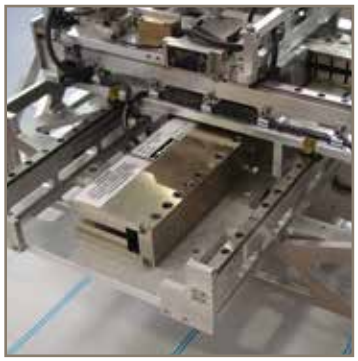
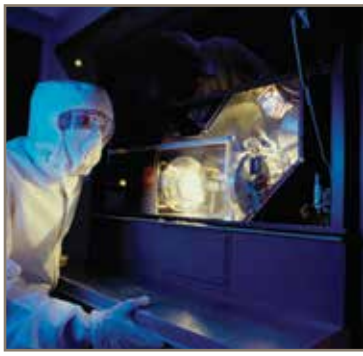


aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

Linear Motors

I-Force Ironless and Ironcore Series



Parker

ENGINEERING YOUR SUCCESS.

I-Force and Ironcore Linear Motors

Parker Hannifin has been providing innovative automation solutions for decades. This spirit of innovation continues within the exploding market of linear motor technology.

In 2003, Parker acquired Trilogy Corporation, one of the most recognized brands in linear motors. The powerful combination of Parker's and Trilogy's patented linear motor solutions gives automation and robotics customers distinct performance enhancements and cost of ownership benefits over competing technologies.

With a full complement of linear motor components and fully engineered positioning systems, Parker has the right solution to increase productivity and to enhance the accuracy and dynamic performance of your machine.

Parker has one of the broadest offerings in available linear motor technologies. From component or "kit" style motors, packaged positioning tables, to complete custom engineered systems, Parker can provide a solution for any linear motion requirement. This document focuses on Parker's two families of component-style motors. Typical applications for Parker linear motor products include:

- **Semiconductor and electronics**
- **Flat panels, solar panels**
- **Medical and life sciences**
- **Machine tools**
- **Optics and photonics**
- **Large format printing, scanning and digital fabrication**

Linear Motor Design Benefits

- **High speeds**
- **High accelerations**
- **Fast response – 100 times that of a mechanical system**
- **Stiffness – spring rate better than a mechanical system**
- **Zero backlash – direct drive technology**
- **Maintenance free operation – mechanical simplicity due to reduced component count**
- **Long travels without performance loss**
- **Suitable for vacuum and harsh environments**

Linear Motor Advantages

A linear motor operates in exactly the same way as a rotary motor that has been "unwrapped." The same electromagnetic effects that produce torque in a rotary motor now produce a direct force in a linear motor.

For many applications, linear motors offer distinct advantages over conventional rotary drive systems. For example, there is no need to couple the motor to the load by means of intermediate mechanical components such as gears, ballscrews, or belt drives. The load is directly connected to the motor.

Therefore, there is no backlash or elasticity from the moving elements. Thus, the dynamic behavior of the servo control is improved and higher levels of accuracy are achieved.

The absence of a mechanical transmission component also results in a drive system with low inertia and noise. In addition, mechanical wear only occurs in the guidance system. Consequently, linear motors have better reliability and lower frictional losses than traditional rotary drive systems.

I-Force Ironless Motors

Page 4 – 26

- **Forces to 3928 N (883 lbs)**
- **Unlimited lengths**
- **Ultra high performance**
- **Zero cogging**

RIPPED Ironcore Motors

Page 27 – 35

- **Forces to 7433 N (1671 lbs)**
- **Unlimited lengths**
- **Highest power per package size**

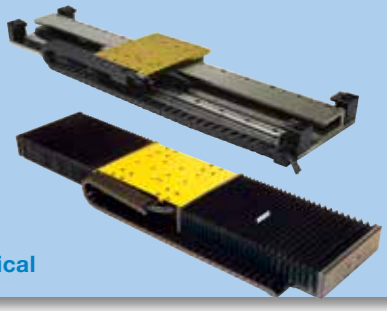
Ironcore Motors E type

Page 36 – 43

- **Peak force 4,860N**
- **Unlimited lengths**
- **Motor efficiency is strongest**

For information on Parker's extensive line of linear motor positioner products including industrial-grade, precision-grade, multi-axis systems and custom capabilities, please visit our website at

www.parker.com/electromechanical



Design Engineering with Linear Motors

Component linear motors such as the I-Force and Ironcore consist of a motor coil and separate magnet track.

