576]	[9.204]	[11.875]	[13.064]	[15.848]	[17.890]

NOTE: All specifications are for reference only.

DC Brushed Linear Motor and Control Selection Guide

Cont. Force		Peak Force		Cont	Peak	Motor	Input Vac 115 VAC 1 Ph			
							Max Speed		Single-Axis	Dual-Axis
Lbs.	N	Lbs.	N	Amps	Amps	Catalog Number	In/s	m/s	Control Catalog No.	Control Catalog No.
4.2	18.7	13	57.9	4.8	15	LMBR06-20	75	1.9	LD2-01S	LD2-02S
11	49.0	33	146.9	5	15	LMBR06-28	75	1.9	LD2-01S	LD2-02S
15	66.8	47	209.2	5	16	LMBR06-33	75	1.9	LD2-01S	LD2-02S
17	75.7	54	240.3	5	16	LMBR06-35	75	1.9	LD2-01S	LD2-02S
24	106.8	75	333.8	5.1	16	LMBR06-43	75	1.9	LD2-01S	LD2-02S
29	129.1	89	396.1	5.1	16	LMBR06-48	75	1.9	LD2-01S	LD2-02S
8.1	36.0	25	111.3	9.4	29	LMBR12-20	75	1.9	LD2-01S	LD2-02S
21	93.5	65	289.3	9.6	29	LMBR12-28	75	1.9	LD2-01S	LD2-02S
29	129.1	91	405.0	9.7	30	LMBR12-33	75	1.9	LD2-01S	LD2-02S
34	151.3	104	462.8	9.8	30	LMBR12-35	75	1.9	LD2-01S	LD2-02S
47	209.2	144	640.8	9.8	30	LMBR12-43	75	1.9	LD2-01S	LD2-02S
55	244.8	171	761.0	9.8	31	LMBR12-48	75	1.9	LD2-01S	LD2-02S

DC Brushed Linear Servo Motor Identification Matrix

TYPE
Linear Motor
Brush

NO. OF POLES
06, 12

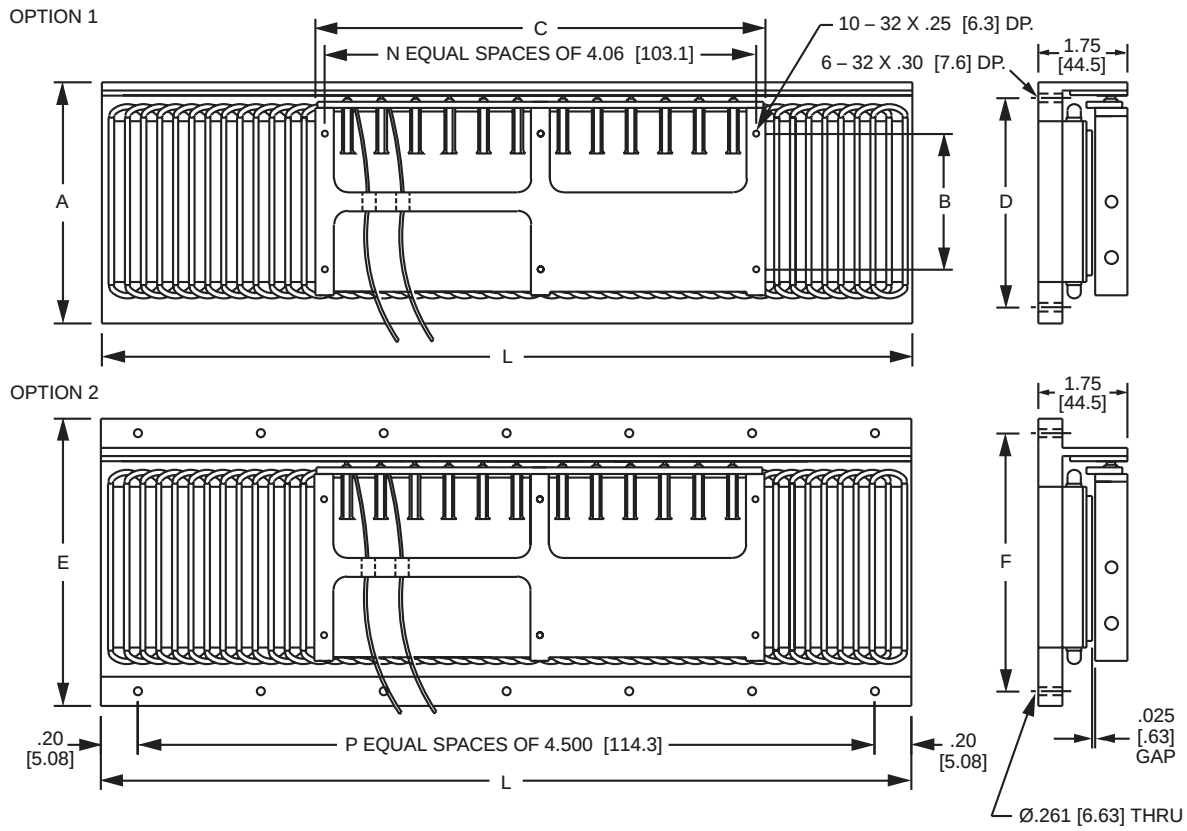
CODE FOR WIDTH OF COIL ASSEMBLY
Inch [mm]
20= 2.00 [50.8]
25 = 2.50 [63.5]
28 = 2.75 [69.85]
30 = 3.00 [76.2]
33 = 3.25 [82.55]
35 = 3.50 [88.9]
40 = 4.00 [101.6]
43 = 4.25 [108]
45 = 4.50 [114.3]
50 = 5.00 [127]

STROKE
(Rounded Down
to nearest Inch)
Max Length = 11 Feet
(3.3 Meters)

MOUNTING OPTION
1 = Mounting Option 1
2 = Mounting Option 2
3 = Other

TERMINATION
0 = Flying Leads
(24" Std.)

DC Brushed Linear Motor Dimensions (Inches [mm])



Width XY	A in [mm]	B in [mm]	D in [mm]	Primary Wgt. Lbs/in [kg/m]	Secondary Wgt. Lbs [kg]
20	2.00 [50.80]	—	1.00 [25.4]	0.25 [4.47]	1.05 [0.47]
28	2.75 [69.85]	1.03 [26.2]	1.75 [44.5]	0.43 [7.69]	1.33 [0.60]
33	3.25 [82.55]	1.53 [38.9]	2.25 [57.2]	0.53 [9.48]	1.90 [0.86]
35	3.50 [88.90]	1.53 [38.9]	2.50 [63.5]	0.59 [10.55]	2.02 [0.91]
43	4.25 [108.0]	2.53 [64.3]	3.25 [82.6]	0.75 [13.42]	2.38 [1.08]
48	4.75 [120.7]	3.03 [77.0]	3.75 [95.3]	0.86 [15.39]	2.63 [1.19]

NOTE: All specifications are for reference only.

Model No.	C in [mm]	N
LMBR06-XY	4.38 [111.3]	1
LMBR12-XY	8.44 [214.4]	2

NOTES: E = A + 1.00 (25.4)
F = D + 1.60 (40.6)
L = C + STROKE
P = To Be Determined

AC Linear Induction Motor

The Linear Induction Motor (LIM) is designed for high-force, long-stroke applications, such as material handling and people movers.

Design Specifications

- High forces to 500 Lbs. [2,225 N] at 15% duty cycle
- Acceleration to 1g [9.8 m/s^2]
- Speeds to 270 in/sec [6.85 m/s] at 60 Hz
  Higher speeds at higher frequencies

Features

- Non-contact, virtually maintenance free
- Heavy payloads
- Unlimited stroke length
- Use with:Single or three-phase AC line voltage, 50 or 60 Hz. Single-phase requires use of external capacitor
- Use inverter for velocity control, or vector control and motion controller for positioning (refer to Baldor's AC controls – 15H Inverter, 18H Vector, and Mint™ positioning controllers)

The single sided Linear Induction Motor consists of a primary coil assembly and a secondary called a reaction plate. The coil assembly is comprised of steel laminations and phase windings with a thermal sensor encapsulated in thermal epoxy. The customer supplied reaction plate is made of 1/8 inch thick aluminum or copper plate bonded to a 1/4 inch thick cold rolled steel. The aluminum faces the coil assembly. The width of a reaction plate must be equal to the width of the coil assembly. A customer supplied bearing system is used to maintain the 1/8 inch airgap between the coil and reaction plate over the length of the stroke.

When AC voltage is applied to the coil windings, a traveling magnetic field is created. This induces current in the reaction plate which in turn creates its own magnetic field. The interaction of the two magnetic fields generates the force and direct linear motion.

Either assembly or the reaction plate can be the moving member of the motor. Typically the reaction plate becomes part of the customer load moving over stationary coil assemblies placed end-to-end for the travel distance. In this configuration the length of the reaction plate must be equal to the center to center distance of two adjacent coil assemblies plus the length of one coil assembly. This will ensure the reaction plate covers adjacent coil assemblies at the point of transition from one coil to the next. Should the coil assembly be the moving element of the motor then the reaction plate length must be equal to the length of stroke plus the length of one coil assembly.

Using two LIMs facing each other can provide increased force. This is known as a double sided linear induction motor. Here the reaction plate will consist only of a 1/4 inch thick aluminum plate without steel backing. The aluminum will require additional support over the length of the stroke.

A variable frequency inverter will provide velocity control of a linear induction motor. A Linear Induction Motor (LIM) equipped with a linear encoder can do point to point programmable positioning when driven with a vector control and motion controller. These motors are supplied in kit form with customer providing reaction plate (secondary) and bearing system to be integrated into the application.

AC Linear Induction Motors

Catalog Number	Force Continuous Lbs	Force Continuous [N]	Amps Continuous 460VAC 3Ph	Weight Lbs [kg]
LMAC1607C23D99	14	[62]	2.3	44 [20]
LMAC1608C23D99	18	[80]	2.9	55 [25]
LMAC1609C23D99	24	[106]	3.7	68 [31]
LMAC1610C23D99	28	[124]	4.2	80 [36.2]
LMAC1611C23D99	32	[142]	5.0	92 [41.6]
LMAC1612C23D99	38	[169]	5.7	105 [47.5]
LMAC1613C23D99	42	[186]	6.1	117 [52.9]
LMAC1614C23D99	46	[204]	7.3	128 [57.9]
LMAC1615C23D99	52	[231]	7.6	140 [63.3]
LMAC1616C23D99	58	[258]	8.0	152 [68.8]
LMAC3207C23D99	28	[124]	4.4	88 [39.8]
LMAC3208C23D99	36	[160]	5.6	110 [49.8]
LMAC3209C23D99	44	[195]	6.8	136 [61.5]
LMAC3210C23D99	52	[231]	8.0	160 [72.4]
LMAC3211C23D99	62	[275]	9.5	184 [83.3]
LMAC3212C23D99	72	[320]	11.0	210 [95.0]
LMAC3213C23D99	78	[347]	11.5	234 [105.9]
LMAC3214C23D99	90	[400]	13.5	256 [115.8]
LMAC3215C23D99	96	[427]	14.1	280 [126.7]
LMAC3216C23D99	100	[445]	14.7	304 [137.6]

Catalog Number	Force @ 15% Duty Cycle Lbs	Force @ 15% Duty Cycle [N]	Amps @ 15% Duty Cycle 460VAC 3Ph	Weight Lbs [kg]
LMAC1607C23D15	70	[311]	11.5	44 [20]
LMAC1608C23D15	90	[400]	14.5	55 [25]
LMAC1609C23D15	120	[534]	18.5	68 [31]
LMAC1610C23D15	140	[622]	21	80 [36.2]
LMAC1611C23D15	160	[711]	25	92 [41.6]
LMAC1612C23D15	190	[845]	28.5	105 [47.5]
LMAC1613C23D15	210	[934]	30.5	117 [52.9]
LMAC1614C23D15	230	[1023]	36.5	128 [57.9]
LMAC1615C23D15	260	[1156]	38	140 [63.3]
LMAC1616C23D15	290	[1289]	40	152 [68.8]
LMAC3207C23D15	140	[622]	22	88 [39.8]
LMAC3208C23D15	180	[800]	28	110 [49.8]
LMAC3209C23D15	220	[978]	34	136 [61.5]
LMAC3210C23D15	260	[1156]	40	160 [72.4]
LMAC3211C23D15	310	[1378]	47.5	184 [83.3]
LMAC3212C23D15	360	[1600]	55	210 [95.0]
LMAC3213C23D15	390	[1434]	57.5	234 [105.9]
LMAC3214C23D15	450	[2000]	67.5	256 [115.8]
LMAC3215C23D15	480	[2135]	70.5	280 [126.7]
LMAC3216C23D15	500	[2224]	73.5	304 [137.6]

NOTE: All specifications are for reference only.

Linear Induction Motor Catalog Identification Matrix

L	M	A	C												

LINEAR MOTOR AC INDUCTION

COIL ASSEMBLY LENGTH
In Inches: 16, 32

COIL ASSY WIDTH
07, 08...16

COOLING
C = Convection
W = Water

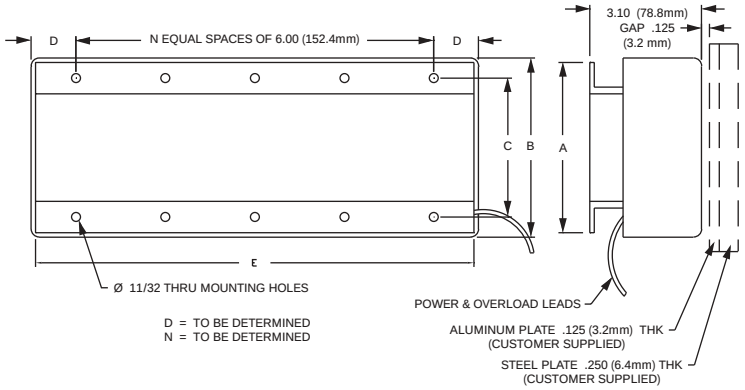
LEAD TYPE
1 = Strain Relief
2 = Flying Leads (36" Std)

NO. PHASES
1 = Single-phase
3 = Three-phase

VOLTAGE CODE OPTION
A = 115 VAC
B = 230 VAC
C = 380 VAC
D = 460/480 VAC
E = 550 VAC
F = 600 VAC

DUTY CYCLE
00 < 1%
50 = 50%
99 = 100%

AC Linear Induction Motor Dimensions (Inches [mm])



Coil Assembly Dimensions (inches [mm])

Catalog Number ①	Catalog Number ②	A	B	C
LMAC1607CXXXXX	LMAC3207CXXXXX	6.5 [165.1]	7 [177.8]	5 [127]
LMAC1608CXXXXX	LMAC3208CXXXXX	7.5 [190.5]	8 [203.2]	6 [152.4]
LMAC1609CXXXXX	LMAC3209CXXXXX	8.5 [215.9]	9 [228.6]	7 [177.8]
LMAC1610CXXXXX	LMAC3210CXXXXX	9.5 [241.3]	10 [254]	8 [203.2]
LMAC1611CXXXXX	LMAC3211CXXXXX	10.5 [266.7]	11 [279.4]	9 [228.6]
LMAC1612CXXXXX	LMAC3212CXXXXX	11.5 [292]	12 [304.8]	10 [254]
LMAC1613CXXXXX	LMAC3213CXXXXX	12.5 [317.5]	13 [330.2]	11 [279.4]
LMAC1614CXXXXX	LMAC3214CXXXXX	13.5 [342.9]	14 [355.6]	12 [304.8]
LMAC1615CXXXXX	LMAC3215CXXXXX	14.5 [368.3]	15 [381]	13 [330.2]
LMAC1616CXXXXX	LMAC3216CXXXXX	15.5 [394]	16 [406.4]	14 [355.6]

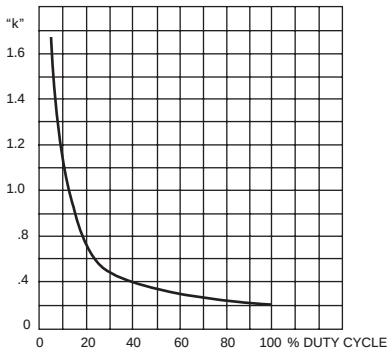
NOTE: All specifications are for reference only.

Catalog No. ① D = 2.125 [54] E = 15.75 [400] N = 2

Catalog No. ② D = 1.0 [25.4] E = 31.5 [800] N = 5

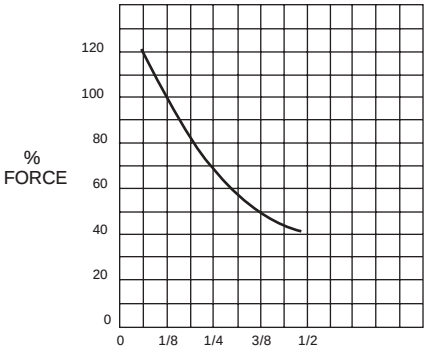
Linear Induction Motor Duty Cycle-Force-Current Curves

Figure 1
The force and current ratings shown in the performance table are based on 460VAC, three-phase, 60 Hz input at a 15% duty cycle and a 1/8 inch airgap. To select a motor at other duty cycles, divide the required force by the duty cycle K factor rating on the curve corresponding to the required duty cycle. Select the closest equivalent or next higher rating from the performance table.



