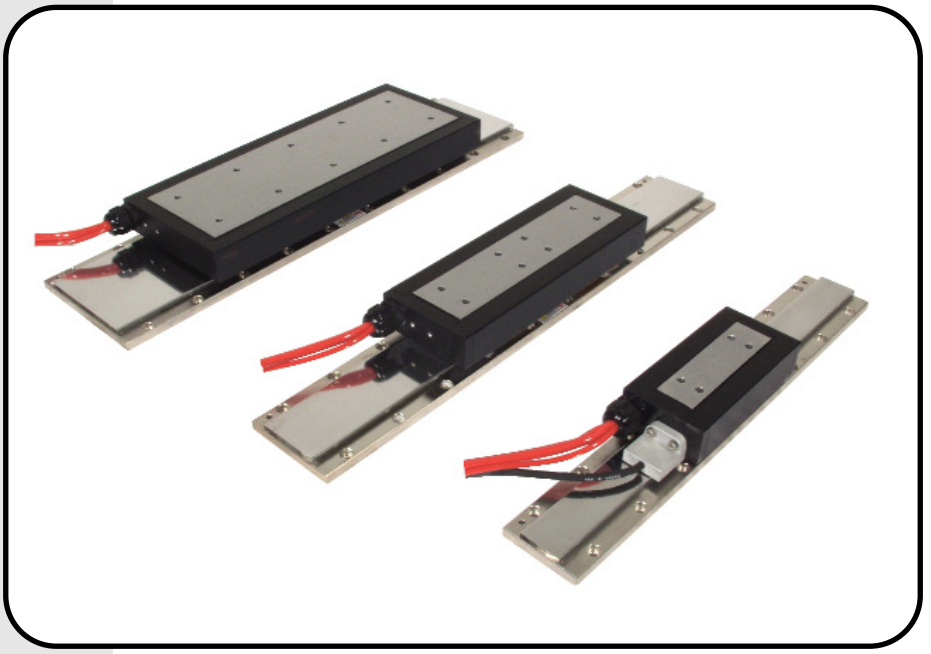
LC Family of Linear Motors

Product Features

- Steel core design for high force density
- Sinusoidal flux density and low-cog design yields smooth motion
- Robust design for heavy duty applications
- Optional Cooling
- Modular magnet tracks permit unlimited travel
- Internal thermal sensor gives added motor protection
- IP 65 Rated
- Ideal for:
  - Pick and place
  - High speed assembly
  - Light machining
  - General automation



LC Family of Linear Motors

High Performance Steel Core Linear Motor

Anorad's LC family of steel core linear motors represents the most advanced linear motor technology available. Drawing on 25 years of linear motor experience, Anorad, the inventor of the brushless linear servo motor, has once again raised the performance bar.

The LC linear motor utilizes a unique patent pending laminated steel core design. Coupled with the latest magnetic materials and optimized by 3D Finite Element Analysis (FEA), a very high force density is achieved. The LC motors are available in models with continuous forces from 19 lb_f to 1272 lb_f, and peak forces from 44 lb_f to 2094 lb_f.

The LC motor is an extremely robust and environmentally protected design. Unlike other linear motors that have the coil laminations exposed in the air gap, the LC motor uses a novel method of molding that completely encapsulates the face of the motors effectively sealing the laminations. Stainless steel shrouds cover the magnet tracks providing additional protection as well as an aesthetically pleasing look.

For servo drives that require commutation feedback, an optional digital Hall effect feedback module may be attached to the front of the motor coil. The LC may also be commutated via software. Anorad offers a full line of compatible servo controls and drives.

Product Profile

Rockwell Automation

Advantages of Linear Motors

Unlimited Travel

Anorad motors do not have limitations on travel displacements. Since the stationary magnet assemblies can be easily joined together to form any length of motor, travel can be made as long as necessary. Since the same moving coil assembly could be used for any travel, there is no trade-off in performance as a function of travel. Screw driven systems, on the other hand, have critical speed limitations and higher inertia with added length. Speed limitations, high inertia, and low stiffness are major performance trade-offs with larger travels with other drive techniques.

Velocity

Anorad linear servo motors can be used in both very low and very high velocity applications, all with very high precision. They can precisely operate at velocities ranging from less than 1 µm/sec (0.00004"/sec) to more than 10 m/sec (400"/sec). Ball screws and lead screws have critical speed limitations. Belt drives exhibit lower stiffness. Rack-and-pinion drives typically have backlash and poor low velocity performance.

Acceleration

Anorad linear motors have a high ratio of peak force to motor inertia (about 30:1). Therefore, almost all the motor force can be used to accelerate the moving load and perform useful work. In typical screw-driven systems, a large portion of the motor torque is lost in overcoming the rotary inertia of the motor, coupling and screw.

Accuracy and Repeatability

With Anorad linear motors, the only limit to total system accuracy and repeatability is the sensing device and the bearings of the positioning system. In rotary driven systems there are additional factors which effect these performance variables, including backlash, hysteresis, lost motion and jitter.

Smoothness Of Motion

Brushless linear servo motors can provide extremely smooth motion, since they have no contacting surfaces to cause jitter. Ultimate smooth motion is achieved with Anorad's sinusoidal-commutated zero cogg non-ferrous motors. By contrast, ball screws are not as smooth due to the vibrating nature of the balls entering and exiting the ball nut raceways, which is easily observed in sub-micron systems. Belt and rack-and-pinion drives also have contacting mechanisms which are susceptible to friction and backlash caused vibrations.

Stiffness

Anorad linear servo motors have very high stiffness, typically higher than a stage's bearings and structural members. With ball screws and rack-and-pinion drives, the couplings, ball nut, and pinions are the highest contributors to low stiffness of a stage. Low stiffness reduces frequency response and increases settling times.

Maintenance and Life Expectancy

Anorad brushless linear servo motors have no contact between the two working members. Therefore, they have an extremely long, virtually maintenance-free life. The non-contact design eliminates lubrication and periodic adjustment to compensate for wear. Rotary driven mechanisms require regular lubrication and occasional replacement due to wear.

Cleanroom and Vacuum Applications

Since the coil assembly and the magnet assembly of linear servo motors do not make contact, they are ideally suited for clean room and vacuum applications. Anorad manufactures linear motors specifically for 10^{-9} torr and high vacuum applications, using special material and manufacturing processes. Anorad is the world leader in vacuum preparation, cleaning, and materials selection fo these critical applications.

Motor Definitions

Continuous Force (FcTmax)
The force produced by continuous current (I_{cTmax}), all the phases sharing the load, provided the coil is secured through an adequate thermal heatsink as specified. This scenario produces a coil temperature equal to the T_{max} rating for the motor.

Peak Force (Fp)
The force produced by peak current (Ip).

Motor Constant (Km)
This is a figure of merit for motor efficiency. It is the ratio of the continuous force (three phases) FcTmax to the square root of the motor power losses in the 3 phases.

Thermal Resistance (R_{th})
The equivalent thermal resistance of the motor, determined by the ratio of coil temperature rise (for example 110°C for LC series) to the total power motor losses in the three phases. We assume the motor is mounted on a heat sink of at least the size specified in this catalog, with ambient temperature below 20°C and with a stroke of at least twice the coil length.

Max Power Dissipation (PcTmax)
The continuous power losses of the motor when the RMS current in the coil is IcTmax and the ambient temperature below 20°C.

Maximum Applied Bus Voltage (V_{DC})
This is the maximum allowable Bus DC voltage that can be applied to the coil.

Electrical Cycle Length (Ec)
This is the length of the electrical cycle and corresponds to twice the magnet length (North to North).

Electrical Time Constant (τ_e)
The time it takes for a step current input to the coil to reach 63% of its final value by overcoming the resistance and the inductance of the coil.

Maximum Coil Temperature (Tmax)
The maximum rated service temperature of the coil = 130°C. However, good practice is to limit the RMS current to no more than 80% of the rated continuous current (IcTmax).

Magnetic Track Mass (Mm)
The mass of the magnetic track per unit of length.

Force Constant (Kf)
The ratio between the motor continuous force (FcTmax) to the motor continuous current (IcTmax).

Back EMF Constant p-p (Ke)
The ratio between the back emf voltage in volt peak to the motor speed.

Peak Current (Ip)
The magnitude of the 3 phase sinusoidal currents that need to be applied to the motor to develop the motor peak force (Fp).

Continuous Current (IcTmax)
The continuous current corresponding to the continuous Force. This is a sinusoidal current which can be expressed either in Amp 0-peak or in Amp rms.

Resistance p-p @ 20°C (R_{20})
This is the cold coil resistance measured phase to phase (line to line) at 20°C.

Inductance p-p (L)
This is the coil inductance measured phase to phase (line to line).

Magnetic Attraction (Fa)
The magnetic attraction force exerted between the coil assembly and its magnet assembly, measured at the nominal air gap.

Coil Mass (Mc)
The mass of the coil including the standard cable length.

Specifications LC-030-XXX

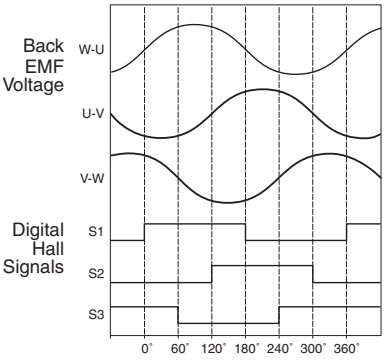
Performance Parameters	Symbol	Units	LC-030-100			LC-030-200			LC-030-300			LC-030-400			LC-030-600			LC-030-800		
Cooling Method			**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**
Continuous Force[1]	F_{cTmax}	N (lb_f)	82 (18)	102 (23)	123 (28)	164 (37)	205 (46)	246 (55)	246 (55)	307 (69)	369 (83)	328 (74)	410 (92)	492 (110)	492 (110)	614 (138)	737 (166)	655 (147)	819 (184)	983 (221)
Peak Force[2]	F_p	N (lb_f)	188 (42)	188 (42)	188 (42)	375 (84)	375 (84)	375 (84)	563 (127)	563 (127)	563 (127)	751 (169)	751 (169)	751 (169)	1126 (253)	1126 (253)	1126 (253)	1501 (337)	1501 (337)	1501 (337)
Motor Constant[1]	K_M	$N/\sqrt{W}$ ($lb_f/\sqrt{W}$)	11.7 (2.6)	11.7 (2.6)	11.7 (2.6)	16.5 (3.7)	16.5 (3.7)	16.5 (3.7)	20.3 (4.6)	20.3 (4.6)	20.3 (4.6)	23.4 (5.3)	23.4 (5.3)	23.4 (5.3)	28.6 (6.4)	28.6 (6.4)	28.6 (6.4)	33.1 (7.4)	33.1 (7.4)	33.1 (7.4)
Thermal Resistance	R_{th}	°C/W	2.24	1.43	1.00	1.12	0.72	0.50	0.75	0.48	0.33	0.56	0.36	0.25	0.37	0.24	0.17	0.28	0.18	0.12
Max Power Dissipation	P_{cTmax}	W	49	77	110	98	153	221	147	230	331	196	307	442	295	460	663	393	614	884
Maximum Applied Bus Voltage[7]	V_{DC}	Volts	650			650			650			650			650			650		
Electrical Cycle Length	E_c	mm	50			50			50			50			50			50		
Electrical Time Constant	τ_e	msec	10			10			10			10			10			10		
Maximum Coil Temperature	T_{max}	°C	130			130			130			130			130			130		
Winding Type			**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**
Force Constant[1,6]	K_F	N/A_{pk} (lb_f/A_{pk})	18.2 (4.1)		N/A	18.2 (4.1)		36.4 (8.2)	18.2 (4.1)		54.6 (12.3)	18.2 (4.1)		36.4 (8.2)	18.2 (4.1)		36.4 (8.2)	18.2 (4.1)		36.4 (8.2)
Back EMF Constant p-p[3,4,6]	K_e	V_p/m/s (V_p/in/s)	21.5 (0.55)		N/A	21.5 (0.55)		43.0 (1.09)	21.5 (0.55)		64.5 (1.64)	21.5 (0.55)		43.0 (1.09)	21.5 (0.55)		43.0 (1.09)	21.5 (0.55)		43.0 (1.09)
Peak Current[4]	I_p	A_{pk} (A_{rms})	12.1 (8.6)		N/A	24.3 (17.1)		12.1 (8.6)	36.4 (25.7)		12.1 (8.6)	48.5 (34.3)		24.3 (17.1)	72.8 (51.4)		36.4 (25.7)	97.0 (68.6)		48.5 (34.3)
Cooling Type			**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**
Continuous Current[1,4]	I_{cTmax}	A_{pk} (A_{rms})	4.5 (3.18)	5.6 (4.0)	6.8 (4.8)	N/A	N/A	N/A	9.0 (6.4)	11.3 (8.0)	13.5 (9.5)	4.5 (3.2)	5.6 (4.0)	6.8 (4.8)	13.5 (9.5)	16.9 (11.9)	20.3 (14.3)	4.5 (3.2)	5.6 (4.0)	6.8 (4.8)	18.0 (12.7)	22.5 (15.9)	27.0 (19.1)	9.0 (6.4)	11.3 (8.0)	13.5 (9.5)	27.0 (19.1)	33.8 (23.9)	40.5 (28.6)	13.5 (9.5)	16.9 (11.9)	20.3 (14.3)	36.0 (25.5)	45.0 (31.8)	54.0 (38.2)	18.0 (12.7)	22.5 (15.9)	27.0 (19.1)
Resistance p-p[3,6] **@20°C**	R_{20}	ohm	2.256		N/A	1.128		4.51	0.75		6.77	0.56		2.26	0.38		1.50	0.28		1.13
Inductance p-p[3]	L	mH	21.6		N/A	10.8		43.0	7.20		65.0	5.0		22.0	4		14	3		11
Mechanical Parameters																				
Magnetic Attraction[8]	F_a	N (lb_f)	393 (88)			786 (177)			1179 (265)			1572 (353)			2358 (530)			3144 (707)		
Coil Mass[5]	M_c	kg (lb_m)	1.28 (2.8)	1.40 (3.1)	1.40 (3.1)	2.23 (4.9)	2.46 (5.4)	2.46 (5.4)	3.20 (7.0)	3.54 (7.8)	3.54 (7.8)	4.17 (9.2)	4.62 (10.2)	4.62 (10.2)	6.03 (13.3)	6.66 (14.7)	6.66 (14.7)	7.94 (17.5)	8.80 (19.4)	8.80 (19.4)
Magnetic Track Mass	M_n	kg/m (lb/in)	4.712 (0.26)			4.712 (0.26)			4.712 (0.26)			4.712 (0.26)			4.712 (0.26)			4.712 (0.26)		