The coil assembly is known as the "forcer" or sometimes as the "primary" element. The forcer generally consists of the motor coil and an attachment plate or mounting bar which allows the coil to connect to the carriage. The motor cables typically exit from one side of the package.

The magnet track is sometimes referred to as the "secondary" element. Depending on the type of linear motor used, the magnet track can either be a single row of magnets or a double-sided configuration offering balanced attraction forces.

The ability to select linear motor components gives the user an economical solution and complete flexibility with respect to integration into the machine. However, this flexibility also requires an understanding of motor characteristics, linear feedback technology, cooling methods, and the performance of the servo amplifier and control system.

- **Let Parker's extensive motion design experience, systematic project management process, and global infrastructure solve your most demanding motion problems**
- **Collaborative development cycle aligns customer goals and rigorous performance specifications with a complete engineered solution**

Please contact Parker application engineering if you need any assistance with your design.

I-Force Ironless Linear Motors

Parker's I-Force Ironless Linear Motors offer high forces and rapid accelerations in a compact package. With forces ranging from 40 N (5.5 lbf) to 878.6 N (197.5 lbf) continuous up to 108.5 N (24.5 lbf) to 3928 N (883 lbf) peak, the I-Force family offers a superior combination of performance and size.

The I-Force patented I-beam shape with its overlapping windings allows for a higher power density in a smaller motor, improved heat removal, and added structural stiffness.

In addition, the ironless (or air core) linear motor design has no attractive force toward the magnets. This allows for easy installation and zero cogging during motion.

Ultra high-flex cables come standard with I-Force motors. In addition, Parker offers modular magnet tracks for unrestricted travel length. Incredibly smooth motion, high precision and high force density make the I-Force linear motors an ideal solution for your demanding positioning requirements.

No attractive force toward the magnets

- **Easier/Safer assembly and handling, smoother travel (no cogging)**

Overlapping windings

- **Increased force density**
- **Improved heat dissipation**
- **Lower temperature rise**
- **Smaller, less expensive motor**

Overlapped windings

Non-overlapped windings

Uses thermally conductive epoxy together with the windings

- **Patented ironless motors design (RE34674) provides better heat dissipation**

Vacuum encapsulation process

- **Allows motors to be used in high-vacuum environments**
- **Rated at 10^{-6} torr, currently used in 10^{-7} torr applications**

Modular magnet track

- **Precision ground 3-piece track**
- **Unrestricted travel length**
- **Two lengths of modular magnet tracks allow unlimited length of travel**

Embedded overtemp thermostat or optional thermistor

- **Protects windings against overheating**
- **Prealigned imbedded digital Hall effect devices**
- **Internal thermal cutout switch protects coil**

Ultra high-flex cables

- **Longer cable life, good for millions of cycles**

Ironless Advantages

- **No attractive force – balanced dual magnet track, safe and easy to handle, no force to deal with during assembly**
- **No cogging – ironless forcer for zero cogging and ultimate smoothness.**
- **Low weight forcer – no iron means higher acceleration and deceleration rates, higher mechanical bandwidth.**
- **Air gap forgiving – easy to align and install**

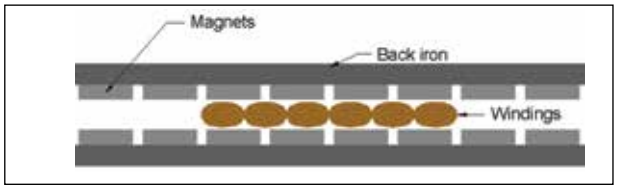
Disadvantages Compared to Ironcore

- **Heat dissipation – higher thermal resistance, patented Parker I-beam design helps mitigate this issue (see below)**
- **Lower RMS power when compared to ironcore designs.**
- **Uses twice as many magnets which increases unit cost**

