AIREX

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P-Series Ironless Linear Motors

P-16 Performance Series

The Airex Advantage - High Density Coils

• Linear Motor force is produced by the interaction of the fixed field created by permanent magnets and the current flowing through each conductor in the coil (Lorentz Force).

• The concept is simple...more conductors equals more force...and that means faster acceleration and a more responsive linear motion system.

• Conventional linear motor coils are “bobbin wound” resulting in less active copper.

• Airex achieves the highest coil density in the industry through a proprietary winding design and process perfected over 20 years.

• Airex Ironless Linear Motors produce 20-60% more force per mm of coil length.

• If you care about performance, let the Airex Advantage empower your success.

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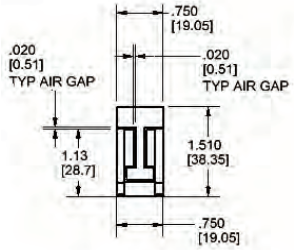
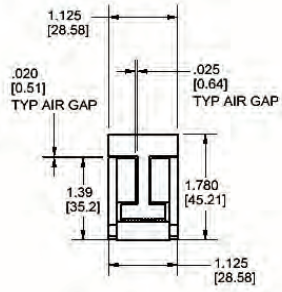
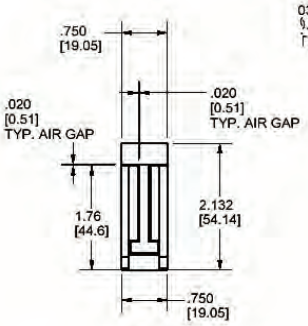


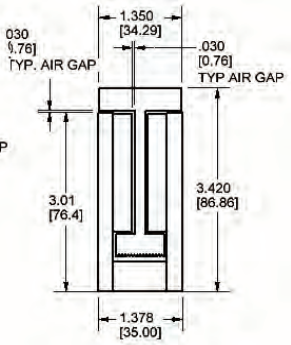
P12 Coil and Magnet Track Assembly



P15 Coil and Magnet Track Assembly



P16 Coil and Magnet Track Assembly



P20 Coil and Magnet Track Assembly

Order your Airex Linear Motor with the part numbers as described below. A complete motor consists of a Linear Motor Coil (LMC) and one or more Linear Motor Magnet Tracks (LMDT), each ordered separately. Magnet Tracks can be assembled end to end to achieve desired travel length.

LINEAR MOTOR COIL	MOTOR SERIES	# OF POLES	COMMUTATION	INTERNAL CONNECTION	CABLE LENGTH	THERMAL DEVICE
L M C - P 1 2 - 1			**3**	**S**	**72**	**P**
LMC	C10 C12 C16 P12 P15 P16 P20	1 - 4 1 - 4 1 - 4 1 - 4 1 - 5 1 - 5 1 - 6	1 = coil only 3 = coil with 120° Hall Effect Device	** Y or D = C series only S = series connection P=parallel Connection *D=double parallel	72 = 72" (1.8 m) Standard	X = none L/F = NC/NO thermostat (P15 & P20) N/P = Negative/Positive temperature coefficient thermistor (standard) C = temperature to current thermistor

LINEAR MOTOR TRACK	MOTOR SERIES	TRACK LENGTH	MAGNET	PROFILE
L M D T - P 1 2 -		**12 . 0**	**F**	**S**
LMDT- For P series LMST- For C series	C10 C12 C16 P12 P15 P16 P20	Length in inches (i.e. 12.0 = 12.0") C10,C12, C16,P12,P15 & P16 have 1.20" [30.5 mm] increments P20 has 2.40" [61.0 mm] increments	F = standard for C12, P12,P15 & P16 B = standard for P20 series	S = standard

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P16 Series Connected Coil Performance Specification