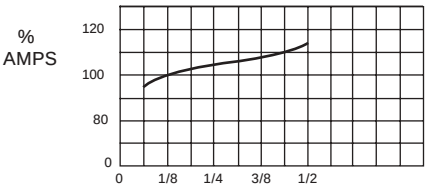
"K" FACTOR – DUTY CYCLE

Figure 2
Provides the % force output versus the motor airgap in inches



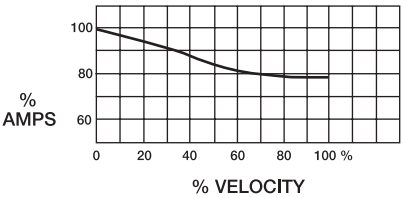
AIRGAP INCHES

Figure 3
Provides the % motor current versus the motor airgap in inches.



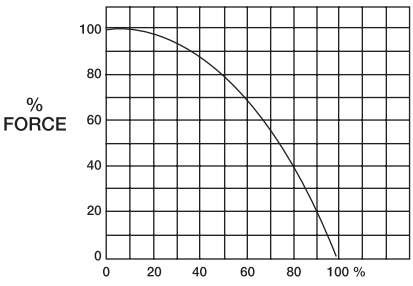
AIRGAP INCHES

Figure 4
Provides the % motor current vs. % motor speed.



% VELOCITY

Figure 5
Plots % thrust (force) vs. % velocity.



% VELOCITY

Polynoid Linear Motor

The AC polynoid derives its name from the solenoid but the similarity stops there. Unlike a solenoid, the polynoid is a linear electric motor.

Design Specifications

- Acceleration to 1g [9.8 m/s^2]
- Speeds to 90 in/sec [2.3 m/s]
- Optional built-in electronic brake (holding coil) for end holding
- Integral rulon bearings
- Low cost, powered by AC line voltage or adjustable speed with an inverter

Features

- Provides long stroke with uniform force
- Stroke limited by end stops on moving rod
- Limited duty cycle applications
- Virtually maintenance free
- Not for positioning applications
- Use with:
  Single or 3-phase AC line voltage, 50 or 60 Hz
  Single-phase requires use of external capacitor

The AC Polynoid provides a constant force for the entire length of its stroke. Its direction of travel is reversible by switching with equal force in both directions. Switching requires the swapping of any two of three motor leads in three-phase units while single-phase reversing is done by the swapping of one line lead to the opposite side of the capacitor lead. Electrical force reversal can be used for dynamic braking.

A polynoid is comprised of two basic parts, a rod and a stator. The rod is copper clad steel, the end of which can feature a tapped mounting hole. An optional holding coil is available for end holding at one or both ends. The stator is a series of coils wound on bobbins. Coils are interconnected. The stator is housed in a smooth cold rolled steel assembly. It is also available finned for greater heat dissipation.

The polynoid is an electrical induction motor. A sweeping magnetic field along the length of the stator coils induces linear motion of the rod through the stator or stator along the rod. The rod reacts to energization in less than 10 msecs accelerating to a limited speed. The time to reach this speed depends upon the net force available and the mass being moved. Normal operating speeds to 50 inches per second for single-phase units with three-phase units going to 90 inches per second.

The rod can be of infinite length when provided with proper support. Output force can be as high as 100 pounds (445 N) per stator with design capability for greater. The force can be controlled by varying the applied voltage (force varies by the square of the voltage) resulting in a degree of speed control.

Polynoid Selection

FINNED SERIES provides maximum heat dissipation and higher duty cycle.

SMOOTH SERIES is designed for applications where space is restricted. The smooth finned series provides force equal to the finned series, but at a lower duty cycle.

STATOR SELECTION

Required information:

1. Weight of all materials to be moved: Include rod at 1 lb/ft
   If rod is stationary, include stator weight listed in spec table.
2. Friction: Measure with spring scale and include spring force is used.
3. Mounting: horizontal or vertical
4. Stroke length
5. Cycle rate in strokes per minute

A. To determine Stroke Time use appropriate graph at right:

1. Follow the appropriate stroke length line to its intersection with the 0.35 force multiplier curve (2.00 force multiplier curve for vertical application).
2. Drop a line from this intersection to the base line and ready time. For three-phase power multiply the time by 0.75.
3. This force multiplier will give the optimum cycling rate with minimum stator size.

NOTE: If stroke time is too slow, use one of the curves to the left of the 0.35 multiplier curve and repeat steps A1 and A2 using the new curve.
If stroke time is too fast, try one of the curves to the right of the 0.35 force multiplier curve and follow steps A1 and A2 using new curve. If still too fast, use Baldor variable frequency inverter.

B. To determine Duty Cycle: If powered in one direction, multiply stroke time times the cycles per minute times 1.6.
If powered in both directions, multiply stroke time, times cycles per minute times 3.2.
The required ON time per cycle should not exceed 10% of the continuous maximum on time shown in the specifications.

C. To determine STATOR FORCE required:
Horizontal mounting: Multiply all weights to be moved by 0-.35 force multiplier. Add friction.
Vertical Mounting: Multiply all weights to be moved by 2.00 force multiplier. Add friction.

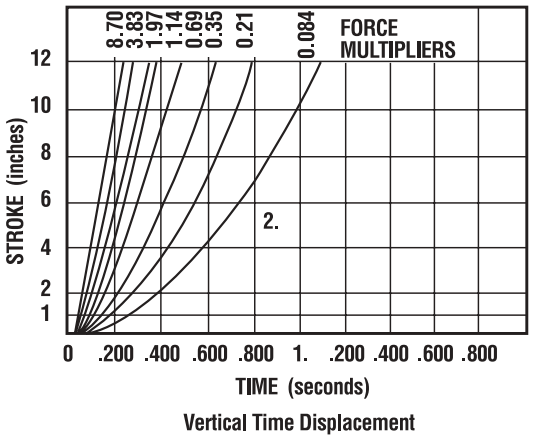
NOTE: If the 0.35 or 2.00 force multipliers did not give adequate stroke time, use the force multiplier determined in A to determine stator force.

ROD SELECTION

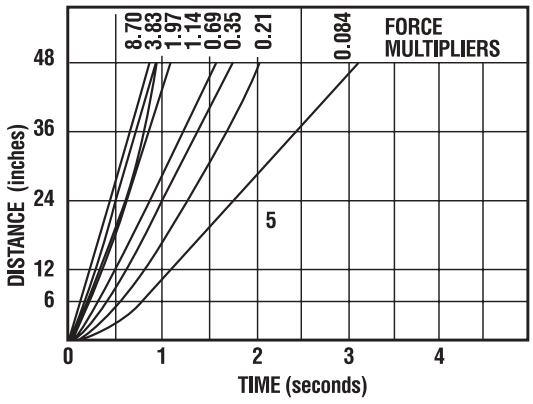
Moving Rod:
Rod length should be limited to approximately twice coil assembly length with no external rod support.
Moving Coil Assembly:
Rod length is unlimited. Rod diameter is 0.72 inches (1.83mm) with ends tapped 1/2 inch (12.5mm) – 13. Optional brass rod end adapters are drilled and tapped 5/16 inch (8mm) – 18.

CAPACITOR SELECTION

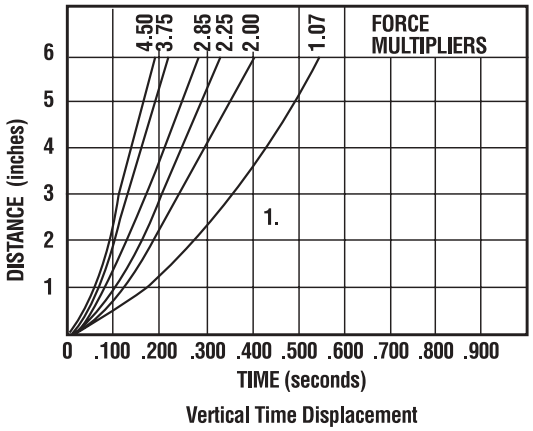
Single-phase capacitor selection guides are given on stator selection charts.



Vertical Time Displacement



Horizontal Time Displacement



Vertical Time Displacement

Single-Phase Smooth Series Polynoid Technical Data

Stall Force	Duty Cycle	Number of	Max on Time for Normal Operation	Max Cont. On Time	Length Bearing To Bearing		Coil Assembly Catalog Number ③	Power	Current Amps		Capacitor Code Number	
Lbs	%	Coils	secs	secs	In	mm		Watts	115/60	230/60	115/60	230/60
3.7	3	2	0.8	8	2.1	53.34	LMPY0203-SX1X-X	600	5.3	2.6	C7	2-C5
2.4	6	2	1.3	13	2.1	53.34	LMPY0206-SX1X-X	360	3.3	1.7	C2	C5
1	7	2	5.5	55	2.1	53.34	LMPY0207-SX1X-X	138	1.2	0.6	C8	C10
7	3	4	1.2	12	3.1	78.74	LMPY0403-SX1X-X	865	7.8	3.9	C6	C8
3.8	9	4	4.5	45	3.1	78.74	LMPY0409-SX1X-X	325	2.9	1.5	C9	C5
1.9	21	4	8.5	85	2.9	73.66	LMPY0421-SX1X-X	175	1.6	0.8	C8	2-C4①
1	45	4	32.0	320	2.9	73.66	LMPY0445-SX1X-X	75	0.7	0.3	C1	C4
10.8	2.2	6	1.8	18	4.1	104.14	LMPY0602-SX1X-X	920	NA	4.2	NA	C8
6	8	6	4.5	45	4.1	104.14	LMPY0608-SX1X-X	510	4.6	2.3	C7	C1,C10①
3	14	6	9.0	90	3.8	96.52	LMPY0614-SX1X-X	280	2.5	1.3	C9	C5
1.5	30	6	31.5	315	3.8	96.52	LMPY0630-SX1X-X	127	1.1	0.6	C1,C10①	C4
17.5	3	8	1.5	15	5.0	127	LMPY0803-SX1X-X	1625	14.8	6.7	C3	C2
7.7	6	8	4.4	44	5.0	127	LMPY0806-SX1X-X	520	4.6	2.3	C7	C8
4.2	9	8	6.0	60	4.6	116.84	LMPY0809-SX1X-X	356	3.4	1.7	C2	C5
2.1	27	8	28.5	285	4.6	116.84	LMPY0827-SX1X-X	158	1.4	0.7	2-C1①	2-C1②
1.2	56	8	93.0	930	4.6	116.84	LMPY0856-SX1X-X	80	0.7	0.4	C1	C4
27	3	12	1.8	18	7.0	177.8	LMPY103-SX1X-X	2250	20.0	10	C3,C 6①	C7
12.5	6	12	4.5	45	7.0	177.8	LMPY1206-SX1X-X	1000	9.0	4.8	C6	C9
6.9	9	12	8.0	80	6.3	160.02	LMPY1209-SX1X-X	565	5.1	2.5	C7	C8
3.8	22	12	24.0	240	6.3	160.02	LMPY1222-SX1X-X	257	2.3	1.1	C9	C4,C10①
1.7	50	12	90.0	900	6.3	160.02	LMPY12050-SX1X-X	112	1.0	0.5	C1,C4①	C10
1	100	12	—	—	6.3	160.02	LMPY1299-SX1X-X	61	0.5	0.3	2-C4①	2-C4①

NOTES: ① Capacitors wired in parallel.
② Capacitors wired in series.
NA – Not available at this voltage.
All single-phase units used in intermittent duty applications will be supplied with overload protector.
③ Select codes for X. Refer to Catalog Identification Matrix.

Single-Phase Finned Series Polynoid Technical Data

Stall Force	Duty Cycle	Number of	Max on Time for Normal Operation	Max Cont. On Time	Length Bearing To Bearing		Coil Assembly Catalog Number③	Power	Current Amps		Capacitor Code Number	
Lbs	%	Coils	secs	secs	In	mm		Watts	115/60	230/60	115/60	230/60
3.7	5	2	0.8	8	2.1	53.34	LMPY0205-FX1X-X	600	5.3	2.6	C7	2-C5
2.4	7	2	1.3	13	2.1	53.34	LMPY0207-FX1X-X	360	3.3	1.7	C2	C5
1	30	2	6.0	60	2.1	53.34	LMPY0230-FX1X-X	138	1.2	0.6	C8	C10
7	5	4	1.2	12	3.1	78.74	LMPY0405-FX1X-X	865	7.8	3.9	C6	C8
3.8	17	4	5.2	52	3.1	78.74	LMPY0417-FX1X-X	325	2.9	1.5	C9	C5
1.9	30	4	9.5	95	2.9	73.66	LMPY0430-FX1X-X	175	1.6	0.8	C8	2-C4①
1	67	4	45.0	450	2.9	73.66	LMPY0467-FX1X-X	75	0.7	0.3	C1	C4
10.8	5	6	2.0	20	4.1	104.14	LMPY0605-FX1X-X	920	NA	4.2	NA	C8
6	11	6	4.5	45	4.1	104.14	LMPY0611-FX1X-X	510	4.6	2.3	C7	C1,C10①
3	14	6	9.5	95	4.1	104.14	LMPY0614-FX1X-X	280	2.5	1.3	C9	C5
1.5	45	6	36.0	360	3.8	96.52	LMPY0645-FX1X-X	127	1.1	0.6	C1,C10①	C4
17.5	5	8	1.5	15	5.0	127	LMPY0805-FX1X-X	1625	14.8	6.7	C3	C2
7.7	11	8	5.8	58	5.0	127	LMPY0811-FX1X-X	520	4.6	2.3	C7	C8
4.2	20	8	9.0	90	4.6	116.84	LMPY0820-FX1X-X	356	3.4	1.7	C2	C5
2.1	50	8	38.3	383	4.6	116.84	LMPY0850-FX1X-X	155	1.4	0.7	2-C1①	2-C1②
1.2	100	8	—	—	4.6	116.84	LMPY0899-FX1X-X	75	0.7	0.4	C1	C4
27	4	12	1.8	18	7.0	177.8	LMPY1204-FX1X-X	2250	20.0	10	C3,C 6①	C7
12.5	15	12	6.0	60	7.0	177.8	LMPY1215-FX1X-X	1000	9.0	4.8	C6	C9
6.9	20	12	8.0	80	6.3	177.8	LMPY1220-FX1X-X	565	5.1	2.5	C7	C8
3.8	46	12	30.0	300	6.3	160.02	LMPY1246-FX1X-X	257	2.3	1.1	C9	C4,C10①
1.7	100	12	—	—	6.3	160.02	LMPY1299-FX1X-X	112	1.0	0.5	C1.C4①	C10
54	5	24	2.0	20	13.1	332.74	LMPY2405-FX1X-X	4350	39	19.5	1-C6,2-C3①	C2,C7①
24.9	10	24	5.8	58	13.1	332.74	LMPY2410-FX1X-X	1560	13.5	6.8	C3,C6①	C2,C7
14.1	20	24	9.0	90	11.8	299.72	LMPY2420-FX1X-X	1068	10.2	5.1	C9,C7①	C9
6.3	37	24	38.5	385	11.8	299.72	LMPY2437-FX1X-X	475	4.2	2.1	2-C2①	C5,C4①

NOTES: ① Capacitors wired in parallel.
② Capacitors wired in series.
NA – Not available at this voltage.
All single-phase units used in intermittent duty applications will be supplied with overload protector.
③ Select codes for X. Refer to Catalog Identification Matrix.