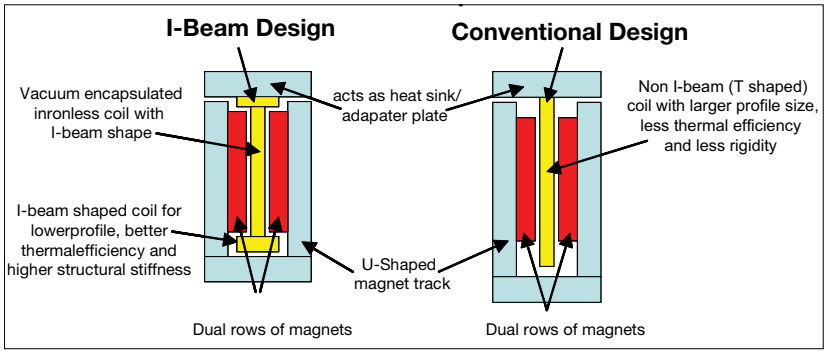
- **Please contact Parker application engineer for IP65**

I-Force Patented I-Beam Design

Ironless motors consist of a forcer (windings), which rides between dual magnet rails.



The forcer does not have any iron laminations in the coil – hence the name ironless. Instead, the copper windings are encapsulated and located in the air gap between the two rows of magnets. Because the motors are ironless, there are no attractive forces or cogging forces between the forcer and the magnet track.



Parker's patented I-beam shape provides very high forces in a compact package. In addition, the design is more thermally efficient than tradition ironless motor designs.

The ironless forcers have lower mass than their ironcore counterparts resulting in extremely high accelerations and overall dynamic performance. The ironless design has zero cogging and the lack of attractive force allows for extended bearing life and, in some applications, the ability to use smaller bearings.

While the high dynamic performance and zero cogging motion make the ironless motors a powerful design, they are not as thermally efficient as their ironcore counterparts. A small contacting surface area and a long thermal path from the winding base to the cooling plate makes the full-load power of these motors low. In addition, the dual row of magnets increases the overall cost of these motors in relation to the generated force and stroke length.

I-Force Ironless Motor Selection

Model	110	210	310	410	ML-50
Page	6	10	14	18	23
Cross Section – H x W mm (in)	50 x 21 (2.05 x 0.82)	57.1 x 31.7 (2.25 x 1.25)	86.4 x 34.3 (3.40 x 1.35)	114.3 x 50.8 (4.50 x 2.00)	155 x 50 (6.10 x 1.97)
Continuous Force – N (lbs)	44 (10)	104.5 (24.8)	262 (58)	878 (197)	852 (191)
Peak Force – N (lbs)	200 (45)	494 (110)	1170 (263)	3928 (883)	3811 (856)
Maximum Track Length – mm (in) Modular Single Piece	 Unlimited 914 (36)	 Unlimited 1219 (48)	 Unlimited 1676 (66)	 Unlimited 1829 (72)	 Unlimited 240 (9.45)
Cooling[1]	—	Internal air cooling manifold available	Internal air cooling manifold or liquid cooling available	Internal air cooling manifold or liquid cooling available	—
Digital Hall Effect Devices	None, Imbedded	None, Imbedded	None, Imbedded	None, Imbedded	HED sensors and overtravel limit are available in connector module

[1] Consult factory for cooling performance

I-Force Ironless 110 Series

Performance

Model	Units	110-1	110-2
Peak Force [1]	N (lb)	108.5 (24.4)	202.5 (45.5)
Continuous Force [2]	N (lb)	24.5 (5.5)	45.4 (10.2)
Peak Power	W	938	1641
Continuous Power	W	47	82

1) Peak force and current based on 5% duty cycle and one second duration.
2) Continuous force and current based on coil winding temperature maintained at 100 ºC.