General and 6 Lead Motor Specifications	UNITS	Dash #	0.5	1	2	3	4
Force Constant	lb_f/A		1.5	3.0	6.0	9.0	12.0
	N/A		6.7	13.4	26.7	40.1	53.5
Max Operating Temperature	°C		130	130	130	130	130
Maximum Temp. Rise	°C		105	105	105	105	105
Coil Resistance (6 lead @ 25°C)	Ω		4.3	8.6	17.1	25.7	34.2
Coil Resistance (6 lead @ Max. °C)	Ω		6.0	12.1	24.2	36.3	48.4
Inductance @ 1kHz	mH		0.8	1.7	3.3	5.0	6.7
Thermal Resistance (Bracket Top Mount)	°C/W		2.40	1.20	0.60	0.40	0.30
Continuous Power Top Mount (Max. °C)	W		44	88	175	263	350
Thermal Resistance, side mount (SP23, 1" hole spacing)	°C/W		2.70	1.35	0.68	0.45	0.34
Continuous Power using Side Mount (Max. °C)	W		39	78	156	233	311
Continuous Power, top mount to plate**(Max. °C)	W		28.6	46.3	74.3	99.5	123.6
Motor Constant	lb_f/sqrt(W)		0.7	1.1	1.5	1.8	2.1
	N/sqrt(W)		3.33	4.71	6.66	8.16	9.42
Peak Power (Max. °C, 10% Duty)	W		438	875	1750	2625	3500
Back EMF Constant	V/inch/s		0.17	0.34	0.68	1.02	1.36
	V/m/s		6.7	13.4	26.7	40.1	53.5
Electrical Time Constant (@ 25°C)	ms		0.19	0.19	0.19	0.19	0.19
(@ 130°C)	ms		0.14	0.14	0.14	0.14	0.14
Maximum Line to Line Voltage	Vrms		500	500	500	500	500
Coil Weight	Pounds		0.10	0.20	0.40	0.60	0.80
	Kilograms		0.05	0.09	0.18	0.27	0.36
Coil length (inside magnet track without HED)	inch		1.21	2.41	4.81	7.21	9.61
HED increases coil length by 1.48 inch (37.6mm)	mm		30.7	61.2	122.2	183.1	244.1
Coil bracket length (without HED option)	inch		2.41	3.61	6.01	8.41	10.81
HED increases bracket length by .28inch, (7.1mm)	mm		61.2	91.7	152.7	213.6	274.6
Delta Connected Specifications	**UNITS**	**Dash #**	**0.5**	**1**	**2**	**3**	**4**
Force Constant	lb_f/A		1.5	3.0	6.0	9.0	12.0
	N/A		6.7	13.4	26.7	40.1	53.5
Phase Resistance (Δ @ 25°C)	Ω		2.85	5.70	11.40	17.10	22.80
Phase Resistance (Δ @ Max. °C)	Ω		4.03	8.06	16.12	24.18	32.23
Inductance @ 1kHz	mH		0.6	1.1	2.2	3.3	4.4
Continuous Force	lb_f		5.0	9.9	19.8	29.7	39.6
	N		22.0	44.1	88.1	132.2	176.2
Continuous Current	A		3.30	3.30	3.30	3.30	3.30
Peak Force*	lb_f		16	31	63	94	125
	N		70	139	279	418	557
Peak Current*	A		10.42	10.42	10.42	10.42	10.42
Continuous Force, aluminum plate heat sink** (see below)	lb_f		4.0	7.2	12.9	18.3	23.5
	N		17.8	32.0	57.4	81.4	104.7
Back EMF Constant	V/inch/s		0.2	0.3	0.7	1.0	1.4
	V/m/s		6.7	13.4	26.7	40.1	53.5
WYE connected Specifications	**UNITS**	**Dash #**	**0.5**	**1**	**2**	**3**	**4**
Force Constant	lb_f/A		2.6	5.2	10.4	15.6	20.8
	N/A		11.6	23.2	46.3	69.5	92.6
Phase Resistance (Ψ @ 25°C)	Ω		8.55	17.10	34.20	51.30	68.40
Phase Resistance (Ψ @ Max. °C)	Ω		12.09	24.18	48.35	72.53	96.70
Inductance @ 1kHz	mH		1.7	3.3	6.7	10.0	13.3
Continuous Force	lb_f		5.0	9.9	19.8	29.7	39.6
	N		22.0	44.1	88.1	132.2	176.2
Continuous Current	A		1.90	1.90	1.90	1.90	1.90
Peak Force*	lb_f		16	31	63	94	125
	N		70	139	279	418	557
Peak Current*	A		6.02	6.02	6.02	6.02	6.02
Continuous Force, aluminum plate heat sink** (see below)	lb_f		4.0	7.2	12.9	18.3	23.5
	N		17.8	32.0	57.4	81.4	104.74
Back EMF Constant	V/inch/s		0.3	0.6	1.2	1.8	2.4
	V/m/s		11.6	23.2	46.3	69.5	92.6