Notes: NC= No Cooling, AC= Air Cooling, WC = Water Cooling

Motor performance specifications are with sinusoidal commutation.

1. Continuous forces, motor constant and current listed are with coils at maximum temperature 130°C, mounted to a 1" aluminum heat sink whose area is noted in the table, and at 20°C ambient.
2. Max on time 1 sec. In certain applications, the motor may produce significantly higher peak forces. Please contact Anorad Applications Engineering for details.
3. All winding parameters listed are measured line-to-line (phase-to-phase).
4. All currents and voltages listed are measured 0-peak of the sine wave unless noted rms.
5. AC and WC include mass of cooling plate. Consult Anorad for Flow and Pressure for air cooled and water cooled version.
6. All specifications are ±10%. Phase-to-phase inductance is ±30%.
7. Maximum cable length 10 meters. Please consult factory concerning applications requiring longer cables.
8. All specifications are at the standard referenced air gap.

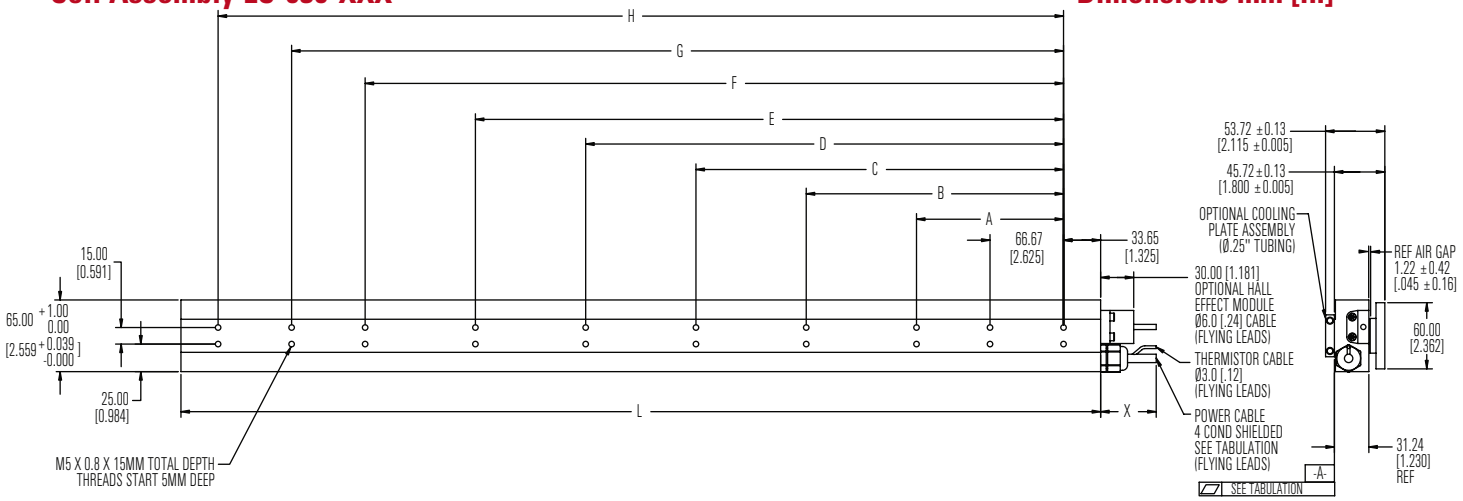
Motor Phasing Diagram



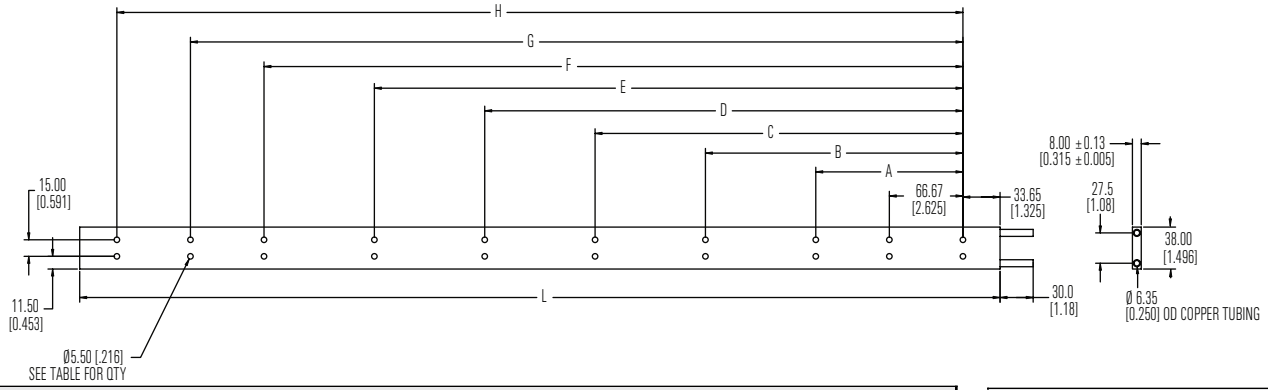
Note: Phasing direction is coil moving towards motor power cable.

Coil Assembly LC-030-XXX

Dimensions mm [in]



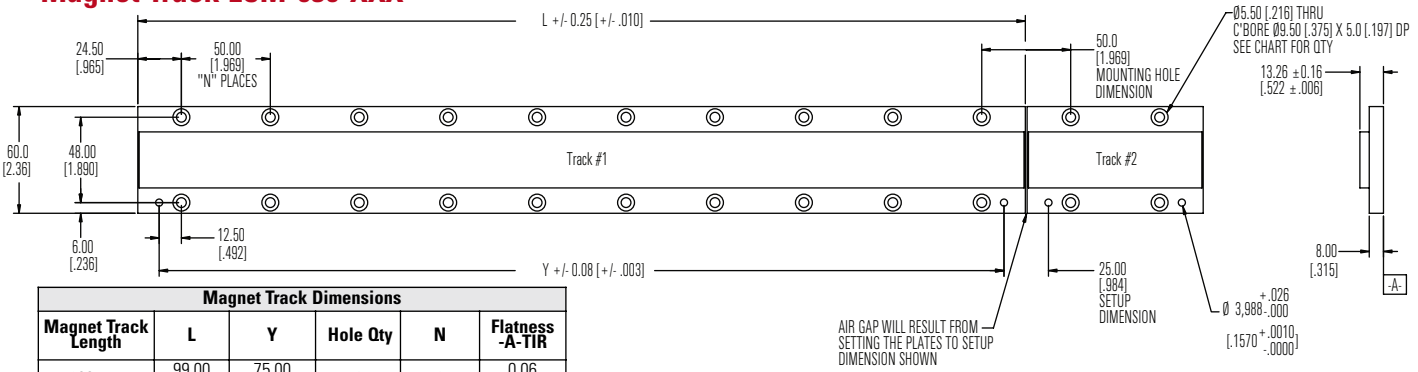
Optional Cooling Plate LCCP-030-XXX



Coil and Cooling Plate Dimensions												
Coil Size	**L**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**Hole Qty (N)**	**Flatness -A-**	**Heat Sink**
030 x 100	134.00 (5.28)									4	0.25 (0.010)	150 x 200 (6 x 8)
030 x 200	234.00 (9.21)	100.00 (3.937)	166.67 (6.562)							8	0.25 (0.010)	150 x 300 (6 x 12)
030 x 300	334.00 (13.15)	133.33 (5.249)	200.00 (7.874)	266.67 (10.499)						10	0.38 (0.015)	150 x 400 (6 x 16)
030 x 400	434.00 (17.09)	133.33 (5.249)	233.33 (9.186)	300.00 (11.811)	366.67 (14.436)					12	0.64 (0.025)	150 x 500 (6 x 20)
030 x 600	634.00 (24.96)	133.33 (5.249)	233.33 (9.186)	333.33 (13.123)	433.33 (17.060)	500.00 (19.686)	566.66 (22.310)			16	0.89 (0.035)	150 x 750 (6 x 30)
030 x 800	834.00 (32.84)	133.33 (5.249)	233.33 (9.186)	333.33 (13.123)	433.33 (17.060)	533.33 (20.997)	633.33 (24.934)	700.00 (27.559)	766.66 (30.184)	20	1.16 (0.045)	150 x 1000 (6 x 40)

Power Cable Gauge		
Coil Size	**Winding Type**	**Wire Gauge**
030 x 100	D	18 GA
030 x 200	D, E	18 GA
030 x 300	D, E	18 GA
030 x 400	D, E	18 GA
030 x 600	D	16 GA
030 x 600	E	18 GA
030 x 800	D	14 GA
030 x 800	E	18 GA

Magnet Track LCM-030-XXX*



Magnet Track Dimensions					
Magnet Track Length	**L**	**Y**	**Hole Qty**	**N**	**Flatness -A-TIR**
100 mm	99.00 (3.90)	75.00 (2.953)	4	1	0.06 (0.002)
250 mm	249.00 (9.80)	225.00 (8.853)	10	4	0.25 (0.010)
400 mm	399.00 (15.71)	375.00 (14.764)	16	7	0.38 (0.015)
500 mm	499.00 (19.65)	475.00 (18.750)	20	9	0.50 (0.020)

* Magnet tracks can be combined for longer travel lengths.