Electrical

Model	Units	110-1		110-2		
Winding	Series/Parallel/Triple	**S**	**P**	**S**	**P**	**T**
Peak Current	A pk sine	15.9	31.8	14.8	29.6	44.4
	RMS	11.2	22.5	10.4	20.9	31.4
Continuous Current	A pk sine	3.6	7.2	3.3	6.6	9.9
	RMS	2.5	5.1	2.3	4.7	7.1
Force Constant [1]	N/A peak	6.8	3.4	13.7	6.8	4.6
	lb/A peak	1.5	0.8	3.1	1.5	1.0
Back EMF [2]	V/m/s	7.9	3.9	15.7	7.9	5.2
	V/in/s	0.20	0.10	0.40	0.20	0.13
Resistance @ 25°C (phase-to-phase) [3]	ohms	3.8	0.95	7.6	1.9	0.84
Inductance (phase-to-phase) [4]	mH	1.0	0.3	2.0	0.5	0.2
Electrical Time Constant [5]	ms	0.3	0.3	0.3	0.3	0.3
Motor Constant [6]	N/√W	3.56	3.56	5.02	5.02	5.02
	lb/√W	0.80	0.80	1.13	1.13	1.13
Terminal Voltage (max.) [7]	VDC	330	330	330	330	330

1) Force constant is peak of resistive force produced by 1.0 amp thru one motor lead and 0.5 amps thru other two leads. Also, Back EMF (V/in/sec) * 7.665 = Force constant (lb/amp).
2) Back EMF measured between any two motor leads while moving at constant velocity. Value is amplitude or 0-Peak of sine wave produced.
3) Resistance measured between any two motor leads with motor connected in Delta winding at 25 ºC. For temperature at 100 ºC, multiply resistance by 1.295 (75 ºC rise * 0.393%/ºC).
4) Inductance measured using 1 Kz with the motor in the magnetic field.
5) Electrical time constant is time it takes for motor value to reach 63% of its final current after a step change in voltage.
6) Motor constant is a measure of efficiency. Calculated by dividing the force constant by the square root of the motor resistance at maximum operating temperature.
7) Consult factory for use with non-Parker amplifiers.

Thermal*

Model	Units	110-1	110-2
Thermal Resistance Wind-Amb [1]	°C/W	1.59	0.92
Thermal Time Constant (min.) [2]		3.2	3.2
Maximum Winding Temperature	°C	100	100

* Use Parker's MotionSizer software for the most accurate estimate of coil temperature for a particular motion profile.
1) Thermal time constant is time it takes for motor temperature to reach 63% of its final value after a step change in power.
2) Thermal resistance is the number of degrees (Celsius) of temperature rise in the winding per watt of power dissipated determined experimentally.

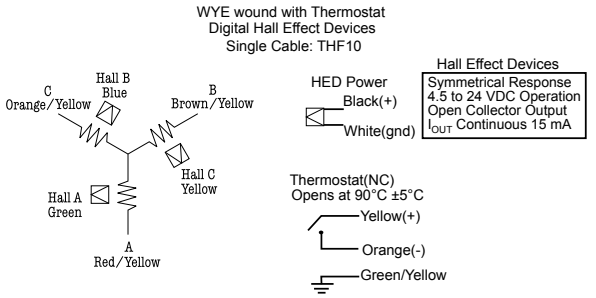
Mechanical

Model	Units	110-1	110-2
Coil Weight	kg (lb)	0.12 (0.27)	0.22 (0.48)
Coil Length	mm (in)	81.3 (3.20)	142.2 (5.60)
Attractive Force	N (lbf)	0	0
Electrical Pitch Length [1]	mm (in)	60.96 (2.40)	60.96 (2.40)

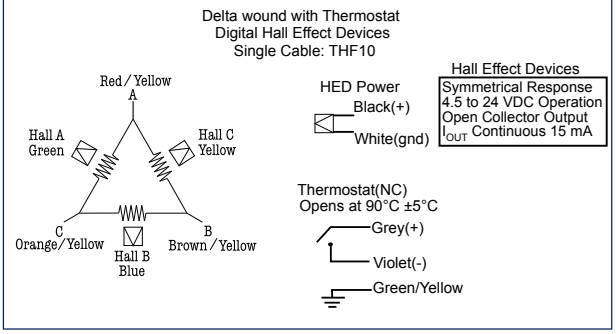
1) Electrical pitch length is distance coil must travel to complete 360° electrical cycle.