* Notes:

Specifications based on heat sink maintained within 10°C of ambient temperature at motor bracket interface.
Dash 4 and larger coils may be constructed in multiple segments. Contact factory for availability.
On time of "Peak Power" (duration) less than 10 seconds.
Back EMF plus IR drop must not exceed "Maximum Terminal Voltage" listed.
Electrical cycle length is 1.2 inch (30.5mm).
Resistance Specifications do not include the cable resistance.
Custom cable required for peak current exceeding 17 ampere.
Cable adds 0.22Ω/m to 6-lead resistance, 0.146Ω/m to Delta resistance and 0.44Ω/m to WYE resistance.
** Heat Sink is a 12" wide, 1/2" thick aluminum plate, extending 2" beyond each end of the coil bracket, in 25°C free air.
Magnet Track weight is 4kg/m (2.7 pounds/foot).

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P16 Parallel Connected Coil Performance Specification

General and 6 Lead Motor Specifications	UNITS	Dash #	1	2	3	4
Force Constant	lb_f/A		1.5	3.0	4.5	6.0
	N/A		6.7	13.4	20.1	26.7
Max Operating Temperature	°C		130	130	130	130
Maximum Temp. Rise	°C		105	105	105	105
Coil Resistance (6 lead @ 25°C)	Ω		2.1	4.3	6.4	8.6
Coil Resistance (6 lead @ Max. °C)	Ω		3.0	6.0	9.1	12.1
Inductance @ 1kHz	mH		0.4	0.8	1.2	1.7
Thermal Resistance (Bracket Top Mount)	°C/W		1.20	0.60	0.40	0.30
Continuous Power Top Mount (Max. °C)	W		88	175	263	350
Thermal Resistance, side mount (SP23, 1" hole spacing)	°C/W		1.35	0.68	0.45	0.34
Continuous Power using Side Mount (Max. °C)	W		1	156	233	311
Continuous Power, top mount to plate**(Max. °C)	W		46.3	74.3	99.5	123.6
Motor Constant	lb_f/sqrt(W)		1.1	1.5	1.8	2.1
	N/sqrt(W)		4.71	6.66	8.16	9.42
Peak Power (Max. °C, 10% Duty)	W		875	1750	2625	3500
Back EMF Constant	V/inch/s		0.17	0.34	0.51	0.68
	V/m/s		6.7	13.4	20.1	26.7
Electrical Time Constant (@ 25°C)	ms		0.19	0.19	0.19	0.19
(@ 130°C)	ms		0.14	0.14	0.14	0.14
Maximum Line to Line Voltage	Vrms		500	500	500	500
Coil Weight	Pounds		0.20	0.40	0.60	0.80
	Kilograms		0.09	0.18	0.27	0.36
Coil length (inside magnet track without HED)	inch		2.41	4.81	7.21	9.61
HED increases coil length by 1.48 inch (37.6mm)	mm		61.2	122.2	183.1	244.1
Coil bracket length (without HED option)	inch		3.61	6.01	8.41	10.81
HED increases bracket length by .28inch, (7.1mm)	mm		91.7	152.7	213.6	274.6
Delta Connected Specifications	**UNITS**	**Dash #**	**1**	**2**	**3**	**4**
Force Constant	lb_f/A		1.5	3.0	4.5	6.0
	N/A		6.7	13.4	20.1	26.7
Phase Resistance (Δ @ 25°C)	Ω		1.43	2.85	4.28	5.70
Phase Resistance (Δ @ Max. °C)	Ω		2.01	4.03	6.04	8.06
Inductance @ 1kHz	mH		0.3	0.6	0.8	1.1
Continuous Force	lb_f		9.9	19.8	29.7	39.6
	N		44.1	88.1	132.2	176.2
Continuous Current	A		6.59	6.59	6.59	6.59
Peak Force*	lb_f		31	63	94	125
	N		139	279	418	557
Peak Current*	A		20.8	20.8	20.8	20.8
Continuous Force, aluminum plate heat sink** (see below)	lb_f		7.2	12.9	18.3	23.5
	N		32.0	57.4	81.4	104.7
Back EMF Constant	V/inch/s		0.2	0.3	0.5	0.7
	V/m/s		6.7	13.4	20.1	26.7
WYE connected Specifications	**UNITS**	**Dash #**	**1**	**2**	**3**	**4**
Force Constant	lb_f/A		2.6	5.2	7.8	10.4
	N/A		11.6	23.2	34.7	46.3
Phase Resistance (Ψ @ 25°C)	Ω		4.28	8.55	12.83	17.10
Phase Resistance (Ψ @ Max. °C)	Ω		6.04	12.09	18.13	24.18
Inductance @ 1kHz	mH		0.8	1.7	2.5	3.3
Continuous Force	lb_f		9.9	19.8	29.7	39.6
	N		44.1	88.1	132.2	176.2
Continuous Current	A		3.80	3.80	3.80	3.80
Peak Force*	lb_f		31	63	94	125
	N		139	279	418	557
Peak Current*	A		12.03	12.03	12.03	12.03
Continuous Force, aluminum plate heat sink** (see below)	lb_f		7.2	12.9	18.3	23.5
	N		32.0	57.4	81.4	104.7
Back EMF Constant	V/inch/s		0.3	0.6	0.9	1.2
	V/m/s		11.6	23.2	34.7	46.3