Rockwell Automation

Specifications LC-050-XXX

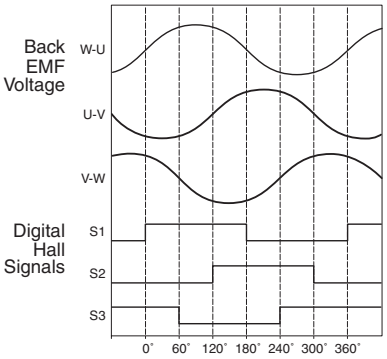
Performance Parameters	Symbol	Units	LC-050-100			LC-050-200			LC-050-300			LC-050-400			LC-050-600			LC-050-800		
Cooling Method			**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**
Continuous Force[1]	F_{cTmax}	N (lb_f)	132 (30)	165 (37)	198 (44)	265 (60)	331 (74)	397 (89)	401 (90)	501 (113)	602 (135)	509 (114)	636 (143)	764 (172)	780 (175)	975 (219)	1170 (263)	1021 (229)	1276 (287)	1531 (344)
Peak Force[2]	F_p	N (lb_f)	302 (68)	302 (68)	302 (68)	600 (135)	600 (135)	600 (135)	941 (212)	941 (212)	941 (212)	1206 (271)	1206 (271)	1206 (271)	1848 (416)	1848 (416)	1848 (416)	2419 (544)	2419 (544)	2419 (544)
Motor Constant[1]	K_M	$N/\sqrt{W}$ ($lb_f/\sqrt{W}$)	15.1 (3.4)	15.1 (3.4)	15.1 (3.4)	21.3 (4.8)	21.3 (4.8)	21.3 (4.8)	26.5 (6.0)	26.5 (6.0)	26.5 (6.0)	30.7 (6.9)	30.7 (6.9)	30.7 (6.9)	37.5 (8.4)	37.5 (8.4)	37.5 (8.4)	43.3 (9.7)	43.3 (9.7)	43.3 (9.7)
Thermal Resistance	R_{th}	°C/W	1.44	0.92	0.64	0.71	0.46	0.32	0.48	0.31	0.21	0.40	0.26	0.18	0.25	0.16	0.11	0.20	0.13	0.09
Max Power Dissipation	P_{cTmax}	W	76	119	172	154	240	346	228	357	514	276	431	620	432	674	971	555	867	1248
Maximum Applied Bus Voltage[7]	V_{DC}	Volts	650			650			650			650			650			650		
Electrical Cycle Length	E_c	mm	50			50			50			50			50			50		
Electrical Time Constant	τ_e	msec	10			10			10			10			10			10		
Maximum Coil Temperature	T_{max}	°C	130			130			130			130			130			130		
Winding Type			**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**
Force Constant[1,6]	K_F	N/A_{pk} (lb_f/A_{pk})	30.3 (6.8)		N/A	30.3 (6.8)		60.7 (13.6)	30.8 (6.9)		92.4 (20.8)	30.8 (6.9)		61.6 (13.8)	30.8 (6.9)		61.6 (13.8)	30.8 (6.9)		61.6 (13.8)
Back EMF Constant p-p[3,4,6]	K_e	V_p/m/s (V_p/in/s)	35.8 (0.91)		N/A	35.8 (0.91)		71.7 (1.82)	36.4 (0.92)		109.1 (2.77)	36.4 (0.92)		72.8 (1.85)	36.4 (0.92)		72.8 (1.85)	36.4 (0.92)		72.8 (1.85)
Peak Current[4]	I_p	A_{pk} (A_{rms})	11.7 (8.3)		N/A	23.3 (16.5)		11.6 (8.2)	35.9 (25.4)		12.0 (8.5)	46.1 (32.6)		23.0 (16.3)	70.6 (49.9)		35.3 (25.0)	92.4 (65.3)		46.2 (32.7)
Cooling Type			**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**
Continuous Current[1,4]	I_{cTmax}	A_{pk} (A_{rms})	4.3 (3.1)	5.4 (3.8)	6.5 (4.6)	N/A	N/A	N/A	8.7 (6.2)	10.9 (7.7)	13.1 (9.3)	4.4 (3.1)	5.5 (3.9)	6.5 (4.6)	13.0 (9.2)	16.3 (11.5)	19.5 (13.8)	4.3 (3.1)	5.4 (3.8)	6.5 (4.6)	16.5 (11.7)	20.7 (14.6)	24.8 (17.5)	8.3 (5.8)	10.3 (7.3)	12.4 (8.8)	25.3 (17.9)	31.7 (22.4)	38.0 (26.9)	12.7 (9.0)	15.8 (11.2)	19.0 (13.4)	33.1 (23.4)	41.4 (29.3)	49.7 (35.2)	16.6 (11.7)	20.7 (14.6)	24.9 (17.6)
Resistance p-p[3,6] **@20°C**	R_{20}	ohm	3.76		N/A	1.88		7.52	1.25		11.28	0.94		3.76	0.63		2.51	0.47		1.88
Inductance p-p[3]	L	mH	36		N/A	18		72	12		108	9		36	6		24	4.5		18
Mechanical Parameters																				
Magnetic Attraction[8]	F_a	N (lb_f)	690 (155)			1379 (310)			2069 (465)			2758 (620)			4137 (930)			5516 (1240)		
Coil Mass[5]	M_c	kg (lb_m)	1.79 (4.0)	1.97 (4.4)	1.97 (4.4)	3.13 (6.9)	3.45 (7.6)	3.45 (7.6)	4.47 (9.8)	4.92 (10.8)	4.92 (10.8)	5.80 (12.8)	6.39 (14.1)	6.39 (14.1)	8.48 (18.7)	9.34 (20.6)	9.34 (20.6)	11.15 (24.6)	12.29 (27.1)	12.29 (27.1)
Magnetic Track Mass	M_n	kg/m (lb/in)	6.62 (0.37)			6.62 (0.37)			6.62 (0.37)			6.62 (0.37)			6.62 (0.37)			6.62 (0.37)		

Notes: NC= No Cooling, AC= Air Cooling, WC = Water Cooling

Motor performance specifications are with sinusoidal commutation.

1. Continuous forces, motor constant and current listed are with coils at maximum temperature 130°C, mounted to a 1" aluminum heat sink whose area is noted in the table, and at 20°C ambient.
2. Max on time 1 sec. In certain applications, the motor may produce significantly higher peak forces. Please contact Anorad Applications Engineering for details.
3. All winding parameters listed are measured line-to-line (phase-to-phase).
4. All currents and voltages listed are measured 0-peak of the sine wave unless noted rms.
5. AC and WC include mass of cooling plate. Consult Anorad for Flow and Pressure for air cooled and water cooled version.
6. All specifications are ±10%. Phase-to-phase inductance is ±30%.
7. Maximum cable length 10 meters. Please consult factory concerning applications requiring longer cables.
8. All specifications are at the standard referenced air gap.

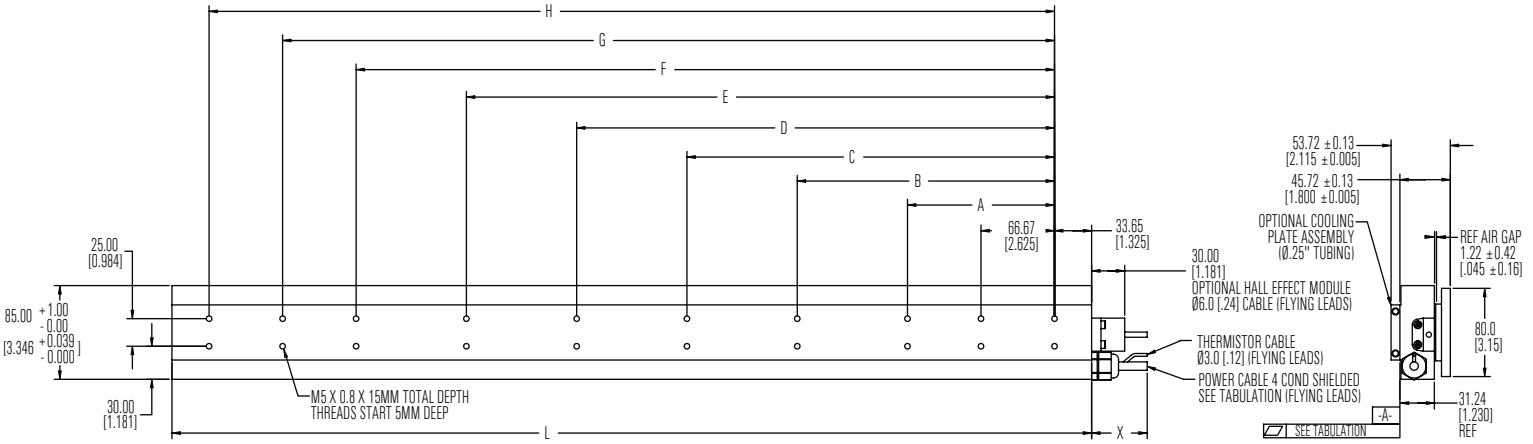
Motor Phasing Diagram



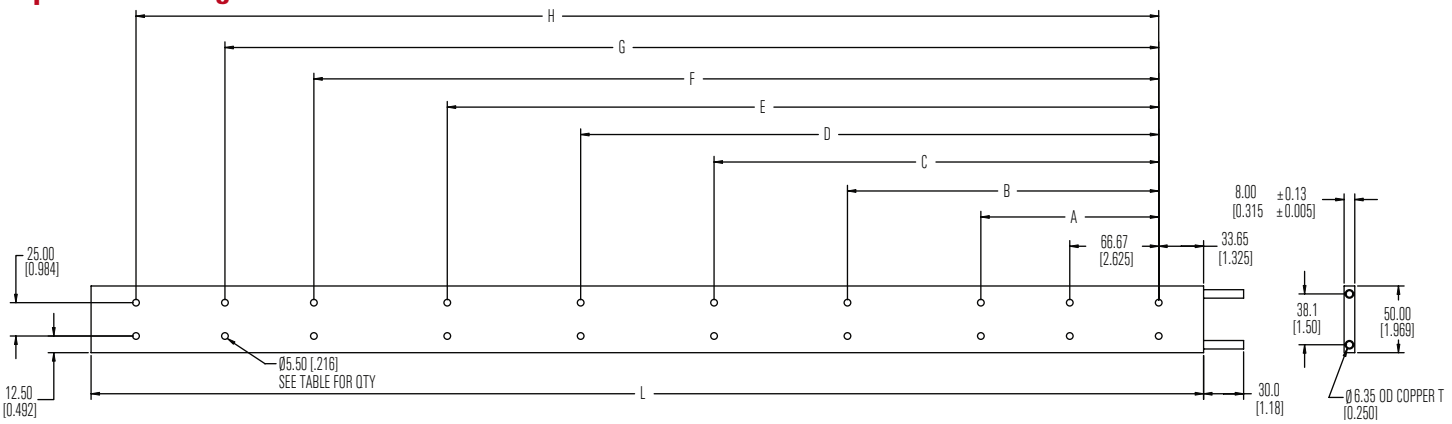
Note: Phasing direction is coil moving towards motor power cable.

Coil Assembly LC-050-XXX

Dimensions mm [in]



Optional Cooling Plate LCCP-050-XXX



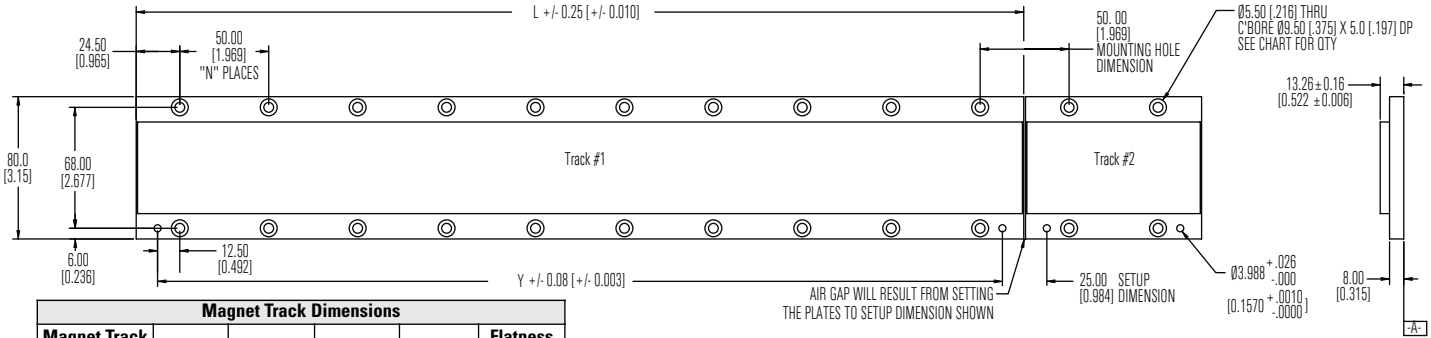
Coil and Cooling Plate Dimensions

Coil Size	L	A	B	C	D	E	F	G	H	Hole Qty (N)	Flatness -A-	Heat Sink
050 x 100	134.00 (5.28)									4	0.25 (0.010)	200 x 200 (8 x 8)
050 x 200	234.00 (9.21)	100.00 (3.937)	166.67 (6.562)							8	0.25 (0.010)	200 x 300 (8 x 12)
050 x 300	334.00 (13.15)	133.33 (5.249)	200.00 (7.874)	266.67 (10.499)						10	0.38 (0.015)	200 x 400 (8 x 16)
050 x 400	434.00 (17.09)	133.33 (5.249)	233.33 (9.186)	300.00 (11.811)	366.67 (14.436)					12	0.64 (0.025)	200 x 500 (8 x 20)
050 x 600	634.00 (24.96)	133.33 (5.249)	233.33 (9.186)	333.33 (13.123)	433.33 (17.060)	500.00 (19.686)	566.66 (22.310)			16	0.89 (0.035)	200 x 750 (8 x 30)
050 x 800	834.00 (32.84)	133.33 (5.249)	233.33 (9.186)	333.33 (13.123)	433.33 (17.060)	533.33 (20.997)	633.33 (24.934)	700.00 (27.559)	766.66 (30.184)	20	1.16 (0.045)	200 x 1000 (8 x 40)

Power Cable Gauge

Coil Size	Winding Type	Wire Gauge
050 x 100	D	18 GA
050 x 200	D, E	18 GA
050 x 300	D, E	18 GA
050 x 400	D, E	18 GA
050 x 600	D	16 GA
050 x 600	E	18 GA
050 x 800	D	14 GA
050 x 800	E	18 GA

Magnet Track LCM-050-XXX*



Magnet Track Dimensions

Magnet Track Length	L	Y	Hole Qty	N	Flatness -A-TIR
100 mm	99.00 (3.90)	75.00 (2.953)	4	1	0.06 (0.002)
250 mm	249.00 (9.80)	225.00 (8.853)	10	4	0.25 (0.010)
400 mm	399.00 (15.71)	375.00 (14.764)	16	7	0.38 (0.015)
500 mm	499.00 (19.65)	475.00 (18.750)	20	9	0.50 (0.020)

* Magnet tracks can be combined for longer travel lengths.