Wiring Options

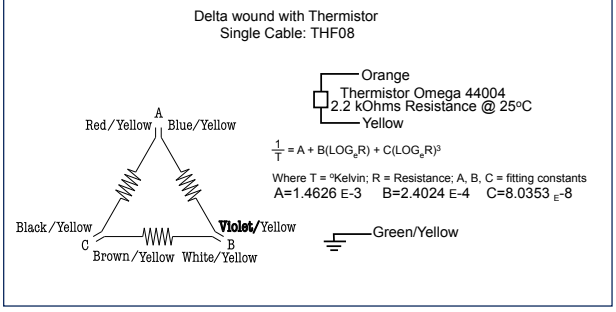
WD0



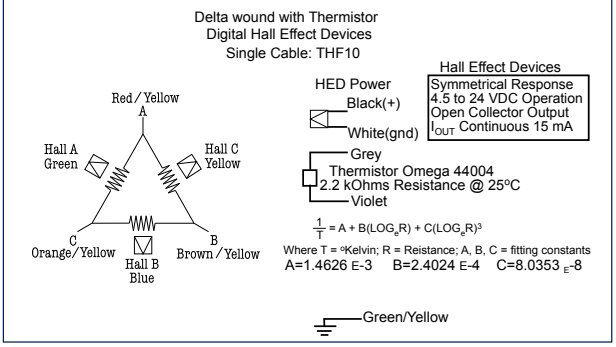
WD3 Preferred configuration with Parker Drives



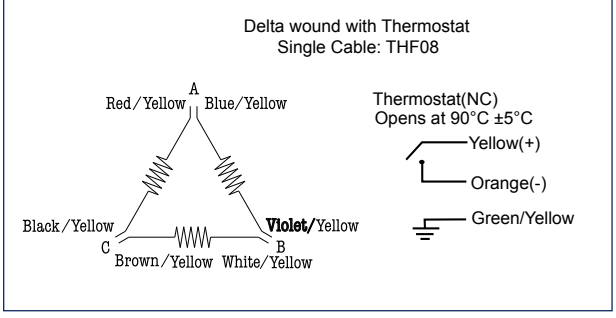
WD1



WD4



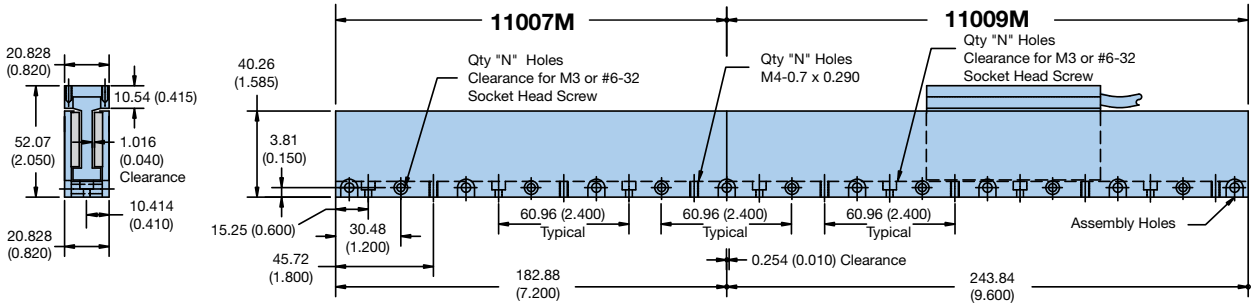
WD2



I-Force Ironless 110 Series

Magnet Track Dimensions

110xxM Modular – mm (in)