Three-Phase Smooth Series Polynoid Technical Data

Stall Force	Duty Cycle	Number of	Max on Time for Normal Operation	Max Cont. On Time	Length Bearing To Bearing		Coil Assembly Catalog Number①	Power	Current Amps	
Lbs	%	Coils	secs	secs	In	mm		Watts	230/60	460/60
6.4	4	3	1.0	10	2.5	63.5	LMPY0304-SX3X-X	748	2.2	1.1
3.6	9	3	2.2	22	2.5	63.5	LMPY0309-SX3X-X	375	1.3	0.7
2.3	15	3	4.5	45	2.5	63.5	LMPY0315-SX3X-X	219	0.8	0.4
1.4	27	3	15.0	150	2.5	63.5	LMPY0327-SX3X-X	124	0.5	NA
1	41	3	22.5	225	2.5	63.5	LMPY0341-SX3X-X	81	0.3	NA
14.3	3	6	1.6	16	3.8	96.5	LMPY0603-SX3X-X	1280	5.5	2.8
8.4	5	6	4.0	40	3.8	96.5	LMPY0605-SX3X-X	650	2.3	1.2
5.1	10	6	9.0	90	3.8	96.5	LMPY0610-SX3X-X	345	1.2	0.6
2	25	6	33.0	330	3.8	96.5	LMPY0625-SX3X-X	130	0.5	0.3
1	51	6	102.0	1020	3.8	96.5	LMPY0651-SX3X-X	63	0.2	NA
23	3	9	1.6	16	5.1	129.5	LMPY0903-SX3X-X	1920	6.6	3.3
17	4	9	2.3	23	5.1	129.5	LMPY0904-SX3X-X	1380	4.8	2.4
13.3	5	9	3.3	33	5.1	129.5	LMPY0905-SX3X-X	990	3.4	1.7
9	8	9	8.5	85	5.1	129.5	LMPY0908-SX3X-X	620	2.2	1.1
5.9	12	9	14.0	140	5.1	129.5	LMPY0912-SX3X-X	400	1.4	0.7
4.5	17	9	19.0	190	5.1	129.5	LMPY0917-SX3X-X	285	1.0	0.5
1.5	52	9	96.0	960	5.1	129.5	LMPY0952-SX3X-X	92	0.4	0.2
27	2	12	2.2	22	6.3	160.0	LMPY1202-SX3X-X	2180	7.6	3.8
18.5	4	12	3.4	34	6.3	160.0	LMPY1204-SX3X-X	1380	4.6	2.3
14	5	12	5.7	57	6.3	160.0	LMPY1205-SX3X-X	980	3.2	1.6
9.3	9	12	11.0	110	6.3	160.0	LMPY1209-SX3X-X	590	2.2	1.1
7.1	12	12	19.0	190	6.3	160.0	LMPY1212-SX3X-X	430	1.5	0.8
4.8	18	12	33.0	330	6.3	160.0	LMPY1218-SX3X-X	290	1.0	0.5
2	43	12	102.0	1020	6.3	160.0	LMPY1243-SX3X-X	120	0.4	9.2
1	100	12	—	—	6.3	160.0	LMPY1299-SX3X-X	52	0.2	0.1

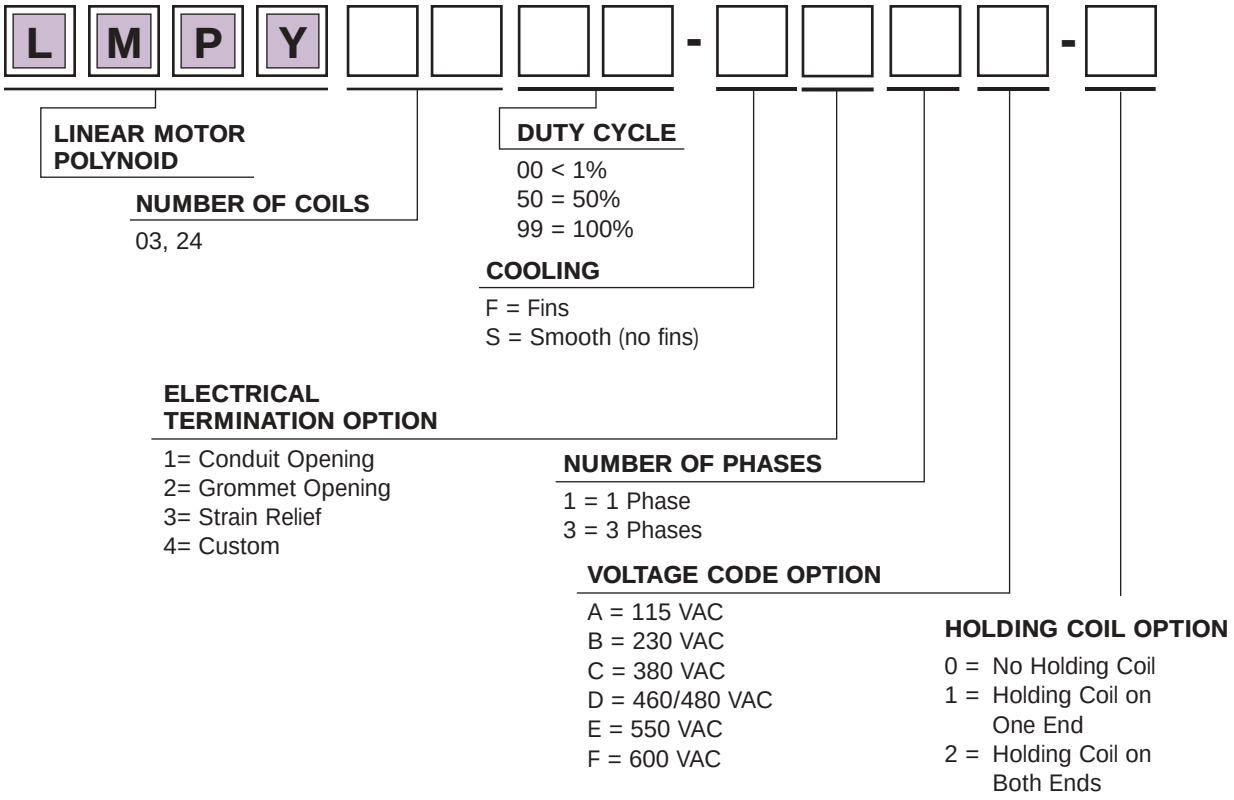
NOTES: NA – Not available at this voltage.
① Select codes for X. Refer to Catalog Identification Matrix

Three-Phase Finned Series Polynoid Technical Data

Stall Force	Duty Cycle	Number of	Max on Time for Normal Operation	Max Cont. On Time	Length Bearing To Bearing		Coil Assembly Catalog Number①	Power	Current Amps	
Lbs	%	Coils	secs	secs	In	mm		Watts	230/60	460/60
6.4	6	3	1.3	13	2.5	63.5	LMPY0306-FX3X-X	748	2.2	1.1
3.6	13	3	2.6	26	2.5	63.5	LMPY0313-FX3X-X	375	1.3	0.6
2.3	22	3	5.5	55	2.5	63.5	LMPY0322-FX3X-X	219	0.8	0.4
1.4	39	3	18.0	180	2.5	63.5	LMPY0339-FX3X-X	124	0.5	NA
1	60	3	30.0	300	2.5	63.5	LMPY0360-FX3X-X	81	0.3	NA
14.3	5	6	1.6	16	3.8	96.5	LMPY0605-FX3X-X	1280	5.5	2.3
8.4	10	6	4.0	40	3.8	96.5	LMPY0610-FX3X-X	650	2.3	1.2
5.1	19	6	11.5	115	3.8	96.5	LMPY0619-FX3X-X	345	1.2	0.6
2	50	6	45.0	450	3.8	96.5	LMPY0650-FX3X-X	130	0.5	0.3
1	100	6	—	—	3.8	96.5	LMPY0699-FX3X-X	63	0.2	NA
23	5	9	1.6	16	5.1	129.5	LMPY0905-FX3X-X	1920	6.6	3.3
17	7	9	2.3	23	5.1	129.5	LMPY0907-FX3X-X	1380	4.8	2.4
13.3	10	9	3.3	33	5.1	129.5	LMPY0910-FX3X-X	990	3.4	1.7
9	15	9	9.3	93	5.1	129.5	LMPY0915-FX3X-X	620	2.2	1.1
5.9	24	9	15.0	150	5.1	129.5	LMPY0924-FX3X-X	400	1.4	0.7
4.5	33	9	25.5	255	5.1	129.5	LMPY0933-FX3X-X	285	1.0	0.5
1.5	100	9	—	—	5.1	129.5	LMPY099-FX3X-X	92	0.4	0.2
27	5	12	2.2	22	6.3	160.0	LMPY1205-FX3X-X	2180	7.6	3.8
18.5	9	12	3.4	34	6.3	160.0	LMPY1209-FX3X-X	1380	4.6	2.3
14	12	12	5.7	57	6.3	160.0	LMPY1212-FX3X-X	980	3.2	1.6
9.3	20	12	15.0	150	6.3	160.0	LMPY1220-FX3X-X	590	2.2	1.1
7.1	28	12	28.0	280	6.3	160.0	LMPY1228-FX3X-X	430	1.5	0.8
4.8	41	12	44.0	440	6.3	160.0	LMPY1241-FX3X-X	290	1.0	0.5
2	100	12	—	—	6.3	160.0	LMPY1299-FX3X-X	120	0.4	9.2
54	5	24	2.2	22	11.8	299.7	LMPY2405-FX3X-X	4350	15.2	7.6
28	12	24	5.7	57	11.8	299.7	LMPY2412-FX3X-X	1960	6.3	3.2
18.6	20	24	15	150	11.8	299.7	LMPY2420-FX3X-X	1180	4.2	2.1
9.6	41	24	44.0	440	11.8	299.7	LMPY2441-FX3X-X	580	2.0	1

NOTES: NA – Not available at this voltage.
① Select codes for X. Refer to Catalog Identification Matrix

Polynoid Catalog Identification Matrix



Polynoid Options

End Holding (Holding Coil Option)
This option can be supplied on all stators to provide holding force at one end or both ends. Requires Rod End Hold Assy. Option below.

Holding Coil Specifications
Force up to 50 lbs. [222.5N]
Duty Cycle – Continuous
Residual Force – 4 lbs [18N] Max
Voltage – 115Vac 60 Hz, 1 ph specify coil for one end or coil for both ends.
230Vac 60Hz, 1 ph specify coil for one end or coil for both ends
Watts – 4 per holding coil
Amps – 0.1
Size – Adds 0.125" [3.2mm] per holding coil to stator length

Rod End Hold Assembly P/N LTPY290-223
Consists of larger washer and threaded brass assembly that screws into rod. Required for end holding coil to function.

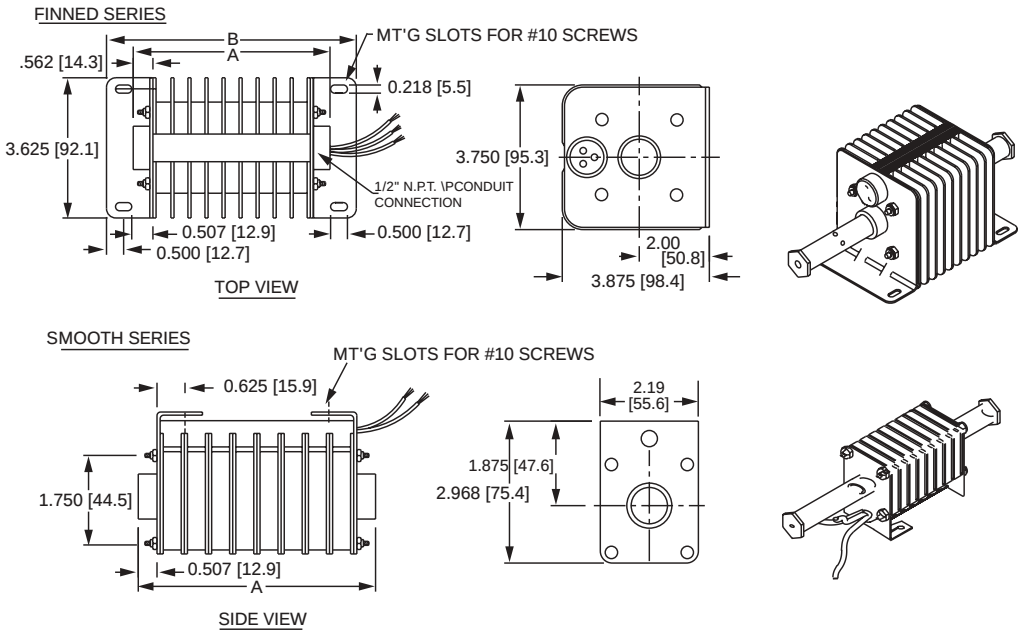
Rod End Adapter P/N LMPY290-684
Brass Assembly that threads into rod to act as a hard stop or to provide means to attach customer load to rod.

Water Resist Stator
Stator and holding coil assemblies can be made water resistant.

Longer Leadwires
Longer leads are optional. Standard length is 18 inches [38mm].

End Bearing
Rulon bearing replacement insert.

Polynoid Linear Motor Dimensions (Inches [mm])



POLYNOID						
Finned Series				Smooth Series		
Coils	A in[mm]	B in[mm]	Wgt. Lb[kg]	Coils	A in[mm]	Wgt. Lb[kg]
2	2.124±.051/[54.2±1.3	3.499±.040/[88.9±1.0	1.7 [0.77]	2	2.134±.051/[54.2±1.3]	0.85 [0.39]
3	2.514±.056/[63.9±1.4]	3.879±.045/[98.5±1.1]	1.9 [0.86]	3	2.514±.056/[63.9±1.4]	0.86 [0.86]
4	3.085±.071/[78.4±1.8]	4.450±.060/[113.0±1.5	2.5 [1.1]	4	3.085±.071/[78.4±1.8]	1.39 [0.631]
6	4.060±.091/[103.1±2.3]	5.425±.080/[137.8±2.0]	3.2 [1.5]	6	4.060±.091/[103.1±2.3]	1.94 [0.88]
8	5.035±.111/[127.9±2.8]	6.400±.100/[162.6±2.5]	4.2 [1.9]	8	5.035±.111/[127.9±2.8]	2.50 [1.14]
9*	5.045±.101/[128.1±2.6]	6.410±.090/[162.8±2.3]	4.0 [1.8]	9*	5.045±.101/[128.1±2.6]	2.20 [1.0]
12	6.986±.151/[177.4±3.8]	8.351±.140/[211.2±3.6]	5.8 [2.6]	12	6.986±.151/[177.4±3.8]	3.60 [1.64]
24	13.125±.271/[333.4±6.8]	14.802±.160/[376.0±4.1]	12.8 [5.8]	24		

NOTES: *Single heat dissipation plates (teeth) High frame, low duty cycle units require double teeth.
All specifications are for reference only.

Polynoid Rods*

Length		Catalog
inch	mm	Number
4	101.6	LTPY001-073
6	152.4	LTPY001-064
8	203.2	LTPY001-066
9	228.6	LTPY001-067
10	254.0	LTPY001-070
12	304.8	LTPY001-068
18	457.2	LTPY001-074
24	609.2	LTPY001-075
36	914.4	LTPY001-076
48	1219.2	LTPY001-077
60	1524.0	LTPY001-078
72	1828.8	LTPY001-079

NOTE: *Add stator length to stroke length

Capacitors for Single-Phase Units

Capacitor	Capacitor	Capacitor Rating	
Code Number	Catalog Number	mFd	Type
C1	LMPC229-002	10	165V C
C2	LMPC229-004	43-53	330V E
C3	LMPC229-006	189-227	165V E
C4	LMPC229-007	3	370V C
C5	LMPC229-008	10	330V C
C6	LMPC229-015	88-108	330V E
C7	LMPC229-016	64-77	330V E
C8	LMPC229-017	21-25	330V E
C9	LMPC229-033	30-36	330V E
C10	LMPC229-045	4	370V C

Non-Commutated DC Linear Servo Motor

Moving Coil and Moving Magnet non-commutated linear motors provide short strokes with constant force over the full stroke in both directions. The motors provide a very fast response because of a low (<<1msec) electric time constant.

MOVING COIL

MOVING MAGNET

Design Specifications

- For closed or open loop systems
- Moving coil or moving magnet versions
- Constant and reversible forces to 150 Lbs. [667 N]
- Acceleration to 10 g's [98 m/s^2]
- High accuracy ±0.0001 in/ft [2.5µm/300m] (encoder dependent)
- High repeatability ±0.00004 in [1µm] (encoder dependent)

Features

- No commutation required
- Highly compact design
- For closed or open loop systems
- Linear recirculating, jewel sapphire, or bronze bearings
- Can be designed for custom packaging and force requirements
- Use with Linear DC servo control

Non-commutated DC linear motors operate at very high speeds without cogging or force ripple and with infinite resolution. For closed loop operation, the motor is coupled with an appropriate feedback device, motor control and motion controller.

The Moving Coil model consists of a cylindrical coil that moves within an annular air gap of the magnet assembly. The poles are magnetized by rare earth magnets. When DC voltage is applied, the coil is caused to move with constant force. When polarity is reversed, the direction of travel is reversed. Magnetic-attractive forces and hysteresis loss are eliminated. Also, eddy currents can be eliminated by utilizing a plastic bobbin.

The Moving Magnet model is like a piston moving within a cylinder. The piston consists of permanent magnets with steel pole pieces and a shaft that passes axially through its center. Endcaps with bearings on both ends of the cylinder support the shaft. The cylinder contains a bobbin to support the coil and an outside steel tube for containing the magnetic flux. DC voltage applied to the coil causes the assembly to move and when the polarity is reversed the direction of travel is reversed.