Rockwell Automation

Specifications LC-075-XXX

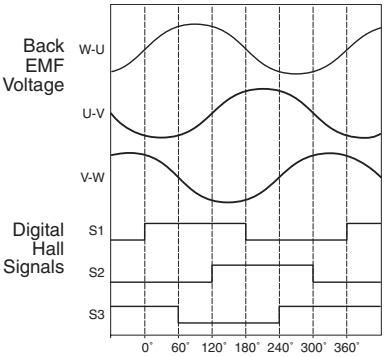
Performance Parameters	Symbol	Units	LC-075-100			LC-075-200			LC-075-300			LC-075-400			LC-075-600			LC-075-800		
Cooling Method			**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**
Continuous Force[1]	F_{cTmax}	N (lb_f)	193 (43)	241 (54)	289 (65)	385 (87)	481 (108)	578 (130)	578 (130)	722 (162)	867 (195)	770 (173)	963 (216)	1155 (260)	1155 (260)	1444 (325)	1733 (390)	1541 (346)	1926 (433)	2311 (519)
Peak Force[2]	F_p	N (lb_f)	441 (99)	441 (99)	441 (99)	882 (198)	882 (198)	882 (198)	1368 (308)	1368 (308)	1368 (308)	1824 (410)	1824 (410)	1824 (410)	2736 (615)	2736 (615)	2736 (615)	3649 (820)	3649 (820)	3649 (820)
Motor Constant[1]	K_M	$N/\sqrt{W}$ ($lb_f/\sqrt{W}$)	19.8 (4.4)	19.8 (4.4)	19.8 (4.4)	27.9 (6.3)	27.9 (6.3)	27.9 (6.3)	34.2 (7.7)	34.2 (7.7)	34.2 (7.7)	39.5 (8.9)	39.5 (8.9)	39.5 (8.9)	48.4 (10.9)	48.4 (10.9)	48.4 (10.9)	55.9 (12.6)	55.9 (12.6)	55.9 (12.6)
Thermal Resistance	R_{th}	°C/W	1.16	0.74	0.51	0.58	0.37	0.26	0.39	0.25	0.17	0.29	0.19	0.13	0.19	0.12	0.09	0.14	0.09	0.06
Max Power Dissipation	P_{cTmax}	W	95	148	214	190	297	428	285	445	641	380	594	855	570	891	1283	760	1188	1711
Maximum Applied Bus Voltage[7]	V_{DC}	Volts	650			650			650			650			650			650		
Electrical Cycle Length	E_c	mm	50			50			50			50			50			50		
Electrical Time Constant	τ_e	msec	10			10			10			10			10			10		
Maximum Coil Temperature	T_{max}	°C	130			130			130			130			130			130		
Winding Type			**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**
Force Constant[1,6]	K_F	N/A_{pk} (lb_f/A_{pk})	45.5 (10.2)		N/A	45.5 (10.2)		91.0 (20.5)	45.5 (10.2)		136.5 (30.7)	45.5 (10.2)		91.0 (20.5)	45.5 (10.2)		91.0 (20.5)	45.5 (10.2)		91.0 (20.5)
Back EMF Constant p-p[3,4,6]	K_e	V_p/m/s (V_p/in/s)	53.7 (1.37)		N/A	53.7 1.37)		107.5 (2.73)	53.7 (1.37)		161.2 (4.10)	53.7 (1.37)		107.5 (2.73)	53.7 (1.37)		107.5 (2.73)	53.7 (1.37)		107.5 (2.73)
Peak Current[4]	I_p	A_{pk} (A_{rms})	11.5 (8.1)		N/A	22.9 (16.2)		11.5 (8.1)	35.6 (25.1)		11.9 (8.4)	47.4 (33.5)		23.7 (16.8)	71.1 (50.3)		35.6 (25.1)	94.8 (67.0)		47.4 (33.5)
Cooling Type			**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**
Continuous Current[1,4]	I_{cTmax}	A_{pk} (A_{rms})	4.2 (3.0)	5.3 (3.7)	6.3 (4.5)	N/A	N/A	N/A	8.5 (6.0)	10.6 (7.5)	12.7 (9.0)	4.2 (3.0)	5.3 (3.7)	6.3 (4.5)	12.7 (9.0)	15.9 (11.2)	19.0 (13.5)	4.2 (3.0)	5.3 (3.7)	6.3 (4.5)	16.9 (12.0)	21.2 (15.0)	25.4 (18.0)	8.5 (6.0)	10.6 (7.5)	12.7 (9.0)	25.4 (18.0)	31.7 (22.4)	38.1 (26.9)	12.7 (9.0)	15.9 (11.2)	19.0 (13.5)	33.9 (23.9)	42.3 (29.9)	50.8 (35.9)	16.9 (12.0)	21.2 (15.0)	25.4 (18.0)
Resistance p-p[3,6] **@20°C**	R_{20}	ohm	4.94		N/A	2.47		9.88	1.65		14.82	1.24		4.94	0.82		3.29	0.62		2.47
Inductance p-p[3]	L	mH	47		N/A	24		95	16		142	12		47	8		32	6		24
Mechanical Parameters																				
Magnetic Attraction[8]	F_a	N (lb_f)	1000 (225)			2000 (450)			2999 (674)			3999 (899)			5999 (1349)			7998 (1798)		
Coil Mass[5]	M_c	kg (lb_m)	2.4 (5.2)	2.6 (5.8)	2.6 (5.8)	4.2 (9.2)	4.6 (10.3)	4.6 (10.3)	6.0 (13.2)	6.7 (14.7)	6.7 (14.7)	7.8 (17.1)	8.7 (19.1)	8.7 (19.1)	11.3 (24.9)	12.5 (27.7)	12.5 (27.7)	14.9 (32.8)	16.5 (36.4)	16.5 (36.4)
Magnetic Track Mass	M_n	kg/m (lb/in)	9.0 (0.5)			9.0 (0.5)			9.0 (0.5)			9.0 (0.5)			9.0 (0.5)			9.0 (0.5)		

Notes: NC= No Cooling, AC= Air Cooling, WC = Water Cooling

Motor performance specifications are with sinusoidal commutation.

1. Continuous forces, motor constant and current listed are with coils at maximum temperature 130°C, mounted to a 1" aluminum heat sink whose area is noted in the table, and at 20°C ambient.
2. Max on time 1 sec. In certain applications, the motor may produce significantly higher peak forces. Please contact Anorad Applications Engineering for details.
3. All winding parameters listed are measured line-to-line (phase-to-phase).
4. All currents and voltages listed are measured 0-peak of the sine wave unless noted rms.
5. AC and WC include mass of cooling plate. Consult Anorad for Flow and Pressure for air cooled and water cooled version.
6. All specifications are ±10%. Phase-to-phase inductance is ±30%.
7. Maximum cable length 10 meters. Please consult factory concerning applications requiring longer cables.
8. All specifications are at the standard referenced air gap.

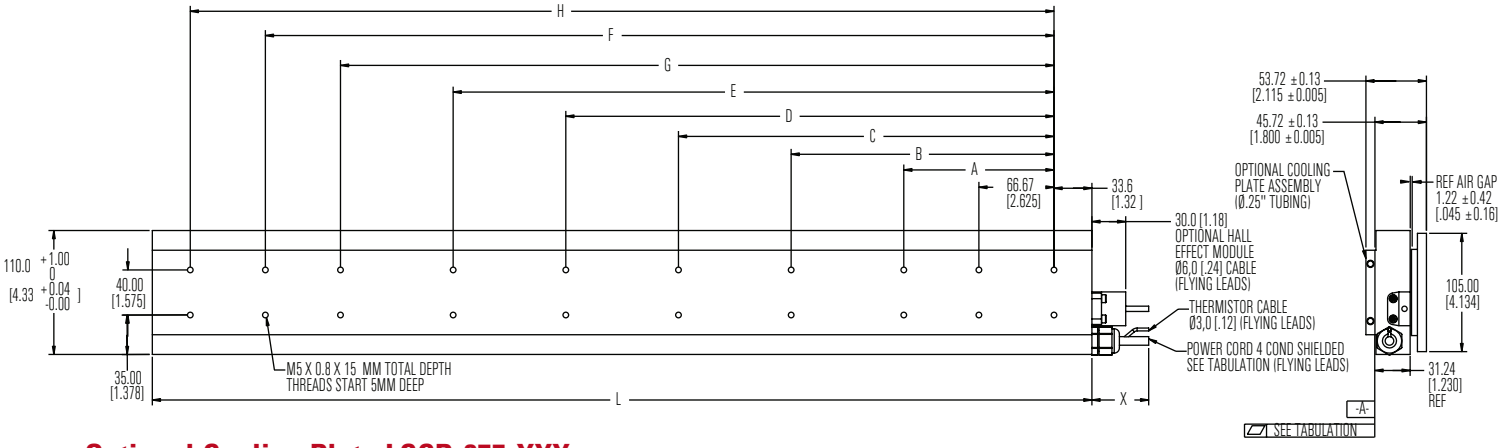
Motor Phasing Diagram



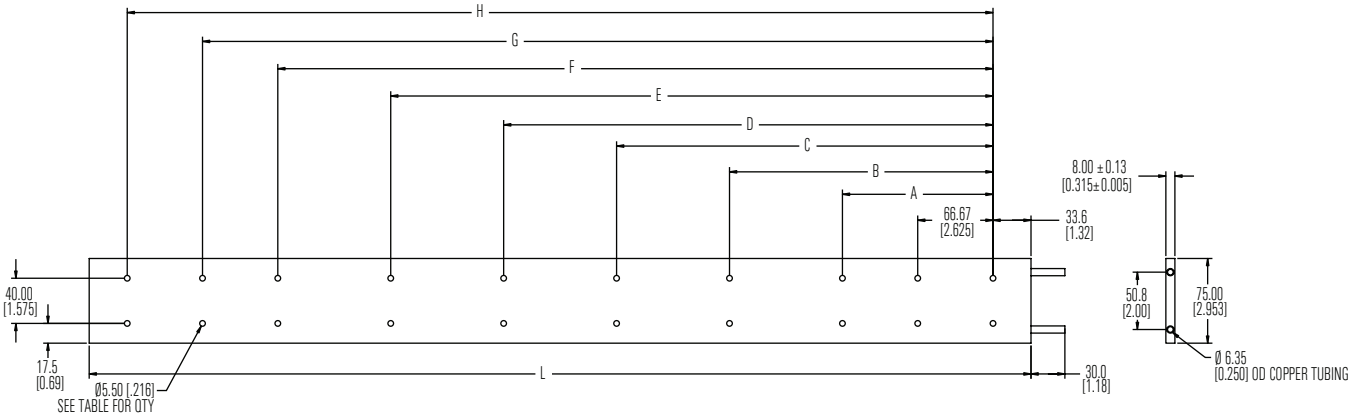
Note: Phasing direction is coil moving towards motor power cable.