	110xxM Modular
Incremental Length – mm (in)	60.96 (2.4)
Minimum Length – mm (in)	121.92 (4.8)
Maximum Length – mm (in) (for single piece)	914.40 (36)
Weight – kg/m (lbs/ft)	3.89 (2.66)

Modular Track Combinations With 11007M and 11009M Sections

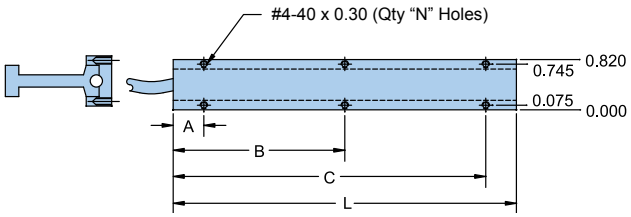
Length (L)*		Quantity	
mm	in	11007M	11009M
182.9	7.2	1	0
243.8	9.6	0	1
365.8	14.4	2	0
426.7	16.8	1	1
487.7	19.2	0	2
548.6	21.6	3	0
609.6	24.0	2	1
670.6	26.4	1	2
731.5	28.8	0	3
792.5	31.2	3	1
853.4	33.6	2	2
914.4	36.0	1	3
975.4	38.4	0	4
1036.3	40.8	3	2
1097.3	43.2	2	3
1158.2	45.6	1	4
1219.2	48.0	0	5
1280.2	50.4	3	3
1341.1	52.8	2	4
1402.1	55.2	1	5
1463.0	57.6	0	6
1524.0	60.0	3	4

*Length is unlimited by combining modular track sections.

Motor Coil Dimensions

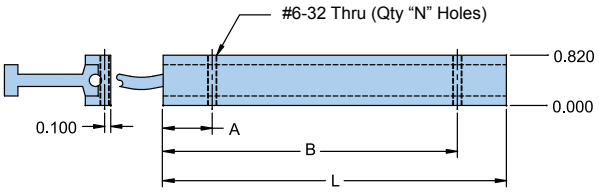
Imperial Mounting Options

Top Mounting (A)



Coil Size/Mounting Code	Dimensions (in)				
	L	N	A	B	C
110-1A	3.20	4	0.50	2.70	-
110-2A	5.60	6	0.50	2.80	5.10

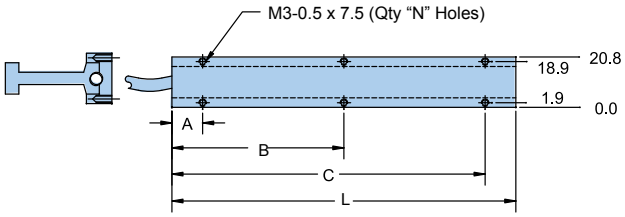
Side Mounting (B)



Coil Size/Mounting Code	Dimensions (in)			
	L	N	A	B
110-1B	3.20	2	0.80	2.40
110-2B	5.60	2	0.80	4.80

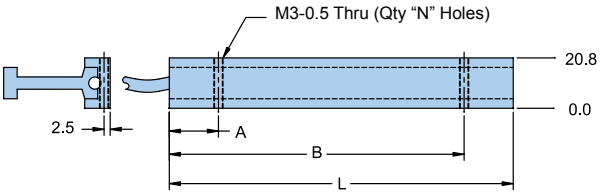
Metric Mounting Options

Top Mounting (M)



Coil Size/Mounting Code	Dimensions (mm)				
	L	N	A	B	C
110-1M	81.3	4	12.7	68.6	-
110-2M	142.2	6	12.7	71.1	129.5

Side Mounting (N)



Coil Size/Mounting Code	Dimensions (mm)			
	L	N	A	B
110-1N	81.3	2	20.3	60.9
110-2N	142.2	2	20.3	121.9

I-Force Ironless 210 Series

Performance

Model	Units	210-1	210-2	210-3	210-4
Peak Force [1]	N (lb)	137.0 (30.8)	255.8 (57.5)	375.0 (84.3)	494.2 (111.1)
Continuous Force [2]	N (lb)	30.7 (6.9)	57.4 (12.9)	84.1 (18.9)	110.3 (24.8)
Peak Power	W	905	1583	2261	2940
Continuous Power	W	45	79	113	147

1) Peak force and current based on 5% duty cycle and one second duration.
2) Continuous force and current based on coil winding temperature maintained at 100 ºC.