Non-Commutated Moving Magnet Technical Data

		Catalog Number			
Parameters	Units	LMNM2-F8-F6	LMNM2-1F3-F2	LMNM2-1F5-F8	LMNM2-1F5-1F1
General:					
Stroke	in [mm]	0.600 [15.2]	0.250 [6.4]	0.750 [19.1]	1.125 [28.6]
Continuous Force	lbs [N]	0.5 [3]	1.9 [9]	2.5 [12]	2.5 [12]
Continuous Current	Amps	0.87	1.02	0.86	1.47
Peak Force@ 10% Duty	lbs [N]	1.5 [7]	5.7 [26]	7.5 [34]	7.5 [34]
Peak current @ 10% Duty	Amps	2.6	3.1	2.6	4.4
Continuous Power	Watts	2	10	10	9
Mechanical:					
No. of poles		2	2	2	2
Motor moving weight	lbs [kg]	0.050 [0.030]	0.100 [0.050]	0.313 [0.150]	0.486 [0.230]
Motor total weight	lbs [kg]	0.163 [0.080]	0.800 [0.370]	1.110 [0.510]	1.280 [0.590]
Bearing Type		Jewel Sapphire	Ball Bushing	Ball Bushing	Ball Bushing
Electrical:					
Force Constant Ph to Ph	lbs[N]/amps	0.58 [2.6]	1.87 [8.3]	2.91 [13.0]	1.70 [7.6]
Back EMF Constant Ph to Ph	V/in/s [V/m/s]	0.07 [2.6]	0.21 [8.3]	0.33 [13.0]	0.19 [7.6]
Resistance Ph to Ph at 25˚C	Ohms	3.2	9.7	13.6	4
Resistance Ph to Ph at 125˚C	Ohms	4.5	13.5	2.7	5.6
Inductance Ph to Ph	mH	0.225	0.9	0.9	1.52
Electrical Time Constant	msec	0.070	0.093	0.066	0.380
Km Motor Constant	lbs[N]/$\sqrt{W}$	0.32 [1.44]	0.60 [2.67]	0.79 [3.51]	0.85 [3.78]

		Catalog Number			
Parameters	Units	LMNM2-1F5-2	LMNM4-F5-F2	LMNM4-2F8-F5	LMNM9-2F8-F5
General:					
Stroke	in [mm]	2.000 [50.8]	0.150 [3.8]	0.500 [12.7]	0.500 [12.7]
Continuous Force	lbs [N]	2 [9]	0.5 [3]	25 [112]	50 [223]
Continuous Current	Amps	2.28	0.45	2.47	4.62
Peak Force@ 10% Duty	lbs [N]	6 [27]	1.5 [7]	75 [334]	150 [668]
Peak current @ 10% Duty	Amps	6.8	1.4	7.4	13.9
Continuous Power	Watts	25	3	54	81
Mechanical:					
No. of poles		2	4	4	9
Motor moving weight	lbs [kg]	0.705 [0.330]	0.022 [0.010]	3.440 [1.570]	5.510 [2.510]
Motor total weight	lbs [kg]	2.275 [1.040]	0.040 [0.020]	10.340 [4.700]	16.540 [7.510]
Bearing Type		Ball Bushing	Jewel Sapphire	Ball Bushing	Ball Bushing
Electrical:					
Force Constant Ph to Ph	lbs[N]/amps	0.88 [3.9]	1.11 [4.9]	10.11 [45.0]	10.81 [48.1]
Back EMF Constant Ph to Ph	V/in/s [V/m/s]	0.10 [3.9]	0.12 [4.9]	1.14 [45.0]	1.22 [48.1]
Resistance Ph to Ph at 25˚C	Ohms	4.8	13.6	8.9	3.8
Resistance Ph to Ph at 125˚C	Ohms	6.7	18.9	12.4	5.3
Inductance Ph to Ph	mH	2.32	0.9	0.9	2.2
Electrical Time Constant	msec	0.483	0.066	0.101	0.579
Km Motor Constant	lbs[N]/$\sqrt{W}$	0.40 [1.78]	0.30 [1.33]	3.39 [15.08]	5.55 [24.67]

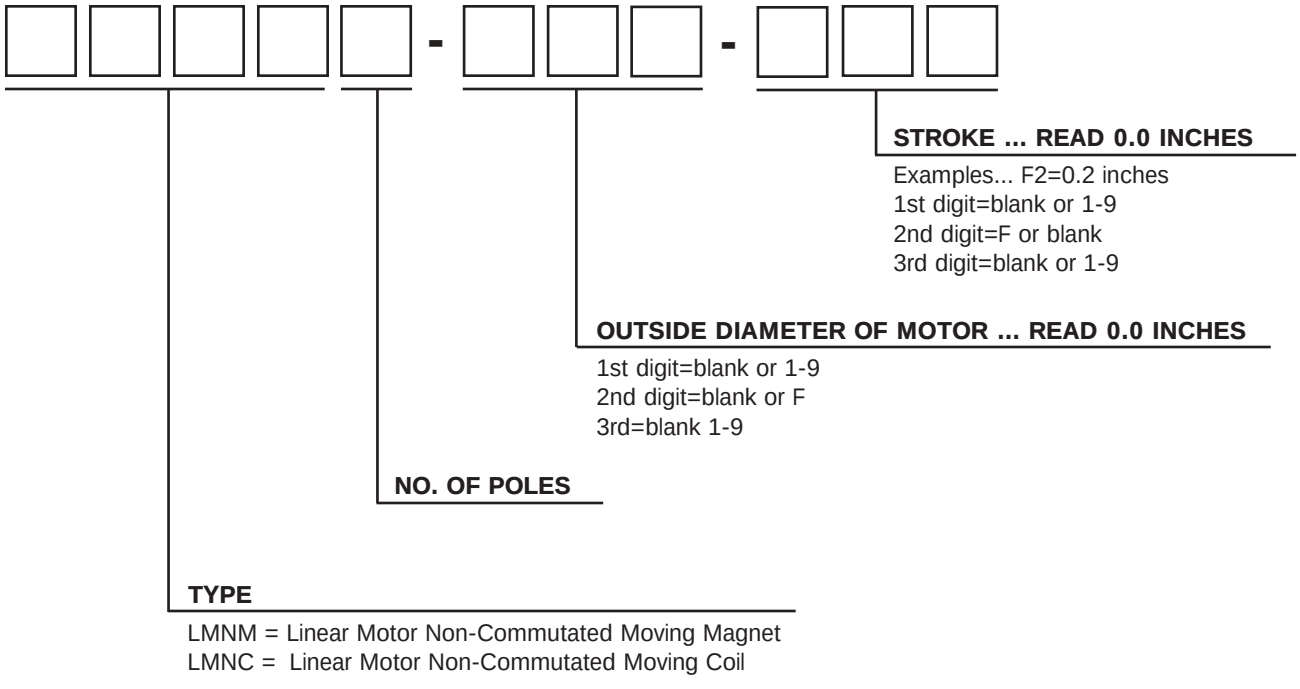
NOTES: 1. All specifications are for reference only.
2. Motors listed above are only a sample of Baldor extensive array of Non-Commutated DC Linear Motors.
3. Non-Commutated DC linear motors can be customized to meet any specific requirements.

Non-Commutated Moving Coil Technical Data

		Catalog Number				
Parameters	**Units**	**LMNC1-1F3-F2**	**LMNC1-1F3-F2**	**LMNC1-1F5-F2**	**LMNC1-2F8-F1**	**LMNC1-3F8-F5**
General:						
Stroke	in [mm]	0.220 [6]	0.220 [6]	0.200 [5]	0.100 [3]	0.500 [1.3]
Continuous Force	lbs [N]	0.625 [3]	1 [5]	1.5 [7]	5 [23]	9 [41]
Continuous Current	Amps	0.5	1.0	2.6	2.0	1.1
Peak Force@ 10% Duty	lbs [N]	1.875 [9]	3 [14]	4.5 [21]	15 [67]	27 [121]
Peak current @ 10% Duty	Amps	1.6	3.1	7.9	6.0	3.2
Continuous Power	Watts	2	7	6	10	13
Mechanical:						
No. of poles		1	1	1	1	1
Motor moving weight	lbs [kg]	0.012 [0.010]	0.012 [0.010]	0.050 [0.030]	0.250 [0.120]	0.600 [0.280]
Motor total weight	lbs [kg]	0.250 [0.120]	0.225 [0.110]	0.550 [0.250]	1.900 [0.870]	5.900 [2.680]
Bearing Type		N/A	N/A	N/A	N/A	N/A
Electrical:						
Force Constant Ph to Ph	lbs/amps	1.18	0.97	0.57	2.48	8.31
	[N]/amps	[5.2]	[4.3]	[2.5]	[11.0]	[37.0]
Back EMF Constant Ph to Ph	V/in/s	0.13	0.11	0.06	0.28	0.94
	[V/m/s]	[5.2]	[4.3]	[2.5]	[11.0]	[37.0]
Resistance Ph to Ph at 25°C	Ohms	7.5	6.5	0.9	2.5	11.5
Resistance Ph to Ph at 125°C	Ohms	10.4	9.1	1.3	3.5	16.0
Inductance Ph to Ph	mH	0.312	1.2	0.12	0.435	2.46
Electrical Time Constant	msec	0.042	0.185	0.133	0.174	0.214
Km Motor Constant	lbs/$\sqrt{W}$	0.43 [1.91]	0.38 [1.69]	0.60 [2.67]	1.57 [6.98]	2.45 [10.90]

NOTES: 1. All specifications are for reference only.
2. Motors listed above are only a sample of Baldor extensive array of Non-Commutated DC Linear Motors.
3. Non-Commutated DC linear motors can be customized to meet any specific requirements.

Non-Commutated Motor Catalog Identification Matrix



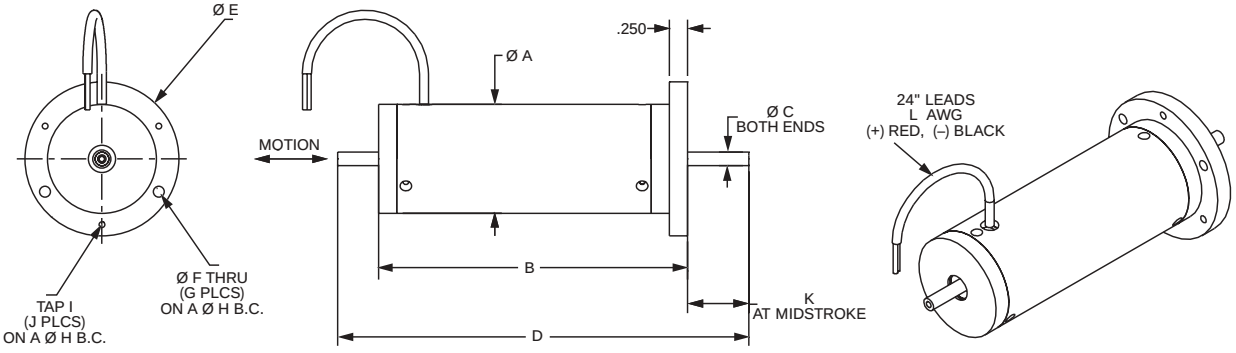
Non-Commutated Moving Magnet Motor Dimesions (in [mm])

		Catalog Number			
Dimension	**Unit**	**LMNM2-F8-F6**	**LMNM2-1F3-F2**	**LMNM2-1F5-F8**	**LMNM2-1F5-1F1**
A	in [mm]	0.750 [19.1]	1.350 [34.3]	1.500 [38.1]	1.500 [38.1]
B	in [mm]	2.200 [55.9]	3.000 [76.2]	3.750 [95.3]	4.255 [108.1]
C	in [mm]	0.124 [3.1]	0.250 [6.4]	0.188 [4.8]	0.188 [4.8]
	Thread	4-40 x .375 DP	10-32 X .300 DP	4-40 X .35 DP	4-40 X .25 DP
		UNC-2A	UNC-2B	UNC-2B	UNC-2B
		(External Thread)			
D	in [mm]	3.272 [83.1]	4.500 [114.3]	5.000 [127.0]	5.660 [143.8]
E	in [mm]	0.750 [19.1]	2.000 [50.8]	2.125 [54.0]	2.120 [53.8]
F	in[mm]	N/A	0.150 [3.8]	0.188 [4.8]	0.150 [3.8]
G	No.	N/A	3	2	3
H	in [mm]	N/A	1.675 [42.5]	1.812 [46.0]	1.810 [46.0]
I	Thread	N/A	6-32 THRU	0.147	6-32 THRU
		N/A	UNC 2-B	3.7	UNC 2-B
J	No.	N/A	3	4	3
K	in [mm]	0.772 [19.6]	0.750 [19.1]	0.625 [15.9]	0.842 [21.4]
Leads	in[mm]	12.0 [304.8]	24.0 [609.6]	24.0 [609.6]	24.0 [609.6]
		Teflon jacket	Teflon jacket	Teflon jacket	Teflon jacket
L	AWG	24	24	24	24

		Catalog Number			
Dimension	**Unit**	**LMNM2-1F5-2**	**LMNM4-F5-F2**	**LMNM4-2F8-F5**	**LMNM9-2F8-F5**
A	in [mm]	1.500 [38.1]	0.520 [13.2]	3.000 [76.2]	3.000 [76.2]
B	in [mm]	7.500 [190.5]	1.670 [42.4]	7.500 [190.5]	12.000 [304.8]
C	in [mm]	0.370 [9.4]	0.124 [3.1]	0.500 [12.7]	0.500 [12.7]
	Thread	10-32 X .300 DP	2-56 X .25 DP	1/4-20 X .5 DP	1/4-20 X .5 DP
		UNC-2B	UNC-2B	UNC-2B	UNC-2B
D	in [mm]	10.000 [254.0]	2.270 [57.7]	10.000 [254.0]	13.000 [330.2]
E	in [mm]	1.500 [38.1]	0.520 [13.2]	3.000 [76.2]	3.000 [76.2]
F	in [mm]	N/A	N/A	N/A	N/A
G	No.	N/A	N/A	N/A	N/A
H	in [mm]	N/A	N/A	N/A	N/A
I	Thread	N/A	N/A	N/A	N/A
		N/A	N/A	N/A	N/A
J	No.	N/A	N/A	N/A	N/A
K	in [mm]	0.125 [3.2]	0.300 [7.6]	0.125 [3.2]	0.500 [12.7]
Leads	in [mm]	24.0 [N/A]	24.0 [N/A]	24.0 [N/A]	24.0 [N/A]
		Teflon jacket	Teflon jacket	Teflon jacket	Teflon jacket
L	AWG.	24	29	20	18

NOTE: All threads are for Tapped Holes, unless specified.

MOVING MAGNET



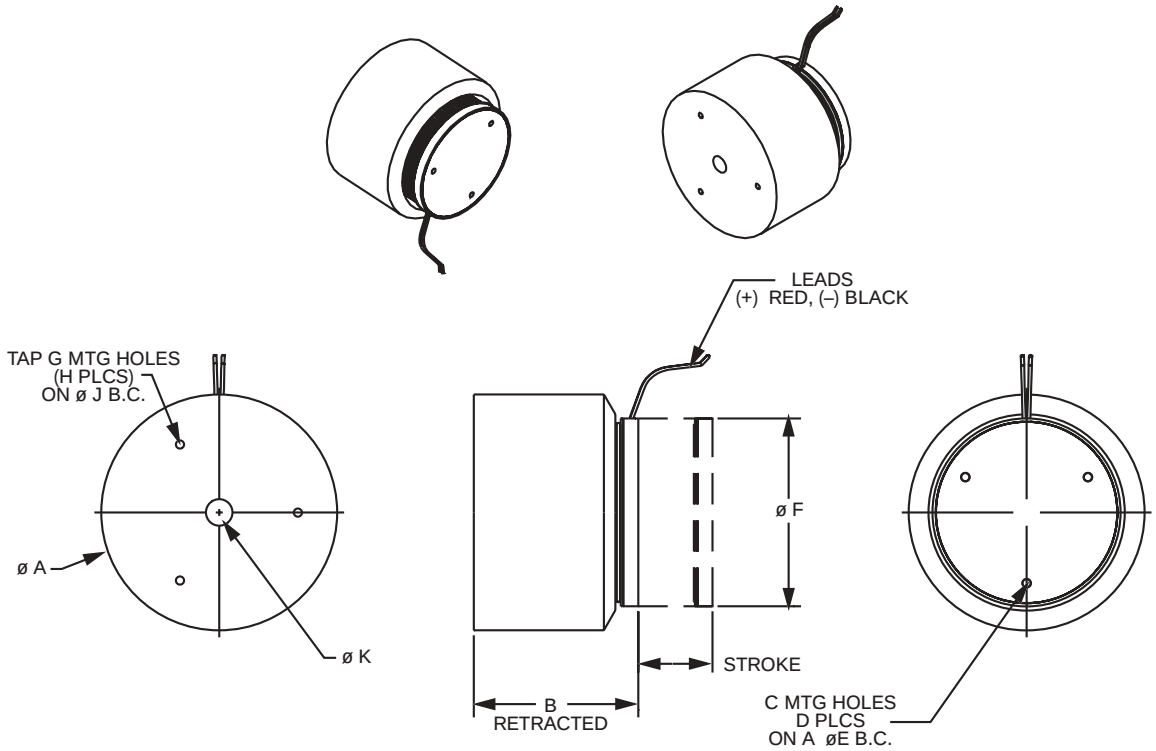
NOTE: All specifications are for reference only.