Coil Assembly LC-075-XXX

Dimensions mm [in]



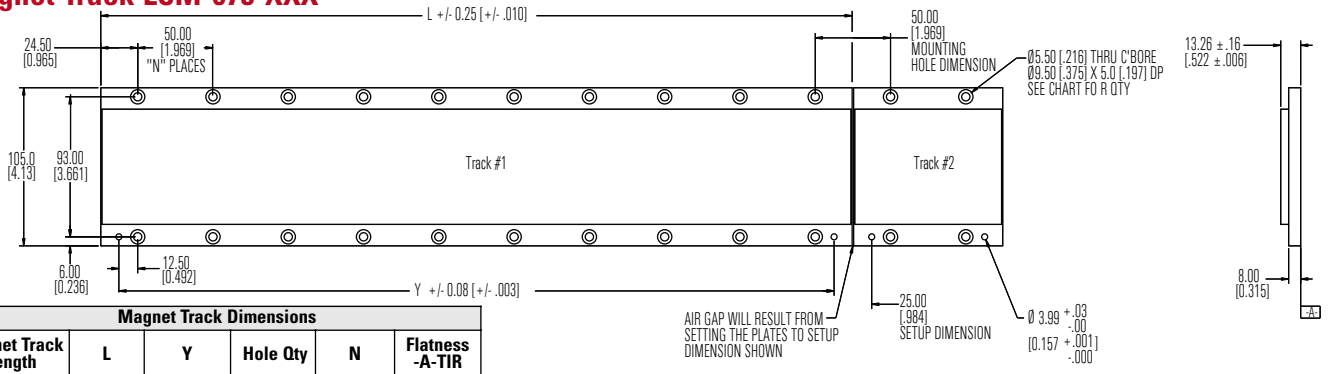
Optional Cooling Plate LCCP-075-XXX



Coil and Cooling Plate Dimensions												
Coil Size	**L**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**Hole Qty (N)**	**Flatness -A-**	**Heat Sink**
075 x 100	134.00 (5.28)									4	0.25 (0.010)	250 x 200 (10 x 8)
075 x 200	234.00 (9.21)	100.00 (3.937)	166.67 (6.562)							8	0.25 (0.010)	250 x 300 (10 x 12)
075 x 300	334.00 (13.15)	133.33 (5.249)	200.00 (7.874)	266.67 (10.499)						10	0.38 (0.015)	250 x 400 (10 x 16)
075 x 400	434.00 (17.09)	133.33 (5.249)	233.33 (9.186)	300.00 (11.811)	366.67 (14.436)					12	0.64 (0.025)	250 x 500 (10 x 20)
075 x 600	634.00 (24.96)	133.33 (5.249)	233.33 (9.186)	333.33 (13.123)	433.33 (17.060)	500.00 (19.686)	566.66 (22.310)			16	0.89 (0.035)	250 x 750 (10 x 30)
075 x 800	834.00 (32.84)	133.33 (5.249)	233.33 (9.186)	333.33 (13.123)	433.33 (17.060)	533.33 (20.997)	633.33 (24.934)	700.00 (27.559)	766.66 (30.184)	20	1.16 (0.045)	250 x 1000 (10 x 40)

Power Cable Gauge		
Coil Size	**Winding Type**	**Wire Gauge**
075 x 100	D	18 GA
075 x 200	D, E	18 GA
075 x 300	D, E	18 GA
075 x 400	D, E	18 GA
075 x 600	D	16 GA
075 x 600	E	18 GA
075 x 800	D	14 GA
075 x 800	E	18 GA

Magnet Track LCM-075-XXX*



Magnet Track Dimensions					
Magnet Track Length	**L**	**Y**	**Hole Qty**	**N**	**Flatness -A-TIR**
100 mm	99.00 (3.90)	75.00 (2.953)	4	1	0.13 (0.05)
250 mm	249.00 (9.80)	225.00 (8.853)	10	4	0.38 (0.015)
400 mm	399.00 (15.71)	375.00 (14.764)	16	7	0.63 (0.025)
500 mm	499.00 (19.65)	475.00 (18.750)	20	9	0.90 (0.035)

* Magnet tracks can be combined for longer travel lengths.

Rockwell Automation

Specifications LC-100-XXX

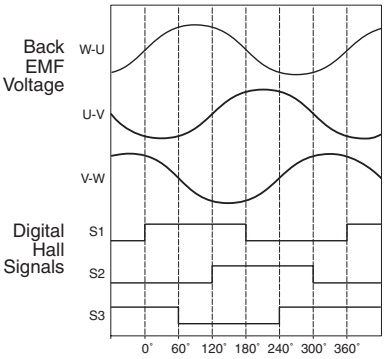
Performance Parameters	Symbol	Units	LC-100-100			LC-100-200			LC-100-300			LC-100-400			LC-100-600			LC-100-800		
Cooling Method			**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**
Continuous Force[1]	F_{cTmax}	N (lb_f)	249 (56)	312 (70)	374 (84)	497 (112)	621 (140)	746 (168)	746 (168)	932 (210)	1118 (251)	994 (223)	1243 (279)	1491 (335)	1491 (335)	1864 (419)	2237 (503)	1988 (447)	2485 (559)	2982 (670)
Peak Force[2]	F_p	N (lb_f)	591 (133)	591 (133)	591 (133)	1178 (265)	1178 (265)	1178 (265)	1767 (397)	1767 (397)	1767 (397)	2356 (530)	2356 (530)	2356 (530)	3534 (794)	3534 (794)	3534 (794)	4712 (1059)	4712 (1059)	4712 (1059)
Motor Constant[1]	K_M	$N/\sqrt{W}$ ($lb_f/\sqrt{W}$)	23.7 (5.3)	23.7 (5.3)	23.7 (5.3)	33.5 (7.5)	33.5 (7.5)	33.5 (7.5)	41.0 (9.2)	41.0 (9.2)	41.0 (9.2)	47.3 (10.6)	47.3 (10.6)	47.3 (10.6)	58.0 (13.0)	58.0 (13.0)	58.0 (13.0)	66.9 (15.0)	66.9 (15.0)	66.9 (15.0)
Thermal Resistance	R_{th}	°C/W	0.99	0.63	0.44	0.50	0.32	0.22	0.33	0.21	0.15	0.25	0.16	0.11	0.17	0.11	0.07	0.12	0.08	0.05
Max Power Dissipation	P_{cTmax}	W	111	174	250	221	345	496	331	517	745	441	689	993	662	1034	1489	882	1379	1986
Maximum Applied Bus Voltage[7]	V_{DC}	Volts	650			650			650			650			650			650		
Electrical Cycle Length	E_c	mm	50			50			50			50			50			50		
Electrical Time Constant	τ_e	msec	10			10			10			10			10			10		
Maximum Coil Temperature	T_{max}	°C	130			130			130			130			130			130		
Winding Type			**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**
Force Constant[1,6]	K_F	N/A_{pk} (lb_f/A_{pk})	60.7 (13.6)		N/A	60.7 (13.6)		121.3 (27.3)	60.7 (13.6)		182.0 (40.9)	60.7 (13.6)		121.3 (27.3)	60.7 (13.6)		121.3 (27.3)	60.7 (13.6)		121.3 (27.3)
Back EMF Constant p-p[3,4,6]	K_e	V_p/m/s (V_p/in/s)	71.7 (1.82)		N/A	71.7 (1.82)		143.3 (3.64)	71.7 (1.82)		215.0 (5.46)	71.7 (1.82)		143.3 (3.64)	71.7 (1.82)		143.3 (3.64)	71.7 (1.82)		143.3 (3.64)
Peak Current[4]	I_p	A_{pk} (A_{rms})	11.5 (8.1)		N/A	22.8 (16.1)		11.4 (8.1)	34.3 (24.2)		11.4 (8.1)	45.7 (32.3)		22.8 (16.1)	68.5 (48.4)		34.3 (24.2)	91.3 (64.6)		45.7 (32.3)
Cooling Type			**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**
Continuous Current[1,4]	I_{cTmax}	A_{pk} (A_{rms})	4.1 (2.9)	5.1 (3.6)	6.2 (4.4)	N/A	N/A	N/A	8.2 (5.8)	10.2 (7.2)	12.3 (8.7)	4.1 (2.9)	5.1 (3.6)	6.1 (4.3)	12.3 (8.7)	15.4 (10.9)	18.4 (13.0)	4.1 (2.9)	5.1 (3.6)	6.1 (4.3)	16.4 (11.6)	20.5 (14.5)	24.6 (17.4)	8.2 (5.8)	10.2 (7.2)	12.3 (8.7)	24.6 (17.4)	30.7 (21.7)	36.9 (26.1)	12.3 (8.7)	15.4 (10.9)	18.4 (13.0)	32.8 (23.2)	41.0 (29.0)	49.2 (34.8)	16.4 (11.6)	20.5 (14.5)	24.6 (17.4)
Resistance p-p[3,6] **@20°C**	R_{20}	ohm	6.12		N/A	3.06		12.24	2.04		18.36	1.53		6.12	1.02		4.08	0.77		3.06
Inductance p-p[3]	L	mH	61		N/A	31		122	20		184	15		61	10		41	8		31
Mechanical Parameters																				
Magnetic Attraction[8]	F_a	N (lb_f)	1310 (294)			2620 (589)			3930 (883)			5240 (1178)			7860 (1767)			10480 (2356)		
Coil Mass[5]	M_c	kg (lb_m)	2.93 (6.5)	3.29 (7.3)	3.29 (7.3)	5.22 (11.5)	5.85 (12.9)	5.85 (12.9)	7.51 (16.5)	8.41 (18.5)	8.41 (18.5)	9.75 (21.5)	10.93 (24.1)	10.93 (24.1)	14.15 (31.2)	15.87 (35.0)	15.87 (35.0)	18.59 (41.0)	20.86 (46.0)	20.86 (46.0)
Magnetic Track Mass	M_n	kg/m (lb/in)	11.39 (0.64)			11.39 (0.64)			11.39 (0.64)			11.39 (0.64)			11.39 (0.64)			11.39 (0.64)		

Notes: NC= No Cooling, AC= Air Cooling, WC = Water Cooling

Motor performance specifications are with sinusoidal commutation.

1. Continuous forces, motor constant and current listed are with coils at maximum temperature 130°C, mounted to a 1" aluminum heat sink whose area is noted in the table, and at 20°C ambient.
2. Max on time 1 sec. In certain applications, the motor may produce significantly higher peak forces. Please contact Anorad Applications Engineering for details.
3. All winding parameters listed are measured line-to-line (phase-to-phase).
4. All currents and voltages listed are measured 0-peak of the sine wave unless noted rms.
5. AC and WC include mass of cooling plate. Consult Anorad for Flow and Pressure for air cooled and water cooled version.
6. All specifications are ±10%. Phase-to-phase inductance is ±30%.
7. Maximum cable length 10 meters. Please consult factory concerning applications requiring longer cables.
8. All specifications are at the standard referenced air gap.