* Notes:

Specifications based on heat sink maintained within 10°C of ambient temperature at motor bracket interface.
Dash 4 and larger coils may be constructed in multiple segments. Contact factory for availability.
On time of "Peak Power" (duration) less than 10 seconds.
Back EMF plus IR drop must not exceed "Maximum Terminal Voltage" listed.
Electrical cycle length is 1.2 inch (30.5mm).
Resistance Specifications do not include the cable resistance.
Custom cable required for peak current exceeding 17 ampere.
Cable adds 0.22Ω/m to 6-lead resistance, 0.146Ω/m to Delta resistance and 0.44Ω/m to WYE resistance.
** Heat Sink is a 12" wide, 1/2" thick aluminum plate, extending 2" beyond each end of the coil bracket, in 25°C free air.
Magnet Track weight is 4kg/m (2.7 pounds/foot).

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P16 Double Parallel Connected Coil Performance Specification						
General and 6 Lead Motor Specifications	**UNITS**	**Dash #**	**2**	**4**	**6**	**8**
Force Constant	lb_f/A		1.5	3.0	4.5	6.0
	N/A		6.7	13.4	20.1	26.7
Max Operating Temperature	°C		130	130	130	130
Maximum Temp. Rise	°C		105	105	105	105
Coil Resistance (6 lead @ 25°C)	Ω		1.1	2.1	3.2	4.3
Coil Resistance (6 lead @ Max. °C)	Ω		1.5	3.0	4.5	6.0
Inductance @ 1kHz	mH		0.2	0.4	0.6	0.8
Thermal Resistance (Bracket Top Mount)	°C/W		0.60	0.30	0.20	0.15
Continuous Power Top Mount (Max. °C)	W		175	350	525	700
Thermal Resistance, side mount (SP23, 1" hole spacing)	°C/W		0.68	0.34	0.23	0.17
Continuous Power using Side Mount (Max. °C)	W		156	311	467	622
Continuous Power, top mount to plate**(Max. °C)	W		74.3	123.6	170.8	217.2
Motor Constant	lb_f/sqrt(W)		1.50	2.12	2.59	3.00
	N/sqrt(W)		6.66	9.42	11.54	13.32
Peak Power (Max. °C, 10% Duty)	W		1750	3500	5250	7000
Back EMF Constant	V/inch/s		0.17	0.34	0.51	0.68
	V/m/s		6.7	13.4	20.1	26.7
Electrical Time Constant (@ 25°C)	ms		0.19	0.19	0.19	0.19
(@ 130°C)	ms		0.14	0.14	0.14	0.14
Maximum Line to Line Voltage	Vrms		500	500	500	500
Coil Weight	Pounds		0.20	0.40	0.60	0.80
	Kilograms		0.44	0.88	1.32	1.76
Coil length (inside magnet track without HED)	inch		4.81	9.61	14.41	19.21
HED increases coil length by 1.48 inch (37.6mm)	mm		122.2	244.1	366.0	487.9
Coil bracket length (without HED option)	inch		6.01	10.81	15.61	20.41