Non-Commutated Moving Coil Dimesions(in [mm])

		Catalog Number				
Dimension	**Unit**	**LMNC1-1F3-F2**	**LMNC1-1F3-F2**	**LMNC1-1F5-F2**	**LMNC1-2F8-F1**	**LMNC1-3F8-F5**
A	in [mm]	1.310 [33.3]	1.280 [32.5]	1.500 [38.1]	2.750 [69.9]	3.750 [95.3]
B	in [mm]	1.040 [26.4]	0.930 [23.6]	3.750 [95.3]	1.350 [34.3]	2.560 [65.0]
C	Thread	0.125	0-80 THRU	4-40 THRU	M3 X .300 DP	8-32 THRU
		3.2	UNC-2B	UNC-2B		UNC-2B
D	No.	1	3	2	4	3
E	in [mm]	N/A	0.375 [9.525]	0.500 [12.700]	1.750 [44.450]	2.250 [57.150]
F	in [mm]	0.743 [18.9]	0.730 [18.5]	1.100 [27.9]	2.280 [57.9]	2.990 [75.9]
G	Thread	N/A	N/A	N/A	M3 X 3/16 DP	8-32 X .375 DP
		N/A	N/A	N/A		UNC-2B
H	No.	N/A	N/A	N/A	4	3
J	in [mm]	N/A	N/A	N/A	2.047 [52.0]	2.500 [63.5]
K	Thread	N/A	0.178	10-32 X .175 DP	1.000	1/2-13 X .625 DP
		N/A	4.5	UNC-2B	25.4	UNC-2B
Leads	in [mm]	12.0 [304.8]	12.0 [304.8]	24.0 [609.6]	12.0 [304.8]	24.0 [609.6]
		Silicon jacket	Silicon jacket	Teflon jacket	Teflon jacket	Teflon jacket
L	AWG	24	24	24	20	24

NOTE: All threads are for Tapped Holes, unless specified.

MOVING COIL

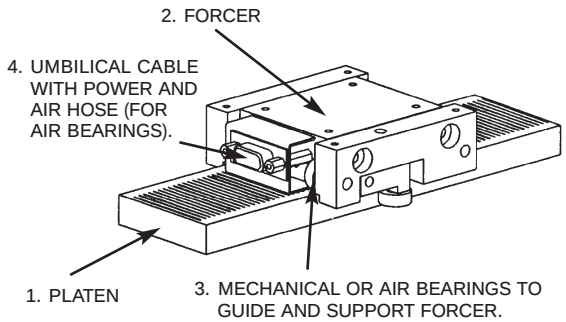


NOTE: All specifications are for reference only.

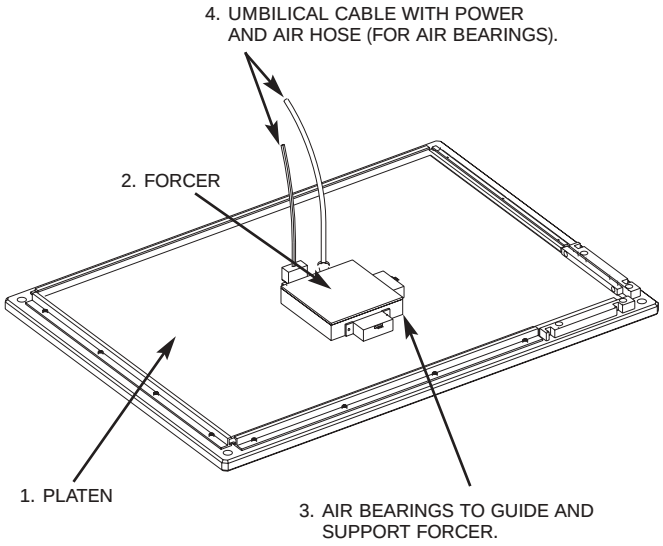
Linear Stepper Motors

The open loop linear stepper motor provides the most economical linear motor positioning solution. There are two types of linear stepper motors, a single-axis linear stepper motor that can be stacked to provide multiple axes and the compact dual-axis linear stepper motor that provides travel along two axes in a single plane. Linear stepper motors incorporate the motor, positioning system and bearings into two components, a moving forcer and a stationary platen.

Single Axis Linear Stepper



Dual Axis Linear Stepper



1. PLATEN

The platen on the single-axis linear stepper motor is a photo-chemically etched teeth on a steel bar or tube (for unsupported spans) filled with epoxy that is ground and hard-chrome plated. The platen of a dual-axis linear stepper motor is a waffle or checkerboard arrangement of teeth etched onto a steel plate in a grid pattern. The magnetic-attractive force between the forcer and platen provides a preload for the bearing system. The integral bearing system maintains the required air gap.

2. FORCER

The single-axis linear stepper motor's moving primary (forcer) is made of multiple laminated steel cores precisely slotted with teeth and permanent magnets. The coils are inserted into the laminated core assemblies, which are encapsulated in an aluminum housing.

The dual-axis linear stepper motor's moving primary (forcer) is made of four single-axis assemblies. Two of the forcer assemblies are mounted in series to provide thrust along the X-axis and the other two are mounted orthogonal to the first two assemblies to provide thrust along the Y-axis. A hard-anodized aluminum housing encapsulates the lamination assemblies and the motor's surface is lapped to provide a flat air-bearing surface.

Multiple forcers that move independently are available on single-axis and dual-axis linear stepper motors.

3. MECHANICAL OR AIR BEARINGS TO GUIDE AND SUPPORT FORCER

The single-axis stepper is available with mechanical or air bearings. The dual-axis stepper is available only with air bearings.

4. UMBILICAL CABLE WITH POWER AND AIR HOSE (FOR AIR BEARINGS)

Customer must supply power and filtered air for air bearings.

5. CLOSING THE STEPPER POSITION LOOP

Stepper motors can lose position or steps at high stepping rates. A stepper position verification sensor (SPS) can be used to close the position loop. While the motors actually run open loop the position sensing devices are used for position verification and stall detection. The SPS confirms the move matches the number of steps commanded. Baldor's SPS provides a positioning resolution of 0.010 inches. This signal can be used to move the forcer to the desired position, hold the forcer in a commanded stop position, re-home the motor or shut the motor control system down.

6. LINEAR STEPPER MOTOR OPERATION

Linear stepper motors divide linear distances into discrete incremental moves called steps. The size of each step is determined by the spacing of the steel teeth in the platen and how the coils are energized. Baldor 2-phase motors travel 0.010 inches (0.254mm) in a single full step yielding 100 steps per inch. Baldor 4-phase motors travel 0.005 inches (0.127mm) in a step.

When the coils are energized in a predetermined pattern the forcer will walk its way down the platen. Reversing the pattern will reverse the direction of travel. The frequency at which the microsteps are generated determine the velocity of the forcer.

Linear stepper motors produce their maximum force at zero speed. As speed increases the ability to switch winding current decreases due to motor inductance. This results in lower forces at higher speeds.

- Stepper Motor Controls – Baldor has linear drivers and linear indexer/drivers. Models are available for either single or dual axis, with operation directly off AC line voltage. The LinStep series are linear drivers which accept step and direction inputs from an external source. The LinStep+ series are complete linear indexer/drivers, which are programmed with either an optional keypad or a PC in a Windows programming environment.

Single-Axis Stepper

The open-loop linear stepper motor provides the most economical linear motor positioning package. It is possible to stack the single axis linear stepper to provide multiple axes. Linear single axis packages are made up of two components: a moving forcer (with bearings) and a stationary platen. A position verification system is available to close the loop.

Design Specifications

- 1g [9.8 m/s^2] acceleration typical
- Force to 50 Lbs. [222.4N]
- High repeatability 0.0004 in [10 µm]
- Resolution = $\frac{\text{Full Step}}{\text{Number of Microsteps}}$

  2-phase min. 0.0002 in [5 µm]

  4-phase min. 0.0001 in [2.5 µm]
- Air gap <0.001 in [25 µm]

Features

- For open loop systems
- No tuning necessary
- Multiple forcers with overlapping trajectories on a single platen
- Roller bearings on 0600 and 1300 series. High stiffness air bearings on 2000 and 2500 series
- Ceiling or wall mounted
- Lowest cost positioning stage
- Use with Microstepping driver (Refer to Baldor LinStep and LinStep+)

The 2 or 4-phase single-axis linear stepper motor consists of a moving forcer and a stationary platen. The forcer is made of two laminated steel cores precisely slotted with teeth and a single permanent magnet. The coil is inserted into the laminated assembly. Leads are provided at the beginnings and ends of the coils. Two interconnected assemblies result in a 2-phase motor. Four interconnected assemblies result in a 4-phase motor. The laminated assembly is encapsulated in an aluminum housing. The forcer is available in different sizes, depending on the application's force requirements.

The platen is a photo-chemically etched teeth on a steel bar filled with epoxy, ground and hard-chrome plated. Standard mounting holes are provided on forcer and platen. The platen is available in lengths over 100 in [2.54m]. The magnetic-attractive force between the forcer and platen is used as a preload for the bearing system. The platen to forcer air gap is maintained by the integral bearing system. The customer must bring power to the forcer with an umbilical cable.

Single-Axis Linear Stepper Motor Technical Data

Catalog Number ①	Units	LMSS0602-2WW0	LMSS0604-2WW0	LMSS1302-2WW1	LMSS-1304-2WW1
No. of phases		2	2	2	2
Static Force	Lbs [N]	2.0 [8.9]	4.0 [17.8]	5.0 [22.2]	10 [44.5]
Force @ 40 in/sec $\frac{\text{Static Force}}{2}$	Lbs[N]	1.0 [4.45]	2.0 [8.9]	2.5 [11.1]	5 [22.2]
Resistance/Coil	ohms	1.5	3.1	2.2	1.1
Inductance/Coil	mH	1.22	0.5	2.6	1.3
Amps/Phase	amps	1.5	3.0	2.0	4.0
Weight	Lbs [kg]	0.4 [0.18]	0.6 [0.27]	0.7 [0.32]	0.9 [0.41]
Bearing Type		Wheel	Wheel	Wheel	AIR ②
Air Bearing Rqmts	CFM [L/min]	N/A	N/A	N/A	2.5 [70.8]
Attractive Force	Lbs [N]	16 [71]	32 [142]	40 [178]	72 [320]

Catalog Number ①	Units	LMSS2004-2AW1	LMSS2504-2AW1	LMSS2508-2AW1
Number of Phases		2	2	2
Static Force	Lbs [N]	20.0 [89.0]	25.0 [111.2]	50.0 [222.4]
Force @ 40 in/sec = $\frac{\text{Static Force}}{2}$	Lbs [N]	10.0 [44.5]	12.5 [55.6]	25.0 [111.2]
Resistance/Coil	ohms	1.6	1.9	3.2
Inductance/Coil	mH	1.6	2.2	3.3
Amps/Phase	amps	4.0	4.0	8.0
Weight	Lbs [kg]	1.2 [0.54]	1.1 [0.50]	2.4 [1.1]
Bearing Type		AIR ②	AIR ②	AIR ②
Air Bearing Rqmts	CFM [L/min]	3.5 [99.1]	3.5 [99.1]	3.5 [99.1]
Attractive Force	Lbs [N]	144 [641]	180 [801]	360 [1,601]

NOTES: ① Four phase is available with the same force ratings and physical size except LMSS0602 and LMSS1302
② Air bearing units use a side ball bearing for lateral guidance as standard. Side air bearings are optional and requires using a tube platen.

Repeatability = +0.0004 in (10µm). Resolution= +0.0001 in (2.5µm), Cyclic error= ±0.0002 in (±5µm) *dependent on drive electronics and system implementation Wheel Bearing Airgap= 0.0015 in (38µm), Air Bearing Airgap= 0.0008 in (20µm), Air Pressure= 60-80 psi with a 3 micron filter.

All specifications are for reference only.

Single-Axis Stepper Forcer Catalog Number Identification Matrix

L M S S [ ][ ][ ][ ] - [ ][ ][ ][ ]

LINEAR MOTOR
Single-axis Stepper

CODE FOR STACK WIDTH
06, 13, 20, 25

NO. OF STACKS

NUMBER OF PHASES
2 or 4

SURFACE BEARINGS
A=Air
W=Wheel

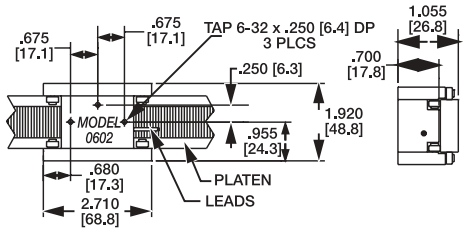
SIDE GUIDANCE BEARINGS
A=Air
W=Wheel

TERMINATION
0 = Flying Leads (24" Std.)
1 = DB9 Connector
2 = Other

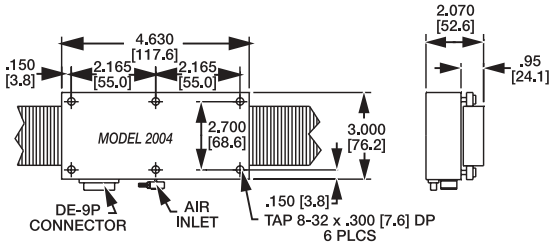
LMSS Series Linear Stepper Motor Forcer Dimensions

(Inches [mm])

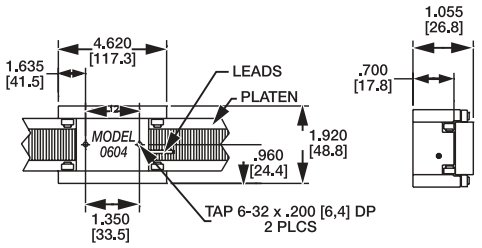
Model 0602



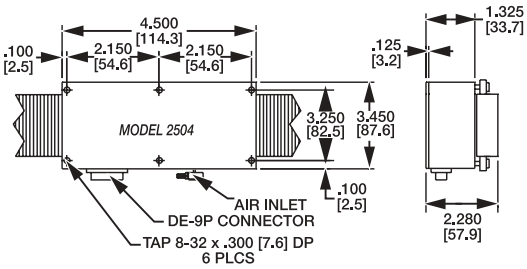
Model 2004



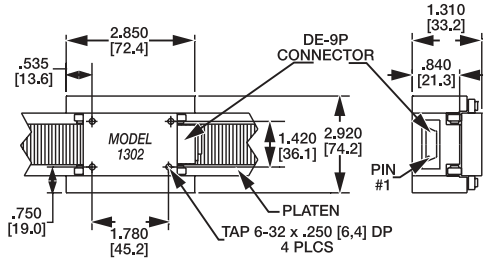
Model 0604



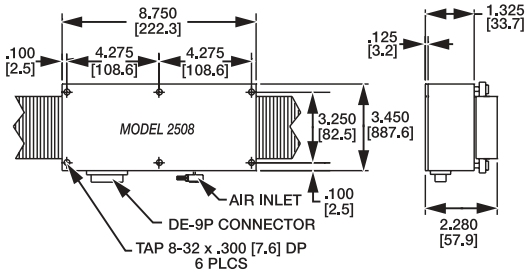
Model 2504



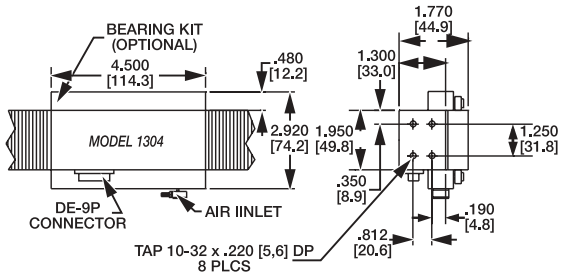
Model 1302



Model 2508

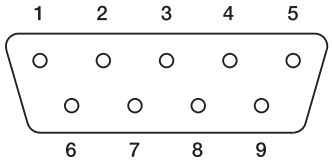


Model 1304



Connections

(View facing male connector)

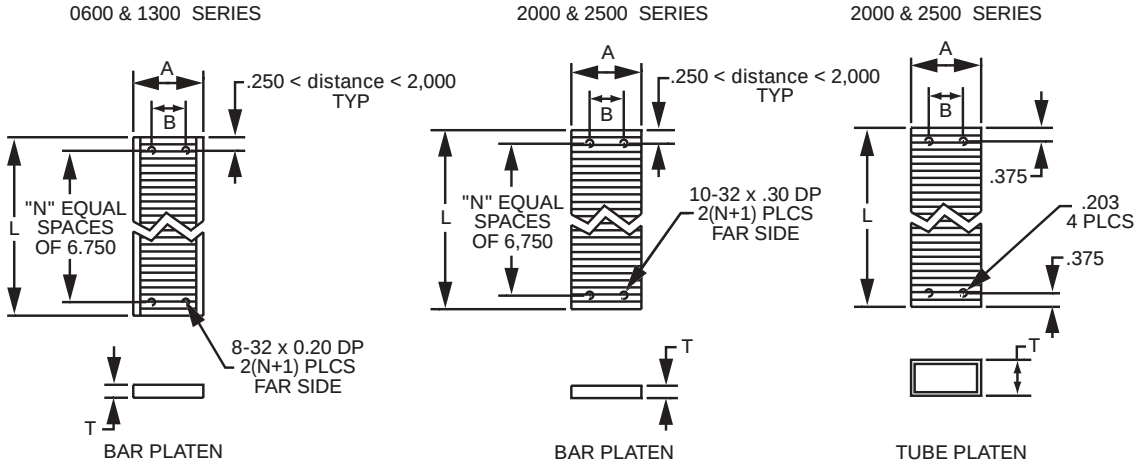


2-Phase Forcer	Pin No.	Function
White	Pin 1	A1 + Winding
Green	Pin 3	B1 + Winding
Red	Pin 7	A1 – Winding
Orange or Yellow	Pin 9	B1 – Winding
Black	Pin 5	Ground

LTSS Series Stepper Motor Platen Dimensions (Inches [mm])

Platen will be cut to length per customer specification.
Bottom mounting holes pattern is as shown.