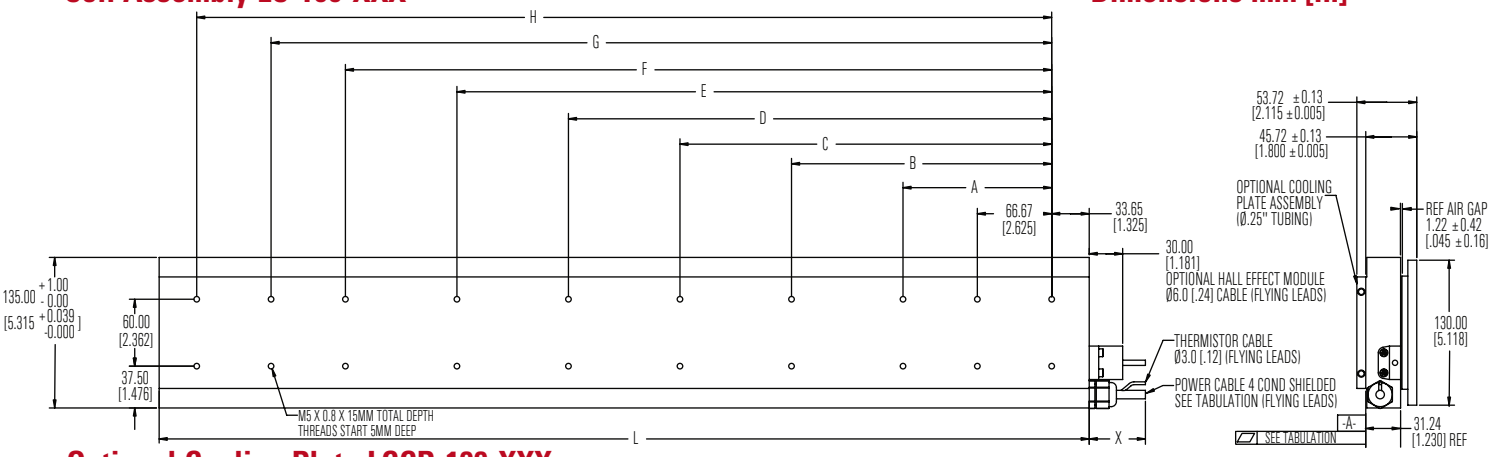
Motor Phasing Diagram



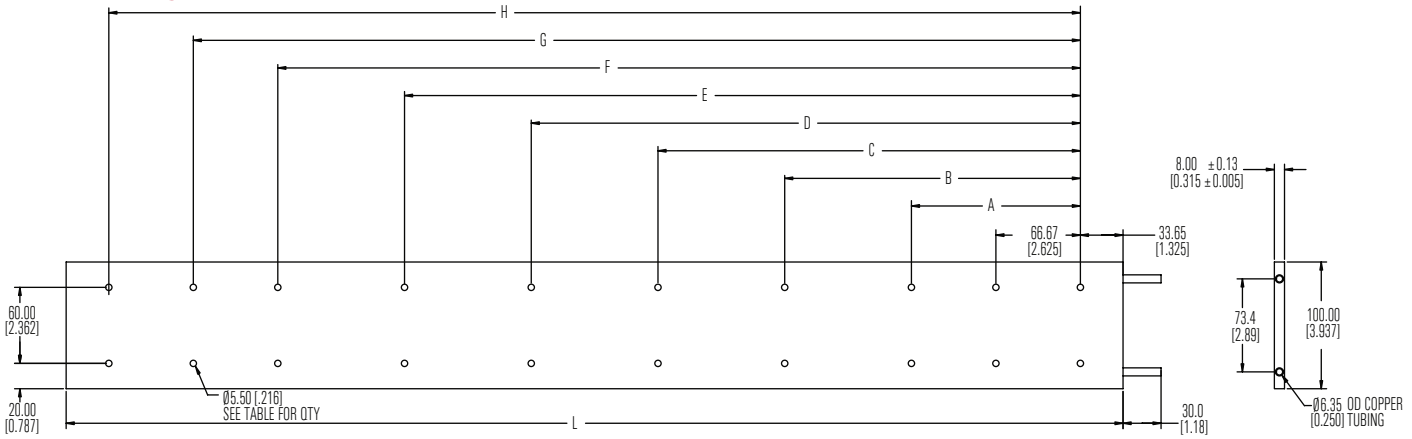
Note: Phasing direction is coil moving towards motor power cable.

Coil Assembly LC-100-XXX

Dimensions mm [in]



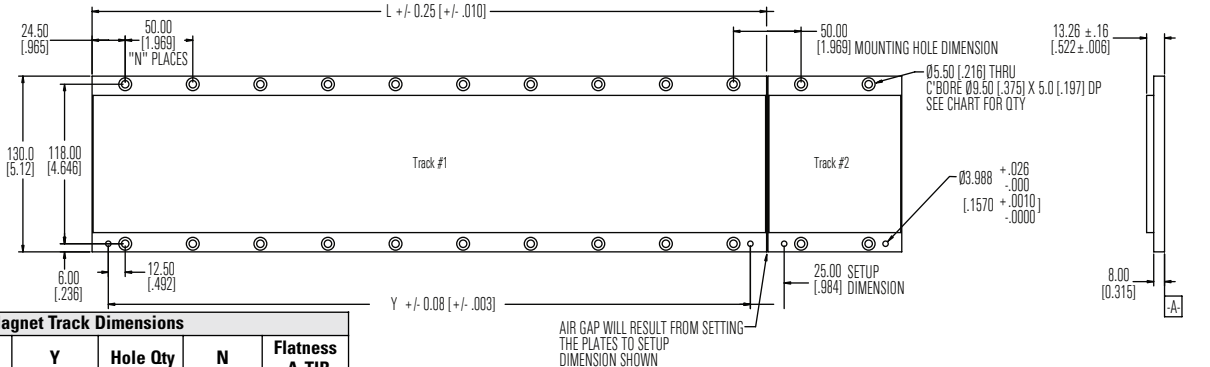
Optional Cooling Plate LCCP-100-XXX



Coil and Cooling Plate Dimensions												
Coil Size	**L**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**Hole Qty (N)**	**Flatness -A-**	**Heat Sink**
100 x 100	134.00 (5.28)									4	0.25 (0.010)	300 x 200 (12 x 8)
100 x 200	234.00 (9.21)	100.00 (3.937)	166.67 (6.562)							8	0.25 (0.010)	300 x 300 (12 x 12)
100 x 300	334.00 (13.15)	133.33 (5.249)	200.00 (7.874)	266.67 (10.499)						10	0.38 (0.015)	300 x 400 (12 x 16)
100 x 400	434.00 (17.09)	133.33 (5.249)	233.33 (9.186)	300.00 (11.811)	366.67 (14.436)					12	0.64 (0.025)	300 x 500 (12 x 20)
100 x 600	634.00 (24.96)	133.33 (5.249)	233.33 (9.186)	333.33 (13.123)	433.33 (17.060)	500.00 (19.686)	566.66 (22.310)			16	0.89 (0.035)	300 x 750 (12 x 30)
100 x 800	834.00 (32.84)	133.33 (5.249)	233.33 (9.186)	333.33 (13.123)	433.33 (17.060)	533.33 (20.997)	633.33 (24.934)	700.00 (27.559)	766.66 (30.184)	20	1.16 (0.045)	300 x 1000 (12 x 40)

Power Cable Gauge		
Coil Size	**Winding Type**	**Wire Gauge**
100 x 100	D	18 GA
100 x 200	D, E	18 GA
100 x 300	D, E	18 GA
100 x 400	D, E	18 GA
100 x 600	D	16 GA
100 x 600	E	18 GA
100 x 800	D	14 GA
100 x 800	E	18 GA

Magnet Track LCM-100-XXX*



Magnet Track Dimensions					
Magnet Track Length	**L**	**Y**	**Hole Qty**	**N**	**Flatness -A-TIR**
100 mm	99.00 (3.90)	75.00 (2.953)	4	1	0.13 (0.005)
250 mm	249.00 (9.80)	225.00 (8.853)	10	4	0.38 (0.015)
400 mm	399.00 (15.71)	375.00 (14.764)	16	7	0.63 (0.025)
500 mm	499.00 (19.65)	475.00 (18.750)	20	9	0.90 (0.035)

* Magnet tracks can be combined for longer travel lengths.

Rockwell Automation

Specifications LC-150-XXX

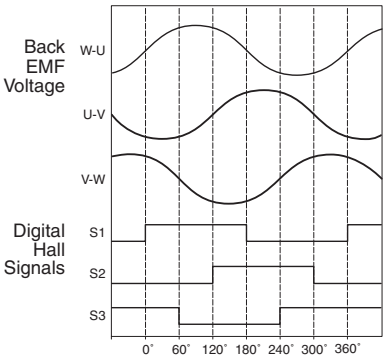
Performance Parameters	Symbol	Units	LC-150-100			LC-150-200			LC-150-300			LC-150-400			LC-150-600			LC-150-800		
Cooling Method			**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**
Continuous Force[1]	F_{cTmax}	N (lb_f)	355 (80)	443 (100)	532 (120)	709 (159)	886 (199)	1064 (239)	1062 (239)	1328 (298)	1593 (358)	1416 (318)	1770 (398)	2124 (478)	2124 (478)	2655 (597)	3187 (716)	2833 (637)	3541 (796)	4249 (955)
Peak Force[2]	F_p	N (lb_f)	876 (197)	876 (197)	876 (197)	1751 (394)	1751 (394)	1751 (394)	2623 (590)	2623 (590)	2623 (590)	3498 (786)	3498 (786)	3498 (786)	5246 (1179)	5246 (1179)	5246 (1179)	6995 (1573)	6995 (1573)	6995 (1573)
Motor Constant[1]	K_M	$N/\sqrt{W}$ ($lb_f/\sqrt{W}$)	30.2 (6.8)	30.2 (6.8)	30.2 (6.8)	42.6 (9.6)	42.6 (9.6)	42.6 (9.6)	52.2 (11.7)	52.2 (11.7)	52.2 (11.7)	60.3 (13.6)	60.3 (13.6)	60.3 (13.6)	73.9 (16.6)	73.9 (16.6)	73.9 (16.6)	85.3 (19.2)	85.3 (19.2)	85.3 (19.2)
Thermal Resistance	R_{th}	°C/W	0.80	0.51	0.35	0.40	0.25	0.18	0.27	0.17	0.12	0.20	0.13	0.09	0.13	0.09	0.06	0.10	0.06	0.04
Max Power Dissipation	P_{cTmax}	W	138	216	311	277	432	622	414	646	931	552	862	1241	827	1293	1861	1103	1724	2482
Maximum Applied Bus Voltage[7]	V_{DC}	Volts	650			650			650			650			650			650		
Electrical Cycle Length	E_c	mm	50			50			50			50			50			50		
Electrical Time Constant	τ_e	msec	10			10			10			10			10			10		
Maximum Coil Temperature	T_{max}	°C	130			130			130			130			130			130		
Winding Type			**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**
Force Constant[1,6]	K_F	N/A_{pk} (lb_f/A_{pk})	91.0 (20.5)		N/A	91.0 (20.5)		182.0 (40.9)	91.0 (20.5)		273.0 (61.4)	91.0 (20.5)		182.0 (40.9)	91.0 (20.5)		182.0 (40.9)	91.0 (20.5)		182.0 (40.9)
Back EMF Constant p-p[3,4,6]	K_e	V_p/m/s (V_p/in/s)	107.5 (2.73)		N/A	107.5 (2.73)		215.0 (5.46)	107.5 (2.73)		322.5 (8.19)	107.5 (2.73)		215.0 (5.46)	107.5 (2.73)		215.0 (5.46)	107.5 (2.73)		215.0 (5.46)
Peak Current[4]	I_p	A_{pk} (A_{rms})	11.3 (8.0)		N/A	22.6 (16.0)		11.3 (8.0)	33.9 (24.0)		11.3 (8.0)	45.2 (32.0)		22.6 (16.0)	67.8 (47.9)		33.9 (24.0)	90.4 (63.9)		45.2 (32.0)
Cooling Type			**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**
Continuous Current[1,4]	I_{cTmax}	A_{pk} (A_{rms})	3.9 (2.8)	4.9 (3.4)	5.8 (4.1)	N/A	N/A	N/A	7.8 (5.5)	9.7 (6.9)	11.7 (8.3)	3.9 (2.8)	4.9 (3.4)	5.8 (4.1)	11.7 (8.3)	14.6 (10.3)	17.5 (12.4)	3.9 (2.8)	4.9 (3.4)	5.8 (4.1)	15.6 (11.0)	19.5 (13.8)	23.3 (16.5)	7.8 (5.5)	9.7 (6.9)	11.7 (8.3)	23.3 (16.5)	29.2 (20.6)	35.0 (24.8)	11.7 (8.3)	14.6 (10.3)	17.5 (12.4)	31.1 (22.0)	38.9 (27.5)	46.7 (33.0)	15.6 (11.0)	19.5 (13.8)	23.3 (16.5)
Resistance p-p[3,6] **@20°C**	R_{20}	ohm	8.48		N/A	4.24		16.96	2.83		25.44	2.12		8.48	1.41		5.65	1.06		4.24
Inductance p-p[3]	L	mH	86		N/A	43		173	28.80		259	22		86	14		58	11		43
Mechanical Parameters																				
Magnetic Attraction[8]	F_a	N (lb_f)	1965 (442)			3930 (884)			5895 (1326)			7860 (1768)			11790 (2652)			15720 (3536)		
Coil Mass[5]	M_c	kg (lb_m)	4.42 (9.8)	5.24 (11.6)	5.24 (11.6)	7.62 (16.8)	9.05 (20.0)	9.05 (20.0)	10.86 (23.9)	12.90 (28.4)	12.90 (28.4)	14.06 (31.0)	16.71 (36.8)	16.71 (36.8)	20.63 (45.4)	24.53 (54.1)	24.53 (54.1)	27.16 (59.9)	32.24 (71.1)	32.24 (71.1)
Magnetic Track Mass	M_n	kg/m (lb/in)	16.16 (0.90)			16.16 (0.90)			16.16 (0.90)			16.16 (0.90)			16.16 (0.90)			16.16 (0.90)		

Notes: NC= No Cooling, AC= Air Cooling, WC = Water Cooling

Motor performance specifications are with sinusoidal commutation.