HED increases bracket length by .28inch, (7.1mm)	mm		152.7	274.6	396.5	518.4
Delta Connected Specifications	**UNITS**	**Dash #**	**2**	**4**	**6**	**8**
Force Constant	lb_f/A		1.5	3.0	4.5	6.0
	N/A		6.7	13.4	20.1	26.7
Phase Resistance (Δ @ 25°C)	Ω		0.71	1.43	2.14	2.85
Phase Resistance (Δ @ Max. °C)	Ω		1.01	2.01	3.02	4.03
Inductance @ 1kHz	mH		0.1	0.3	0.4	0.6
Continuous Force	lb_f		19.8	39.6	59.4	79.2
	N		88.1	176.2	264.4	352.5
Continuous Current	A		13.18	13.18	13.18	13.18
Peak Force*	lb_f		63	125	188	251
	N		279	557	836	1115
Peak Current*	A		41.7	41.7	41.7	41.7
Continuous Force, aluminum plate heat sink** (see below)	lb_f		12.9	23.5	33.9	44.1
	N		57.4	104.7	150.8	196.4
Back EMF Constant	V/inch/s		0.2	0.3	0.5	0.7
	V/m/s		6.7	13.4	20.1	26.7
WYE connected Specifications	**UNITS**	**Dash #**	**2**	**4**	**6**	**8**
Force Constant	lb_f/A		2.6	5.2	7.8	10.4
	N/A		11.6	23.2	34.7	46.3
Phase Resistance (Ψ @ 25°C)	Ω		2.14	4.28	6.41	8.55
Phase Resistance (Ψ @ Max. °C)	Ω		3.02	6.04	9.07	12.09
Inductance @ 1kHz	mH		0.4	0.7	1.1	1.4
Continuous Force	lb_f		19.8	39.6	59.4	79.2
	N		88.1	176.2	264.4	352.5
Continuous Current	A		7.61	7.61	7.61	7.61
Peak Force*	lb_f		63	125	188	251
	N		279	557	836	1115
Peak Current*	A		24.06	24.06	24.06	24.06
Continuous Force, aluminum plate heat sink** (see below)	lb_f		12.9	23.5	33.9	44.1
	N		57.4	104.7	150.8	196.4
Back EMF Constant	V/inch/s		0.3	0.6	0.9	1.2
	V/m/s		11.6	23.2	34.7	46.3

* Notes:

Specifications based on heat sink maintained within 10°C of ambient temperature at motor bracket interface.
Dash 4 and larger coils may be constructed in multiple segments. Contact factory for availability.
On time of "Peak Power" (duration) less than 10 seconds.
Back EMF plus IR drop must not exceed "Maximum Terminal Voltage" listed.
Electrical cycle length is 1.2 inch (30.5mm).
Resistance Specifications do not include the cable resistance.
Custom cable required for peak current exceeding 17 ampere.
Cable adds 0.22Ω/m to 6-lead resistance, 0.146Ω/m to Delta resistance and 0.44Ω/m to WYE resistance.
** Heat Sink is a 12" wide, 1/2" thick aluminum plate, extending 2" beyond each end of the coil bracket, in 25°C free air.
Shaded columns represent "Special" models.
Magnet Track weight is 4kg/m (2.7 pounds/foot).