Series	Catalog Number	A In [mm]	T In [mm]	B In [mm]	Weight (lbs/in)	Mass (kg/m)
0600 Bar	LTSS06WB-XXX	1.21 [30.7]	.35 [8.9]	0.96 [24.4]	0.118	2.11
1300 Bar	LTSS13XB-XXX	1.96 [49.8]	.468 [11.9]	0.96 [24.4]	0.264	4.72
2000 Bar	LTSS20XB-XXX	1.96 [49.8]	.468 [11.9]	0.96 [24.4]	0.264	4.72
2000 Tube	LTSS20XT-XXX	1.96 [49.8]	.468 [24.4]	0.96 [24.4]	0.153	2.73
2500 Bar	LTSS25XB-XXX	3.0 [76.2]	0.96 [24.4]	2.0 [50.8]	0.680	12.15
2500 Tube	LTSS25XT-XXX	3.0 [76.2]	0.96 [24.4]	2.0 [50.8]	0.223	3.99



LTSS Series Stepper Motor Platens Catalog Identification Matrix

L T S S [ ][ ][ ][ ] - [ ][ ][ ]

LINEAR PLATEN
Single-axis Stepper

CODE FOR STACK WIDTH
06 = 0600 Series Forcers
13 = 1300 Series Forcers
20 = 2000 Series Forcers
25 = 2500 Series Forcers

TYPE OF FORCER
A = Air Bearing Forcers
W = Wheel Bearing Forcers

TYPE OF PLATEN
T = Tube Platen (2000 and 2500 Series only)
B = Bar Platen (All Series)

LENGTH
(In Inches) ①
Per Customer Spec

NOTE: ① Length rounded up to nearest whole inch. Platen with length greater than 58.0 inches will only be available in modular form.

Dual-Axis Stepper

The open-loop linear stepper motor provides the most economical linear motor positioning package. The compact dual-axis stepper motor provides travel along two axes in a single plane. The dual axis package is comprised of two components: a moving forcer (with bearings) and a stationary platen. A position verification system is available to close the loop.

Design Specifications

- Two-axis motion in a single plane
- Acceleration to 2g [19.6 m/s^2]
- High repeatability 0.0002 in [5.08 µm]
- Flatness = 0.0005 in/ft. [12.7 µm/300 m]
- Resolution = $\frac{\text{Full Step}}{\text{Number of microsteps}}$

  2-phase min. 0.0002 in [5 µm]

  4-phase min. 0.0001 in [2.5 µm]
- Platens up to 36 in x 59 in [914 mm x 1,498 mm]

Features

- For open position loop systems
- No tuning necessary
- Multiple forcers with overlapping trajectories on a single platen
- High stiffness air bearings
- Mount face up or inverted.
- Required control: Microstepping driver
- Lowest cost dual-axis positioning stage

The dual-axis linear stepper motor is designed for two-axis open loop positioning. It is a two axis stage with integrated air bearings and positioning system.

The moving primary 2 or 4-phase dual-axis linear stepper motor consists of a moving forcer and a stationary platen. The forcer is made of four single-axis coil assemblies. Two of the forcer assemblies are mounted in series to provide a thrust in the X direction and the other two are mounted orthogonal (at 90 deg.) to the first two assemblies to provide thrust in the Y direction. The forcer assemblies are encapsulated in a hard anodized aluminum housing. The motor's surface is lapped to provide a flat surface for the air bearing. The floating height of the air bearing is less than 0.001 in [25 µm]. The forcer is available in eight sizes, depending on the application's force requirements.

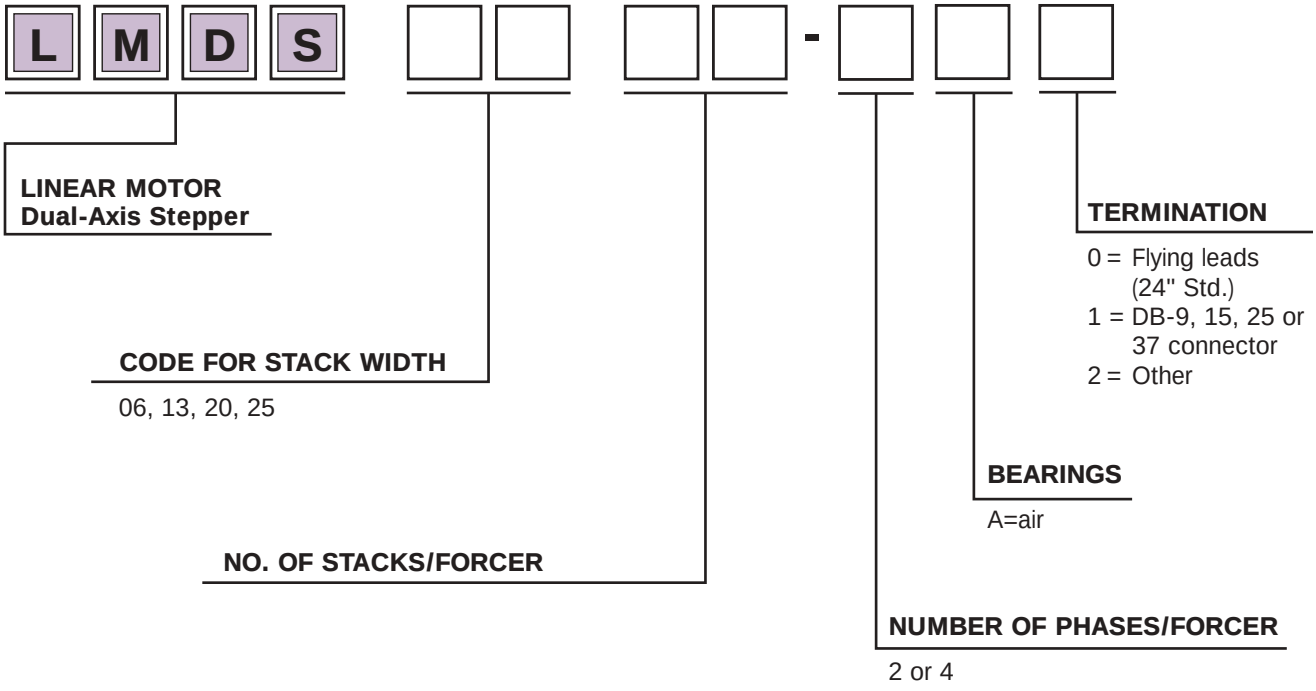
The platen is a photo-chemically etched steel plate that is filled with epoxy and ground. Standard mounting holes are provided on forcer and platen. The platen is available in sizes up to 36 in x 59 in [0.24m x 0.34m]. Preload for the bearing system is provided by the magnetic-attractive force between the forcer and the platen. The customer must bring power to the forcer with a cable, and provide the bearing air supply.

Dual-Axis Linear Stepper Motor Technical Data

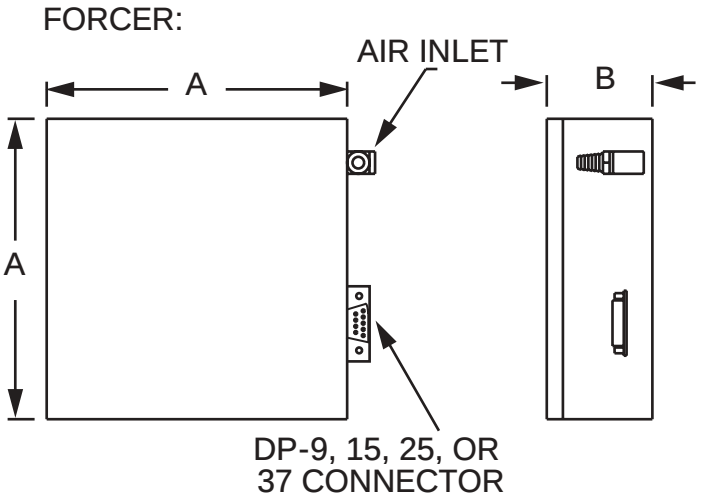
CATALOG NO.	Units	LMDS0602-2A0	LMDS1302-2A0	LMDS2002-2A0	LMDS1304-2A0	LMDS2004-2A0	LMDS2504-2A0
Number of Phases①		2	2	2①	2①	2①	2①
Static Force	Lbs [N]	3.0 [13.3]	6 [26.7]	9 [40.0]	15 [66.7]	24 [106]	30 [133]
Force @ 30 in/sec	Lbs [N]	1.5 [6.65]	3 [13.3]	4.5 [20.0]	7.5 [33.4]	12 [53.3]	15 [66.7]
Resistance/Phase	ohms	3.1	4.2	6.5	2.2	3.2	3.8
Inductance/Phase	mH	2.35	5.2	6.6	2.6	3.3	4.4
Amps/Phase	amps	2.0	2.0	2.0	4.0	4.0	4.0
Weight	Lbs [kg]	8 [3.6]	1.1 [0.50]	1.6 [0.72]	3.2 [1.4]	4.5 [2.0]	5.1 [2.3]
Airflow	CFM[L/min]	1.5 [42]	2.0 [56]	2.5 [70]	3.0 [84]	3.5 [98]	4.0 [112]
Attractive Force	Lbs [N]	36 [160]	90 [400]	162 [721]	203 [903]	324 [1,441]	405 [1,801]

NOTES: ① Four phase is available with the same force ratings and physical size. Typically, a 4-phase motor has twice the resolution as a 2-phase. The maximum 4-phase resolution is about ±1 µm.
Bi-directional repeatability= ±0.0002 in (±5 µm). Unidirection repeatability better than .0001 inch.
Resolution = 0.0002 in (2.5 µm), Cyclic error= ±0.0002 in(±5 µm) dependent on drive electronics and system implementation
Standard Pitch 0.040 in, Optional Pitch 0.020 in.
Air Bearing Airgap = 0.0008 in (20 µm), Air Pressure= 60-80 psi with a 3 micron filter.
All specifications are for reference only.

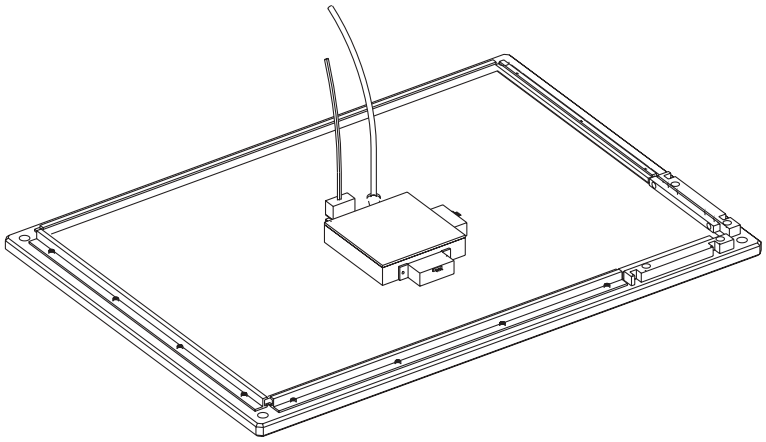
Dual-Axis Forcer Catalog Identification Matrix

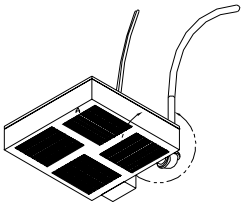


Dual-Axis Forcer Dimensions Inches [mm]



Dual-Axis Forcer Dimensions (Inches [mm])		
Catalog Number	**A**	**B**
LMDS-0602	3.15 [80.0]	1.1 [28]
LMDS-1302	3.80 [96.5]	1.2 [30]
LMDS-2002	4.75 [120.7]	1.2 [30]
LMDS-1304	5.88 [149.4]	1.2 [30]
LMDS-2004	6.50 [165.1]	1.2 [30]
LMDS-2504	7.00 [177.8]	1.45 [37]





Dual-Axis Forcer
(bottom view)

Dual-Axis Platen Catalog Identification Matrix

L T D S - ☐ ☐ - ☐

LINEAR PLATEN
Dual-Axis Stepper

BASE TYPE
1 = Honeycomb (All Stainless)
2 = 1" Solid Steel
3 = Special (Cast Iron, Granite, etc.)

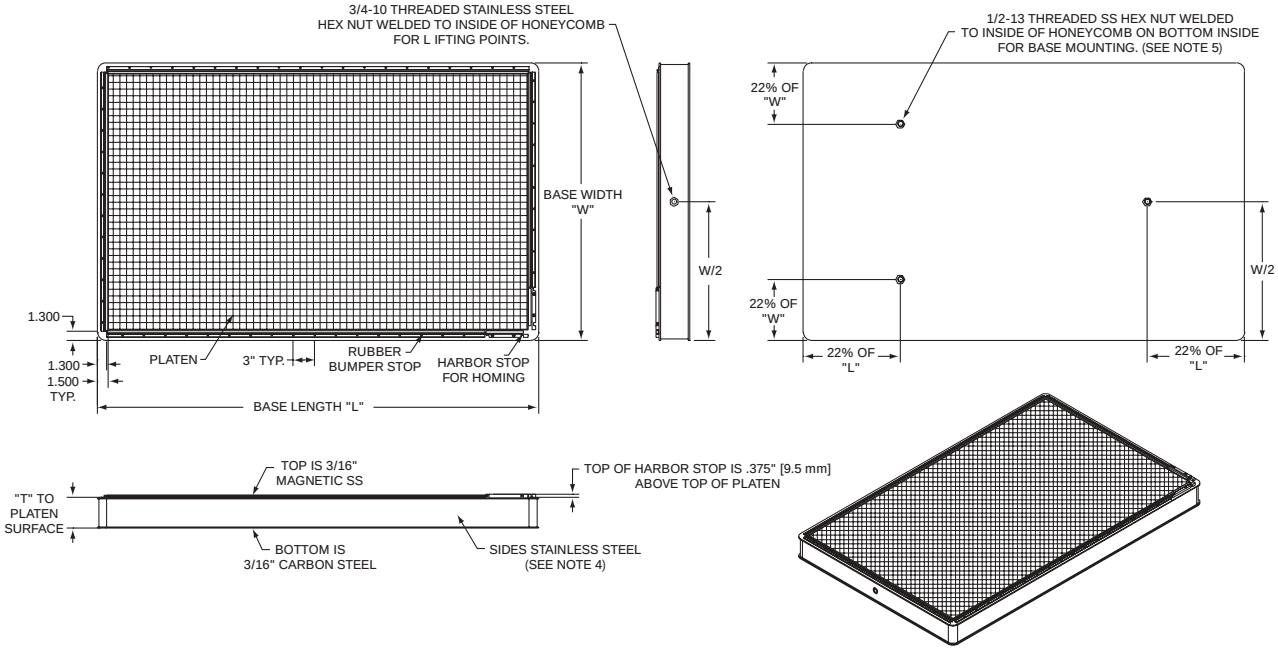
FEATURES
S = Standard Features (w/Max. size)
C = Custom (Size, bumpers, mtg. holes, stop, carbon steel, etc.