1. Continuous forces, motor constant and current listed are with coils at maximum temperature 130°C, mounted to a 1" aluminum heat sink whose area is noted in the table, and at 20°C ambient.
2. Max on time 1 sec. In certain applications, the motor may produce significantly higher peak forces. Please contact Anorad Applications Engineering for details.
3. All winding parameters listed are measured line-to-line (phase-to-phase).
4. All currents and voltages listed are measured 0-peak of the sine wave unless noted rms.
5. AC and WC include mass of cooling plate. Consult Anorad for Flow and Pressure for air cooled and water cooled version.
6. All specifications are ±10%. Phase-to-phase inductance is ±30%.
7. Maximum cable length 10 meters. Please consult factory concerning applications requiring longer cables.
8. All specifications are at the standard referenced air gap.

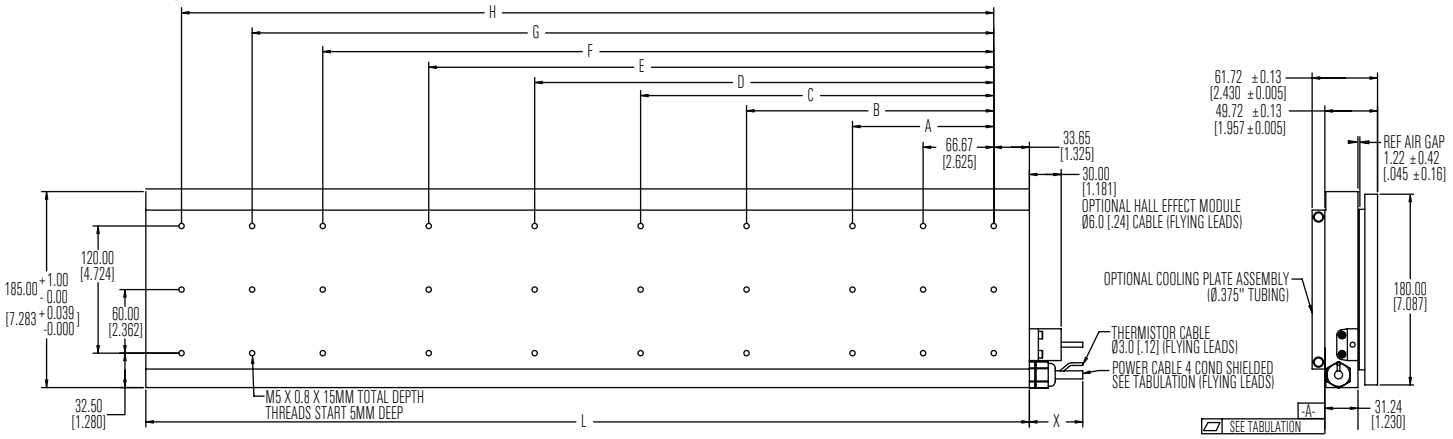
Motor Phasing Diagram



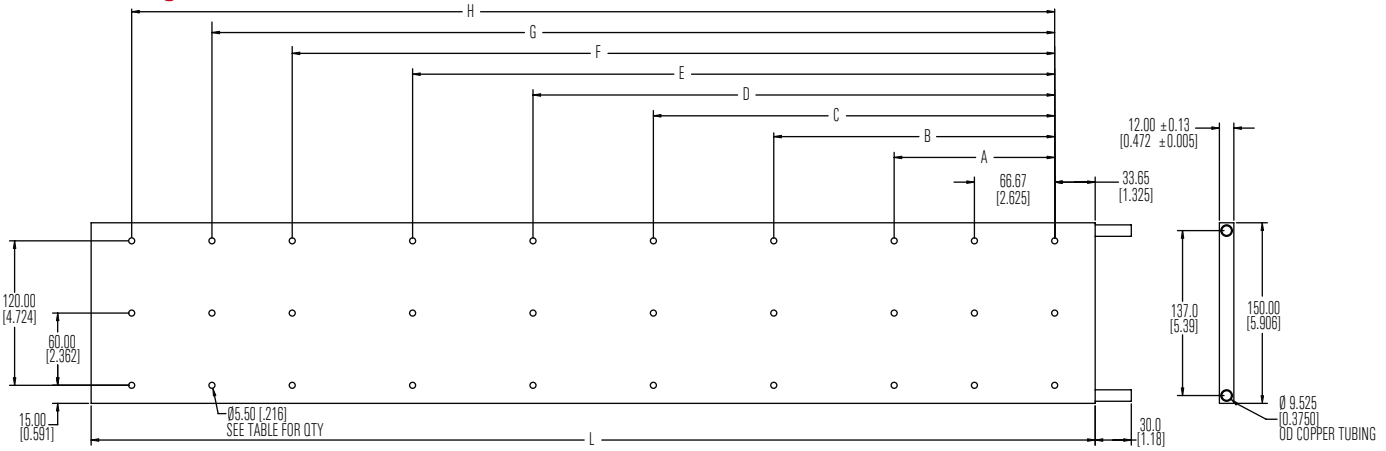
Note: Phasing direction is coil moving towards motor power cable.

Coil Assembly LC-150-XXX

Dimensions mm [in]



Optional Cooling Plate LCCP-150-XXX



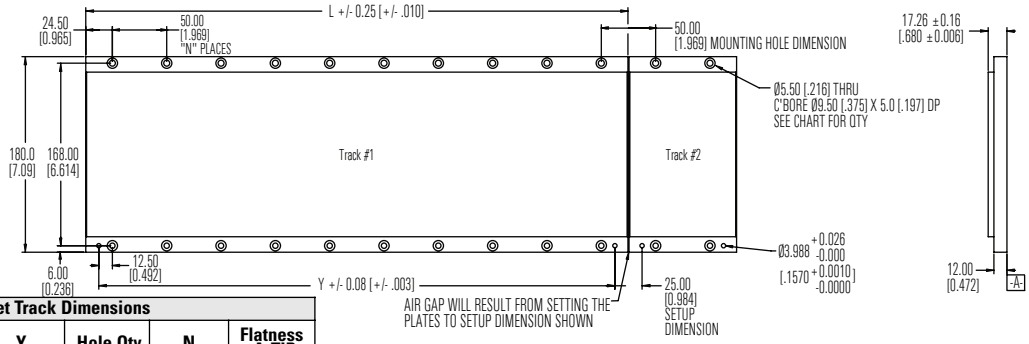
Coil and Cooling Plate Dimensions

Coil Size	L	A	B	C	D	E	F	G	H	Hole Qty (N)	Flatness -A-	Heat Sink
150 x 100	134.00 (5.28)									6	0.25 (0.010)	400 x 200 (16 x 8)
150 x 200	234.00 (9.21)	100.00 (3.937)	166.67 (6.562)							12	0.25 (0.010)	400 x 300 (16 x 12)
150 x 300	334.00 (13.15)	133.33 (5.249)	200.00 (7.874)	266.67 (10.499)						15	0.38 (0.015)	400 x 400 (16 x 16)
150 x 400	434.00 (17.09)	133.33 (5.249)	233.33 (9.186)	300.00 (11.811)	366.67 (14.436)					18	0.64 (0.025)	400 x 500 (16 x 20)
150 x 600	634.00 (24.96)	133.33 (5.249)	233.33 (9.186)	333.33 (13.123)	433.33 (17.060)	500.00 (19.686)	566.66 (22.310)			24	0.89 (0.035)	400 x 750 (16 x 30)
150 x 800	834.00 (32.84)	133.33 (5.249)	233.33 (9.186)	333.33 (13.123)	433.33 (17.060)	533.33 (20.997)	633.33 (24.934)	700.00 (27.559)	766.66 (30.184)	30	1.16 (0.045)	400 x 1000 (16 x 40)

Power Cable Gauge

Coil Size	Winding Type	Wire Gauge
150 x 100	D	18 GA
150 x 200	D, E	18 GA
150 x 300	D, E	18 GA
150 x 400	D, E	18 GA
150 x 600	D	16 GA
150 x 600	E	18 GA
150 x 800	D	14 GA
150 x 800	E	18 GA

Magnet Track LCM-150-XXX*



Magnet Track Dimensions

Magnet Track Length	L	Y	Hole Qty	N	Flatness -A-TIR
100 mm	99.00 (3.90)	75.00 (2.953)	4	1	0.13 (0.005)
250 mm	249.00 (9.80)	225.00 (8.853)	10	4	0.38 (0.015)
400 mm	399.00 (15.71)	375.00 (14.764)	16	7	0.63 (0.025)
500 mm	499.00 (19.65)	475.00 (18.750)	20	9	0.90 (0.035)

* Magnet tracks can be combined for longer travel lengths.

Rockwell Automation

Specifications LC-200-XXX

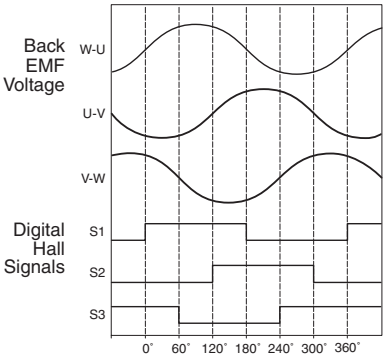
Performance Parameters	Symbol	Units	LC-200-100			LC-200-200			LC-200-300			LC-200-400			LC-200-600			LC-200-800		
Cooling Method			**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**
Continuous Force[1]	F_{cTmax}	N (lb_f)	448 (101)	560 (126)	672 (151)	897 (202)	1121 (252)	1345 (302)	1344 (302)	1680 (378)	2015 (453)	1792 (403)	2239 (503)	2687 (604)	2687 (604)	3359 (755)	4031 (906)	3583 (806)	4479 (1007)	5375 (1208)
Peak Force[2]	F_p	N (lb_f)	1107 (249)	1107 (249)	1107 (249)	2214 (498)	2214 (498)	2214 (498)	3318 (746)	3318 (746)	3318 (746)	4424 (995)	4424 (995)	4424 (995)	6637 (1492)	6637 (1492)	6637 (1492)	8849 (1989)	8849 (1989)	8849 (1989)
Motor Constant[1]	K_M	$N/\sqrt{W}$ ($lb_f/\sqrt{W}$)	35.6 (8.0)	35.6 (8.0)	35.6 (8.0)	50.3 (11.3)	50.3 (11.3)	50.3 (11.3)	61.5 (13.8)	61.5 (13.8)	61.5 (13.8)	71.1 (16.0)	71.1 (16.0)	71.1 (16.0)	87.0 (19.6)	87.0 (19.6)	87.0 (19.6)	100.5 (22.6)	100.5 (22.6)	100.5 (22.6)
Thermal Resistance	R_{th}	°C/W	0.69	0.44	0.31	0.35	0.22	0.15	0.23	0.15	0.10	0.17	0.11	0.08	0.12	0.07	0.05	0.09	0.06	0.04
Max Power Dissipation	P_{cTmax}	W	159	248	358	318	497	715	477	745	1073	636	993	1430	954	1490	2146	1272	1987	2861
Maximum Applied Bus Voltage[7]	V_{DC}	Volts	650			650			650			650			650			650		
Electrical Cycle Length	E_c	mm	50			50			50			50			50			50		
Electrical Time Constant	τ_e	msec	10			10			10			10			10			10		
Maximum Coil Temperature	T_{max}	°C	130			130			130			130			130			130		
Winding Type			**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**	**D**		**E**
Force Constant[1,6]	K_F	N/A_{pk} (lb_f/A_{pk})	121.3 (27.3)		N/A	121.3 (27.3)		242.7 (54.6)	121.3 (27.3)		364.0 (81.8)	121.3 (27.3)		242.7 (54.6)	121.3 (27.3)		242.7 (54.6)	121.3 (27.3)		242.7 (54.6)
Back EMF Constant p-p[3,4,6]	K_e	V_p/m/s (V_p/in/s)	143.3 (3.64)		N/A	143.3 (3.64)		286.6 (7.28)	143.3 (3.64)		430.0 (10.92)	143.3 (3.64)		286.6 (7.28)	143.3 (3.64)		286.6 (7.28)	143.3 (3.64)		286.6 (7.28)
Peak Current[4]	I_p	A_{pk} (A_{rms})	10.7 (7.6)		N/A	21.5 (15.2)		10.7 (7.6)	32.2 (22.7)		10.7 (7.6)	42.9 (30.3)		21.4 (15.2)	64.3 (45.5)		32.2 (22.7)	85.8 (60.7)		42.9 (30.3)
Cooling Type			**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**	**NC**	**AC**	**WC**
Continuous Current[1,4]	I_{cTmax}	A_{pk} (A_{rms})	3.7 (2.6)	4.6 (3.3)	5.5 (3.9)	N/A	N/A	N/A	7.4 (5.2)	9.2 (6.5)	11.1 (7.8)	3.7 (2.6)	4.6 (3.3)	5.5 (3.9)	11.1 (7.8)	13.8 (9.8)	16.6 (11.7)	3.7 (2.6)	4.6 (3.3)	5.5 (3.9)	14.8 (10.4)	18.5 (13.1)	22.1 (15.7)	7.4 (5.2)	9.2 (6.5)	11.1 (7.8)	22.1 (15.7)	27.7 (19.6)	33.2 (23.5)	11.1 (7.8)	13.8 (9.8)	16.6 (11.7)	29.5 (20.9)	36.9 (26.1)	44.3 (31.3)	14.8 (10.4)	18.5 (13.1)	22.1 (15.7)
Resistance p-p[3,6] **@20°C**	R_{20}	ohm	10.84		N/A	5.42		21.68	3.62		32.58	2.72		10.86	1.81		7.24	1.36		5.43
Inductance p-p[3]	L	mH	111.6		N/A	55.8		223	37.20		335	28		112	19		74	14		56
Mechanical Parameters																				
Magnetic Attraction[8]	F_a	N (lb_f)	2620 (589)			5240 (1178)			7860 (1767)			10480 (2356)			15720 (3534)			20960 (4712)		
Coil Mass[5]	M_c	kg (lb_m)	5.74 (12.7)	6.83 (15.1)	6.83 (15.1)	9.98 (21.8)	11.79 (26.0)	11.79 (26.0)	14.04 (30.9)	16.76 (36.9)	16.76 (36.9)	18.19 (40.1)	21.72 (47.9)	21.72 (47.9)	26.79 (59.1)	31.92 (70.4)	31.92 (70.4)	35.23 (77.7)	42.03 (92.7)	42.03 (92.7)
Magnetic Track Mass	M_n	kg/m (lb/in)	20.93 (1.18)			20.93 (1.18)			20.93 (1.18)			20.93 (1.18)			20.93 (1.18)			20.93 (1.18)		

Notes: NC= No Cooling, AC= Air Cooling, WC = Water Cooling

Motor performance specifications are with sinusoidal commutation.

1. Continuous forces, motor constant and current listed are with coils at maximum temperature 130°C, mounted to a 1" aluminum heat sink whose area is noted in the table, and at 20°C ambient.
2. Max on time 1 sec. In certain applications, the motor may produce significantly higher peak forces. Please contact Anorad Applications Engineering for details.
3. All winding parameters listed are measured line-to-line (phase-to-phase).
4. All currents and voltages listed are measured 0-peak of the sine wave unless noted rms.
5. AC and WC include mass of cooling plate. Consult Anorad for Flow and Pressure for air cooled and water cooled version.
6. All specifications are ±10%. Phase-to-phase inductance is ±30%.
7. Maximum cable length 10 meters. Please consult factory concerning applications requiring longer cables.
8. All specifications are at the standard referenced air gap.

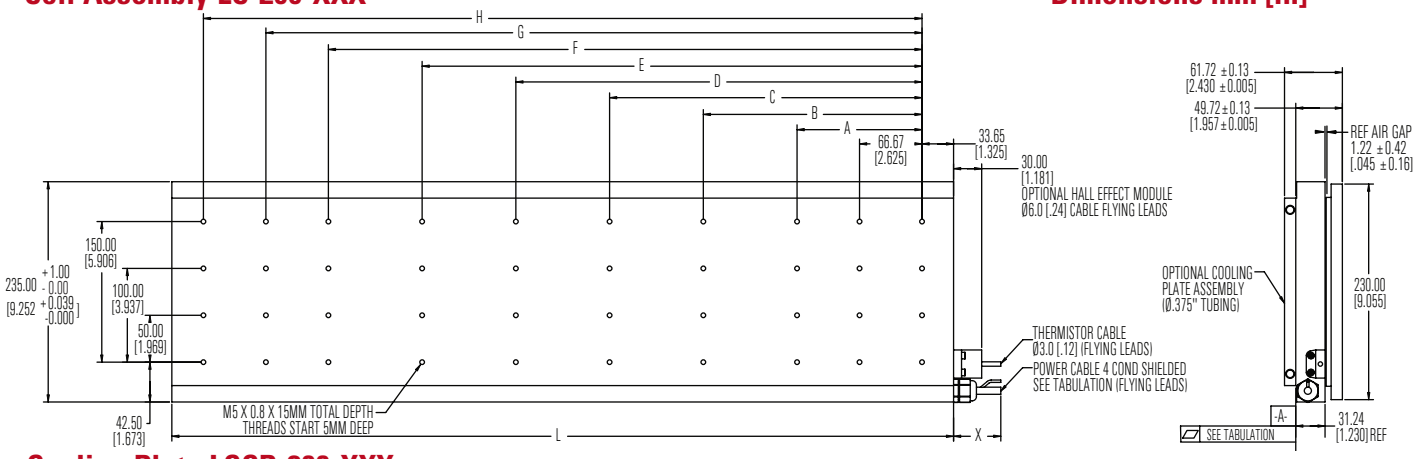
Motor Phasing Diagram



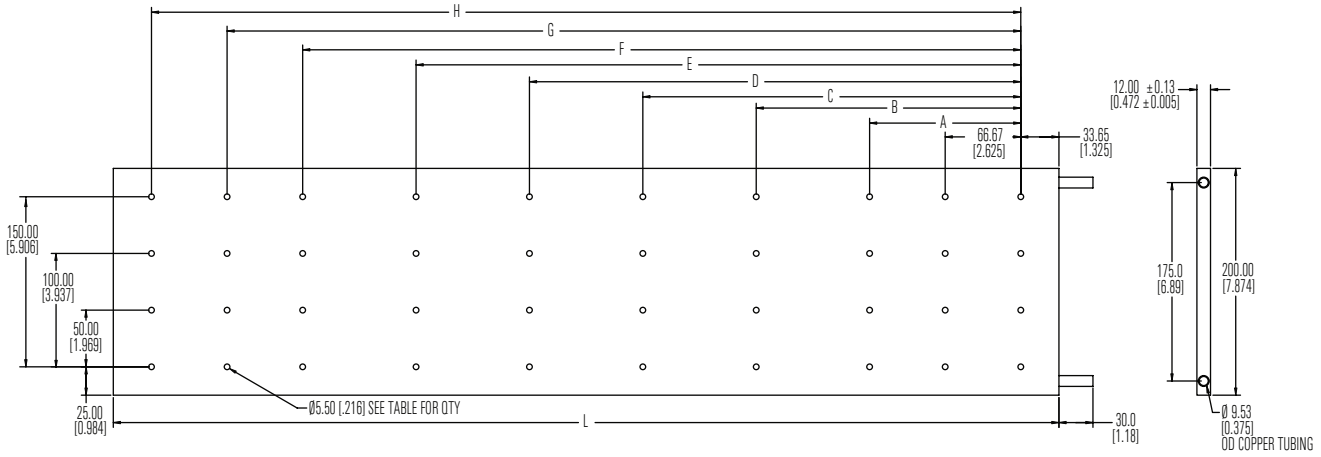
Note: Phasing direction is coil moving towards motor power cable.

Coil Assembly LC-200-XXX

Dimensions mm [in]



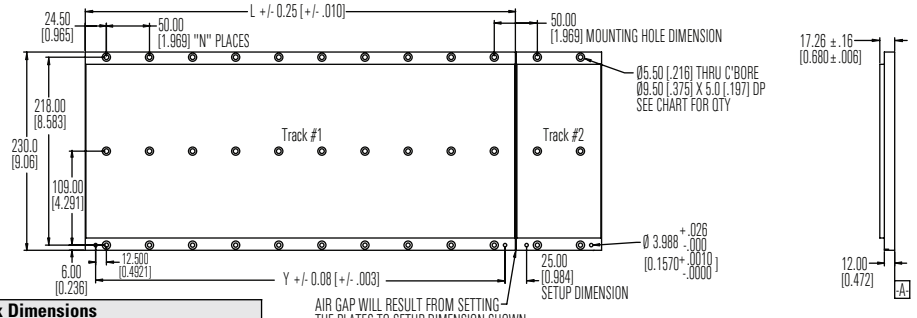
Cooling Plate LCCP-200-XXX



Coil and Cooling Plate Dimensions												
Coil Size	**L**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**Hole Qty (N)**	**Flatness -A-**	**Heat Sink**
200 x 100	134.00 (5.28)									8	0.25 (0.010)	500 x 200 (20 x 8)
200 x 200	234.00 (9.21)	100.00 (3.937)	166.67 (6.562)							16	0.25 (0.010)	500 x 300 (20 x 12)
200 x 300	334.00 (13.15)	133.33 (5.249)	200.00 (7.874)	266.67 (10.499)						20	0.38 (0.015)	500 x 400 (20 x 16)
200 x 400	434.00 (17.09)	133.33 (5.249)	233.33 (9.186)	300.00 (11.811)	366.67 (14.436)					24	0.64 (0.025)	500 x 500 (20 x 20)
200 x 600	634.00 (24.96)	133.33 (5.249)	233.33 (9.186)	333.33 (13.123)	433.33 (17.060)	500.00 (19.686)	566.66 (22.310)			32	0.89 (0.035)	500 x 750 (20 x 30)
200 x 800	834.00 (32.84)	133.33 (5.249)	233.33 (9.186)	333.33 (13.123)	433.33 (17.060)	533.33 (20.997)	633.33 (24.934)	700.00 (27.559)	766.66 (30.184)	40	1.16 (0.045)	500 x 1000 (20 x 40)

Power Cable Gauge		
Coil Size	**Winding Type**	**Wire Gauge**
200 x 100	D	18 GA
200 x 200	D, E	18 GA
200 x 300	D, E	18 GA
200 x 400	D, E	18 GA
200 x 600	D	16 GA
200 x 600	E	18 GA
200 x 800	D	14 GA
200 x 800	E	18 GA

Magnet Track LCM-200-XXX*



Magnet Track Dimensions					
Magnet Track Length	**L**	**Y**	**Hole Qty**	**N**	**Flatness -A-TIR**
100 mm	99.00 (3.90)	75.00 (2.953)	6	1	0.25 (0.010)
250 mm	249.00 (9.80)	225.00 (8.853)	15	4	0.50 (0.020)
400 mm	399.00 (15.71)	375.00 (14.764)	24	7	0.76 (0.030)
500 mm	499.00 (19.65)	475.00 (18.750)	30	9	1.0 (0.040)

* Magnet tracks can be combined for longer travel lengths.

Rockwell Automation

Ordering Information - LC-030, -050, -075, -100, -150, -200

Model	Frame Size	Coil Length	Winding Code	Cooling Option	Hall Feedback	Thermal Protection	Cable Length	UL Rated	Special Options
LC-	030-	100-	D-	0-	T-	TR-	0-		

030
050
075
100
150
200

100 = 100mm
200 = 200mm
300 = 300mm
400 = 400mm
600 = 600mm
800 = 800mm

D
E

0 = None (Standard)

T = Trapezoidal Hall Effect
0 = No Feedback

TR = PTC Thermal Sensor
TS = Thermal Switch

0 = 300mm
1 = 600mm
2 = 1000mm

Blank = Not UL Rated
UL = UL Rated

Blank = Standard

Magnet Track

Model	Frame Size	Magnet Length	Cover	Special Options
LCM-	030-	100-	C	

030
050
075
100
150
200

100 = 100mm
250 = 250mm
400 = 400mm
500 = 500mm

C = Cover (Standard)

Blank = Standard

Cooling Plate

Model	Frame Size	Coil Length	Cooling
LCCP-	030-	100-	AC

030
050
075
100
150
200

100 = 100mm
200 = 200mm
300 = 300mm
400 = 400mm
600 = 600mm
800 = 800mm

AC = Air Cooling
WC = Water Cooling

Cable Coding

	Color	Function
Motor Leads (Standard)	RED	ØU (A)
	WHT	ØV (B)
	BLK	ØW (C)
	GRN/YEL	GND
	BLK	**TR** (130ºC)
Thermal Protection (Optional)	BLK	**TR** (130ºC)
	BLU	**TS** (130ºC)
	BLU	**TS** (130ºC)
Trapezoidal Hall Effect (Optional)	RED	V+
	WHT	S1
	BLU	S2
	ORN	S3
	BLK	VRTN

Note: V+ = 5-24 Vdc
Motor and Hall effect cables are shielded.

All Specifications subject to change. Consult factory or website for latest specifications.

www.anorad.com **www.rockwellautomation.com**

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