Size Class	Overall Size (Inch)	Travel Area (Inch)
D = Double	62 X 39	59 X 36
L = Long	55 X 35	52 X 31.25 (Honeycomb only)
F = Full	43 X 33	40 X 30
T = 3 Quarters	33 X 33	30 X 30
H = Half	33 X 23	30 X 20
Q = Quarter	23 X 18	20 X 15
S = Sixth	18 X 16.33	15 X 13.33
E = Eighth	18 X 13	15 X 10

Size Class is dependent on Base Size. Maximum dimensions for the size classes are shown. Larger size choices will fall into next size class.Usable Platen Area is 3" less than dimensions shown.

Dual-Axis Platen Dimensions
Stainless Steel Platens

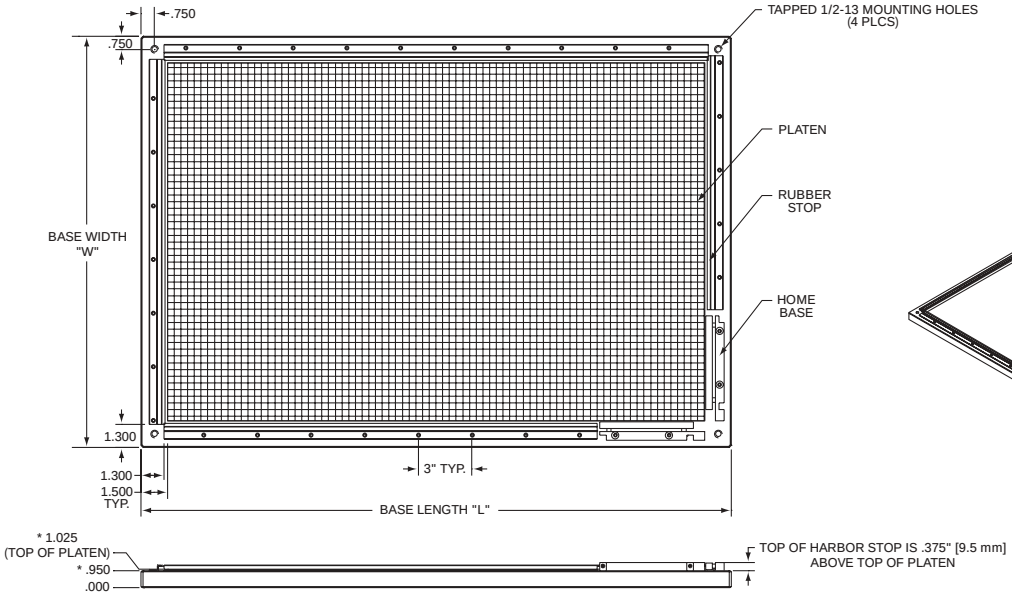
(Inches [mm])

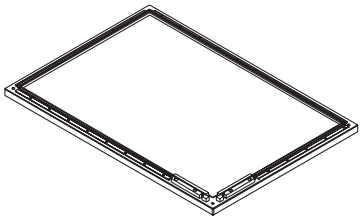


CATALOG NO.		LTDS-E1-S	LTDS-S1-S	LTDS-Q1-S	LTDS-H1-S	LTDS-T1-S	LTDS-F1-S	LTDS-L1-S	LTDS-D1-S
Overall	Inch	18.00	18.00	23.00	33.00	33.00	43.00	55.00	62.00
Length	meter	0.46	0.46	0.58	0.84	0.84	1.09	1.41	1.57
Overall	Inch	13.00	16.33	18.00	23.00	33.00	33.00	35.00	39.00
Width	Meter	0.33	0.41	0.46	0.58	0.84	0.84	089	0.99
Platen	Inch	2.37	2.37	2.37	2.37	2.37	4.37	4.37	4.37
Thickness	mm	60.1	60.1	60.1	60.1	60.1	114	114	114
Usable	Inch	15.00	15.00	20.00	30.00	30.00	40.00	52.5	59.00
Length	Meter	0.38	0.38	0.51	0.76	0.76	1.02	1.33	1.50
Usable	Inch	10.00	13.33	15.00	20.00	30.00	30.00	32.00	36.00
Width	Meter	0.25	0.34	0.38	0.51	0.76	0.76	0.81	0.91
Platen	Lbs	49	61	78	135	170	325	425	487
Weight	Kg	22	28	35	61	77	148	193	221

NOTE: 1. Stainless steel top, sides and bottom
2. Flatness: Top: ± 0-.0005 inch/foot [12.7 microns/305mm] typical
3. Flatness: Bottom: ± 0.005 inch/foot [127 microns/305mm] typical
4. Add 0.40 inch [12mm] thickness for bumpers (Std. on all platens with two harbor stop homing devices at right corner)
5. Parallelism of top to bottom: ± 0.10 inch [0.254mm] typical
6. Larger size platens available on request

Dual-Axis Platen Dimensions
Carbon Steel Platens (Inches [mm])





NOTES: 1) Hard Chrome-Plated Base
2) Flatness Top ± .0005 Inch/Foot [12 microns/305 mm] Typ.
3) Parallelism of Top to Bottom ±.010" Typ.
4) * + .050
– .000

CATALOG NO.		LTDS-E2-S	LTDS-S2-S	LTDS-Q2-S	LTDS-H2-S	LTDS-T2-S	LTDS-F2-S
Overall Length	Inch	18.00	18.00	23.00	33.00	33.00	43.00
	[Meter]	[0.46]	[0.46]	[0.58]	[0.84]	[0.84]	[1.09]
Overall Width	Inch	13.00	16.33	18.00	23.00	33.00	33.00
	[Meter]	[0.33]	[0.41]	[0.46]	[0.58]	[0.84]	[0.84]
Usable Length	Inch	15.00	15.00	20.00	30.00	30.00	40.00
	[Meter]	[0.38]	[0.38]	[0.51]	[0.76]	[0.76]	[1.02]
Usable Width	Inch	10.00	13.33	15.00	20.00	30.00	30.00
	[Meter]	[0.25]	[0.34]	[0.38]	[0.51]	[0.76]	[0.76]
Platen Weight	Lbs	65	82	116	214	308	402
	[Kg]	[30]	[36]	[53]	[97]	[140]	[183]

Stepper Positioning Sensor

The Stepper Positioning Sensor (SPS) provides closed-loop operation of single and dual-axis linear steppers. The sensor operates as an incremental encoder in conjunction with the motor platen to recognize lost steps. The output signal can be used by the controller to shut the system down, re-home or move to the desired position.

Typically, the SPS closed-loop repeatability is the same as open-loop repeatability. Resolution is 400 or 200 µm. Output signal is phase A/B square waves.

The Stepper Positioning Sensor is a factory installed option.

Design Specifications

- Provides position verification for open position loop systems
- Converts an open loop stepper motor system to a closed loop system
- Operates as an incremental encoder in conjunction with the motor platen

Features

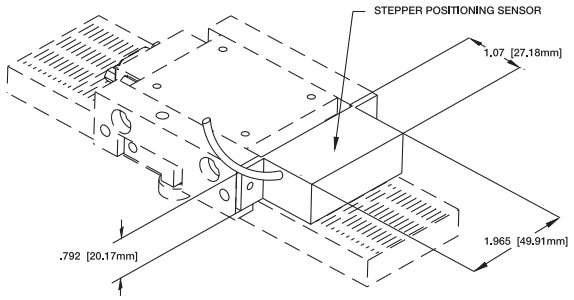
- Senses lost steps to the controller
- Signal can be used to shut down, re-home or move to the desired position
- Can be used for single and dual-axis linear stepper motors
- Encoder scale not required

Stepper Positioning Sensor Technical Data

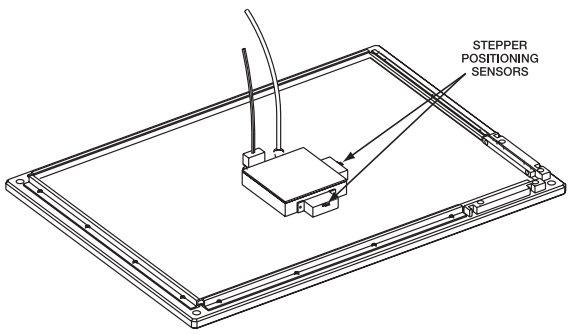
Catalog Number	Units	LMSVS-200	LMSPS-400
Resolution	in [µm]	0.0002 [5.8]	0.0004 [10.16]
Power Supply	VDC	5 ± 5%	5 ± 5%
Output Signal		TTL Quadrature Output	TTL Quadrature Output
Weight	oz. [gms]	2.75 [77]	2.75 [77]
Construction		Metal Shell	Metal Shell

Stepper Positioning Sensor Dimensions (Inches [mm])

Single-Axis Stepper



Dual-Axis Stepper



LinStep Series
Stepper Motor Controls

The LinStep Series of linear microstepping controls provides ease of use, in a reliable fully-protected unit. It accepts the standard step and direction commands from any indexer (controller). The anti-resonance circuitry allows for more usable force, and smoother performance with less machine vibration. The revolutionary internal cooling design uses less panel space while keeping internal electronics cool for reliable performance.

Design Specifications

- Direct 115 VAC or 230 VAC, 1 Phase Input
- Built in power supply
- Anti-resonance circuitry for smooth operation
- Built in regenerative
- Selectable resolution – Single Axis 10-1 micron; Dual Axis 250-4 micron
- Internal cooling design keeps electronics cool and clean
- Reliable performance and operation
- Efficient design allows stacking to reduce panel space
- CE, UL, cUL

Keypad Features

- Keypad for HMI or as programming tool
- Backlit 40 character display
- Menu driver setup and help
- Displays current position and I/O status
- Use for diagnostics and troubleshooting
- IP 65 for remote panel mount
- Connects to control or mounts remotely

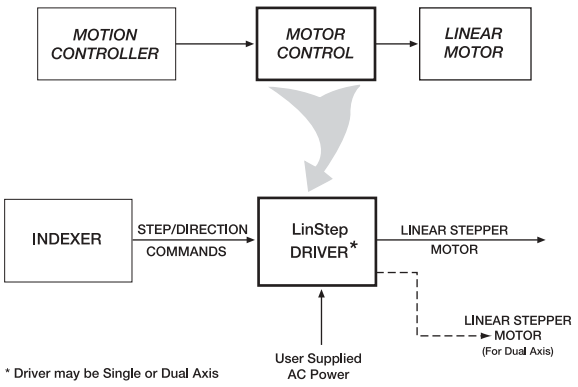
Protection Features

- Short circuit
- Undervoltage
- Regen/Overvoltage
- Over temperature
- Interlock

Input Voltage		115 VAC 1ϕ	230 VAC 1ϕ
Number of Axes	Output Current	Catalog Number	Catalog Number
1	3.9	–	LX1D2A03F9
1	7.9	LX1D1A07F9	–
2	6	LX2D1A06	–

LinStep Single/Dual-Axis Drivers

LinStep Single/Dual-Axis drivers accept step and direction commands from popular commercially available stepper controllers.



LinStep Technical Data

Description	Units	Catalog Number		
		Single Axis		Dual Axis
		LX1D1A07F9	LX1D2A03F9	LX2D1A06
Nominal Input Voltage	VAC	115	230	115
Phases	#	1	1	1
Input Frequency	Hz	50/60	50/60	50/60
Voltage Range	VAC	92-132	184-265	105-132
Bus Voltage	Vdc	160	320	160
Nominal Output Current (Adjustable 0.1A increments)	amps	0.1-7.9	0.1-3.9	0.1-6.0
Resolution		Selectable – See Table Below		
Efficiency	%	85	85	85
Switching Frequency	KHz	20	20	1.25
Max Operating Temp	Deg C	50	50	65
Humidity (Non Condensing)	%	0 to 90	0 to 90	0 to 90

Single-Axis
Selectable Resolution

Step/Rev Setting	Linear Motor Resolution*		
	Inch	mm	micron
5000	4.00 E-4	1.02 E-2	10.16
10000	2.00 E-4	5.08 E-3	5.08
18000	1.10 E-4	2.79 E-3	2.79
20000	1.00 E-4	2.54 E-3	2.54
25000	8.00 E-5	2.03 E-3	2.032
25400	7.80 E-5	1.98 E-3	1.981
36000	5.50 E-5	1.39 E-3	1.397
50000	4.00 E-5	1.02 E-3	1.016

NOTE: * Based on 2 phase 1.8 deg. motor step angle.

Dual-Axis
Selectable Resolution

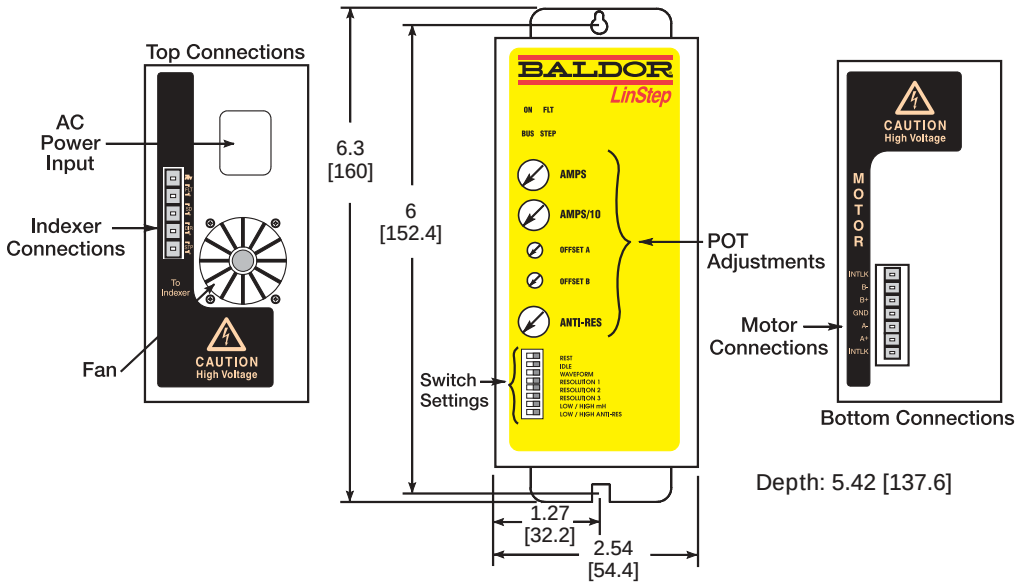
Step/Rev Setting	Linear Motor Resolution*		
	Inch	mm	micron
200	0.01	2.54 E-1	2.54 E2
400	0.005	1.27 E-1	1.27 E2
1000	0.002	5.08 E-2	5.08
5000	4.0 E-4	1.02 E-2	10.2
10000	2.0 E-4	5.08 E-3	5.08
18000	1.1 E-4	2.79 E-3	2.79
25000	8.0 E-5	2.03 E-3	2.03
25400	7.8 E-5	1.98 E-3	1.98 E-3

Setup Overview

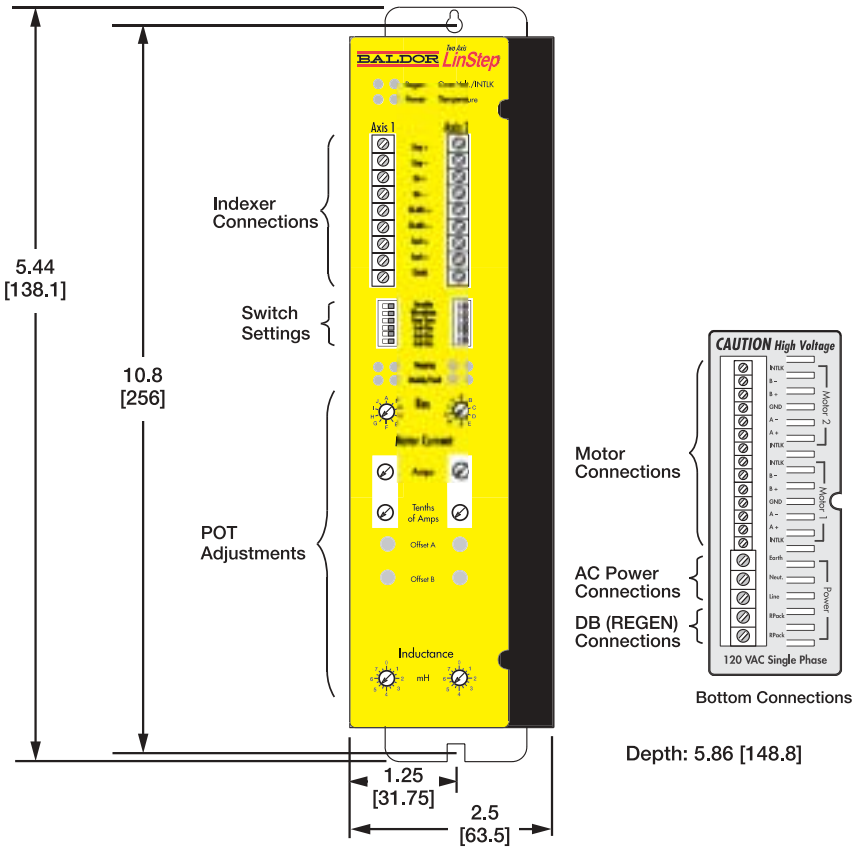
Standby Current Setting	Single Axis – Idle Current, if selected will reduce current to 75% of drive setting if no step pulses are received for 10 msec. Rest Setting – if selected, will reduce motor current to 1 amp after no motion for 12 minutes. Dual Axis – Standby Setting – If selected, reduces current to 70% after 250 msec. Both Axis – Full current resumption upon receipt of next step pulse.
Waveform	Configures shape of waveform for optimizing smoothness and step-to-step accuracy.
Resolution	Configures resolution to achieve desired number of steps per engineering unit per inch.
Anti-Resonance	Adjust gain of compensation to improve motion performance.
Offset Adjust	Provided to optimize smooth operation and step-to-step accuracy.
Motor Amp	Adjust motor current from 0.0 - 6.0 amps (peak) per motor phase.
Inputs	Step, direction, and shutdown: Optically isolated Direction: Low logic = fwd; High logic = rev. A 0.4 microsec setup time required after direction change before next step pulse is sent to drive Step input: Triggered on rising edge: Single Axis – 250 nsec min width, 2 Mhz max pulse rate Dual Axis – 400 nsec min width, 125 Khz max pulse rate
Fault Output	Optically isolated NPN, collector (Fault+) and Emitter (Fault–) connection available Output Off = No Faults: Output On = Drive Fault
LED Diagnostic	Power on, steps received, direction received, overvoltage, over temperature, undervoltage, interlock, regen short circuit
Protection	Short Circuit – Disable on phase-to-phase or phase-to-ground detected Undervoltage – Disable if supply drops below 90 VAC Over Temperature – Disable if heatsink > 65° C Overvoltage – 220 VAC for 115 VAC units: 440 VAC for 230 VAC units

Typical Connections and Dimensions (in[mm])

Single-Axis



Dual-Axis



LinStep+ Stepper Motor Indexer/Driver

LinStep+ controls are complete linear motor microstepper indexer/driver packages. Some models have ratings to 8 amps. The programming language, with IntelliStep application software, eases setup and integration. LinStep+ controls accept encoder feedback for closed loop position verification, position maintenance and stall detection.

Design Specifications

- Direct 115 and 230 VAC
- Built-in power supply
- 160 and 320 VDC Bus
- Anti-resonance circuitry for smooth operation
- High speed registration Input
- User scaling of position, velocity and acceleration
- Accepts encoder feedback for position maintenance, stall detection and closed loop position verification
- Internal cooling design reduces panel space, increases component life, provides long reliable operation and performance
- 16 Configurable optically isolated I/O, dedicated home and 2 dedicated EOT limits
- CE, UL, cUL Certified

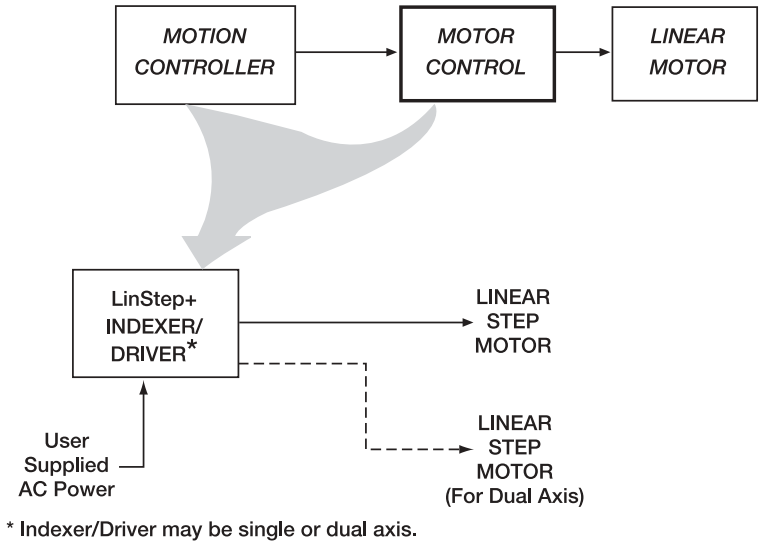
Protection Features

- Undervoltage
- Short circuit
- Regen/Overvoltage
- Interlock
- Over temperature

Input Voltage		115 VAC 1ϕ	230 VAC 1ϕ
Number of Axes	Output Current	Catalog Number	Catalog Number
1	3	LX1P1A03F9-2	–
1	3.9	–	LX1P2A03F9-2
1	7.9	LX1P1A07F9-2	–
2	6	LX2P1A06-2	–

LinStep+ Single-Axis Microstepping Indexer/Driver

The LinStep+ is a complete microstepping indexer driver package. Baldor's IntelliStep programming language eases setup and application development.



* Indexer/Driver may be single or dual axis.

LinStep+ Indexer/Driver Technical Data

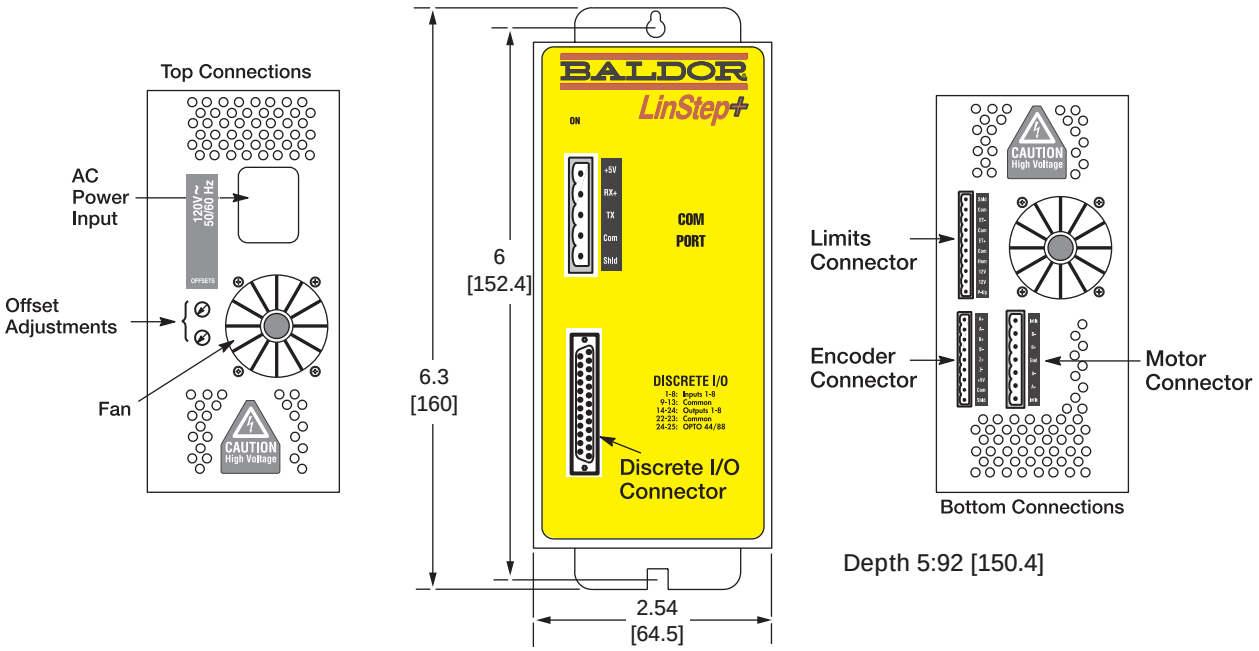
Description	Units	Catalog Number			
		Single Axis			Dual Axis
		LX1P1A03-2	LX1P1A07F9-2	LX1P2A03F9-2	LX2P1A06-2
Nominal Input Voltage	VAC	115	115	230	115
Phases	#	1	1	1	1
Input Frequency	Hz	50/60	50/60	50/60	50/60
Voltage Range	VAC	92-132	92-132	184-265	92-132
Bus Voltage	VDC	160	160	320	160
Nominal Output Current	amps	0.1-3.0	0.1-7.9	0.1-3.9	0.1-6.0
Resolution	inch [mm]	55×10^{-5} [1.02×10^{-3}]			4.0×10^{-5} [1.02×10^{-3}]
Efficiency (Running)	%	85	85	85	85
Switching Frequency	KHz	20	20	20	20
Encoder	–	Optically Isolated, differential line driver, 5 VDC, 500 KHz Max (2 MHz post quadrature)			
Encoder Power	–	5 VDC @ 200 mA (encoder)			
Inputs	–	8 Programmable +2 Limit and 1 Home input. (24 VDC maximum – optically isolated ≤ 3 mA sink current at ≥ 0.7 Volts)			
Output Power	–	12 VDC @ 12 mA (Pull-ups)			
Programmable Outputs	–	8 Open collector (100 mA maximum sink current, 350 mA maximum total sink amps)			
Programming	–	Keypad or Serial communications			
Max Operating Temp	Deg C	50	50	50	50
Humidity (Non Condensing)	%	0 to 90	0 to 90	0 to 90	0 to 90

Setup Overview for LinStep+

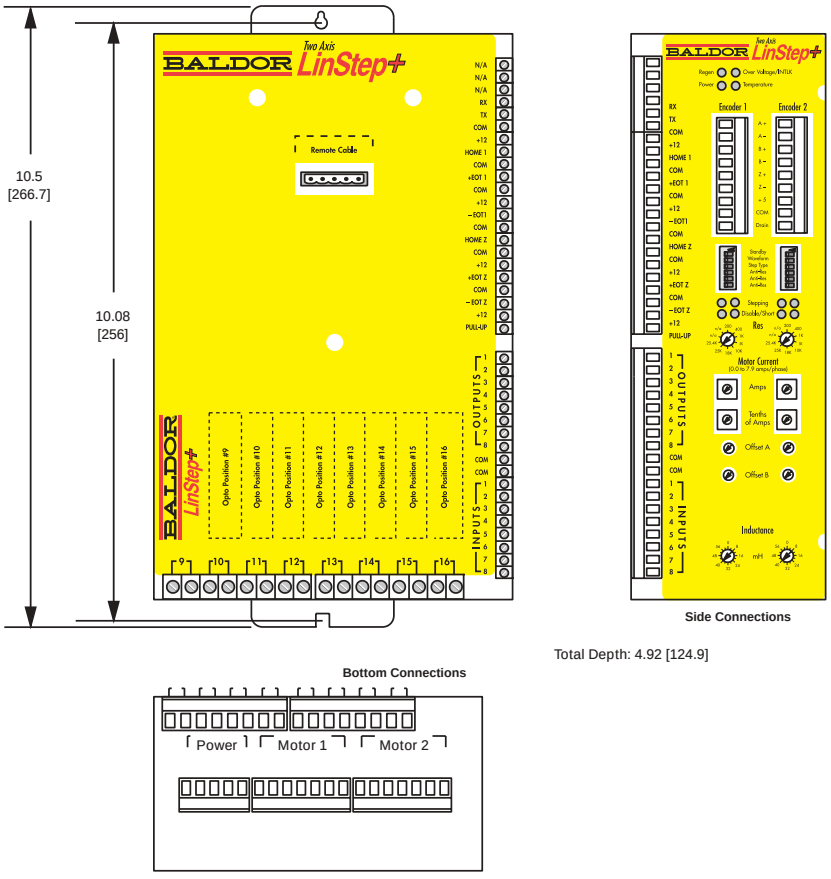
Standby Current Setting	Single Axis – Idle Current, if selected will reduce current to 75% of drive setting if no step pulses are received for 10 msec. Rest Setting – if selected, will reduce motor current to 1 amp if no motion occurs for 12 minutes. Both set via software. Dual Axis – Standby Setting – If selected, reduces current to 70% after 250 msec. Both Axis – Full current resumption upon receipt of next step pulse.
Waveform	Configures shape of waveform for optimizing smoothness and step-to-step accuracy. Single axis set via software; dual axis via DIP switch.
Resolution	Configures resolution to achieve desired number of steps per engineering unit per inch. Single axis set via software; dual axis via rotary switch.
Anti-Resonance	Adjust gain of compensation to improve motion performance. Single axis set via software; dual axis via DIP switch.
Offset Adjust	Provided to optimize smooth operation and step-to-step accuracy.
Motor Amp	Adjust motor current from 0.0 to “drive rated amps (peak)” per motor phase. Single axis is set via software; dual axis via 10-position rotary switches.
Output	Step pulse width is 0.8 - 10 msec depending on resolution setting.
Position Range	± 2147,483,647 step, absolute and incremental.
Velocity Range	1-1,250,000 steps/sec
Acceleration Range	0.1-1 G with linear stepper motor
Digital Inputs	8 programmable. Dual axis includes additional EOT limits and 1 home. (24 VDC maximum – optically isolated < 3 ma sink current at >0.7 volts)
Digital Outputs	8 programmable (Open collector, sink current 100 ma max, 350 ma max total)
Fault Input	Optically isolated TTL level, internal 1.0 Kohm pull up to +5 V
LED Diagnostic	Power on, stepping, direction received, overvoltage, over temperature, regen short circuit
Protection	Short Circuit – Disable on phase-to-phase or phase-to-ground detected Undervoltage – Disable if supply drops below 90 VAC Over Temperature – Disable if heatsink > 70° C Interlock – Disable if interlock connection broken Regen/Overvoltage – 220 VAC for 115 VAC units: 440 VAC for 230 VAC units
Encoder	Optically isolated, differential line driver 5 VDC, 500 KHz max (2 Mhz post quadrature) 200 mA encoder supply on board

Typical Connections and Dimensions (in[mm])

Single Axis



Dual Axis



Baldor IntelliStep Keypad

- Optional Keypad
- Use for Setup, programming tool, or HMI
- 40 character easy-to-read backlit display
- Remote panel mountable with NEMA 4 (IP65) protection
- Displays current position and I/O status
- Cable connection to single-axis LinStep+ indexer/driver
- Direct connection to dual-axis LinStep+ indexer/driver

"F" Keys (F1, F2, F3)
Used as Menu selectors. used with numeric keys to select commands in the program editor.

0 - 9 Keys
Enters numbers. Used with "ALPHA" to select characters, and with "F" Keys to select commands in the program editor.

MENU KEYS

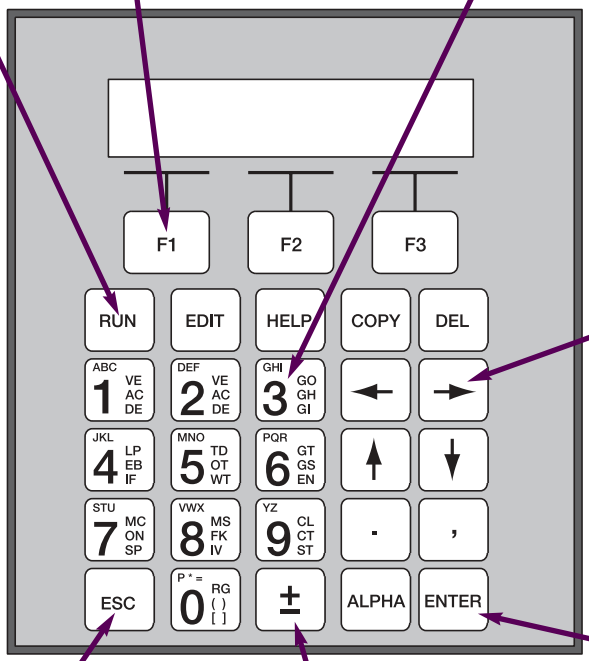
Run
Runs a program, jogs an axis, or accesses Test/Debug functions.

Edit
Edits Setup parameters and programs, lists programs, and resets position counter.

Help
Provides help on keys, menus, and command syntax.

Copy
Copy programs between keypads, between keypad and PC, or from program to program.

Del
Deletes characters in the editor or deletes entire programs from memory.



← ↑ → ↓

For scrolling through menu options, setup choices, and programs in the editor.

Moves an axis in JOG mode.

ENTER
Saves parameters that have been typed into a configuration or the program editor. Enters a space in the program editor.

ESC
Stops a program or moves back one menu level. Exits and saves a program in the program editor.

±
Selects the direction of motion in programs, and may be used in math programs.

Baldor's IntelliStep Motion Developer

Baldor's "IntelliStep" software is a Microsoft Windows® based application development tool. It could be used in place of the optional keypad for setup and programming of the LinStep+. The IntelliStep software aids you to quickly set up your package and create programs using a PC. It is possible to download programs to LinStep+ or retrieve an existing program.