Electrical

Model	Units	210-1			210-2			210-3			210-4		
Winding	Series/Parallel/Triple	**S**	**P**	**T**	**S**	**P**	**T**	**S**	**P**	**T**	**S**	**P**	**T**
Peak Current	A pk sine	12.6	25.2	37.8	11.8	23.6	35.4	11.5	23.0	34.5	11.3	22.6	33.9
	RMS	8.9	17.8	26.7	8.3	16.7	25.0	8.1	16.3	24.4	8.0	16.0	23.9
Continuous Current	A pk sine	2.8	5.6	8.4	2.6	5.2	7.8	2.6	5.2	7.8	2.5	5.0	7.5
	RMS	1.9	3.9	5.9	1.8	3.7	5.5	1.8	3.7	5.5	1.8	3.5	5.3
Force Constant [1]	N/A peak	10.9	5.4	3.6	21.8	10.9	7.3	32.7	16.4	10.9	43.6	21.8	14.5
	lb/A peak	2.5	1.2	0.8	4.9	2.5	1.6	7.4	3.7	2.5	9.8	4.9	3.3
Back EMF [2]	V/m/s	12.6	6.3	4.2	25.2	12.6	8.4	37.8	18.9	12.6	50.4	25.2	16.8
	V/in/s	0.32	0.16	0.11	0.64	0.32	0.21	0.96	0.48	0.32	1.28	0.64	0.43
Resistance @ 25°C (phase-to-phase) [3]	ohms	5.9	1.5	0.7	11.8	3.0	1.3	17.7	4.4	2.0	23.6	5.9	2.6
Inductance (phase-to-phase) [4]	mH	2.4	0.6	0.3	4.8	1.2	0.5	7.2	1.8	0.8	9.6	2.4	1.1
Electrical Time Constant [5]	ms	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Motor Constant [6]	N/√W	4.54	4.54	4.54	6.45	6.45	6.45	7.87	7.87	7.87	9.12	9.12	9.12
	lb/√W	1.02	1.02	1.02	1.45	1.45	1.45	1.77	1.77	1.77	2.05	2.05	2.05
Terminal Voltage (max.) [7]	VDC	330	330	330	330	330	330	330	330	330	330	330	330

1) Force constant is peak of resistive force produced by 1.0 amp thru one motor lead and 0.5 amps thru other two leads. Also, Back EMF (V/in/sec) * 7.665 = Force constant (lb/amp).
2) Back EMF measured between any two motor leads while moving at constant velocity. Value is amplitude or 0-Peak of sine wave produced.
3) Resistance measured between any two motor leads with motor connected in Delta winding at 25 ºC. For temperature at 100 ºC, multiply resistance by 1.295 (75 ºC rise * 0.393%/ºC).
4) Inductance measured using 1 Kz with the motor in the magnetic field.
5) Electrical time constant is time it takes for motor value to reach 63% of its final current after a step change in voltage.
6) Motor constant is a measure of efficiency. Calculated by dividing the force constant by the square root of the motor resistance at maximum operating temperature.
7) Consult factory for use with non-Parker amplifiers.

Thermal*

Model	Units	210-1	210-2	210-3	210-4
Thermal Resistance Wind-Amb [1]	°C/W	1.67	0.94	0.66	0.51
Thermal Time Constant (min.) [2]		4.3	4.3	4.3	4.3
Maximum Winding Temperature	°C	100	100	100	100

* Use Parker's MotionSizer software for the most accurate estimate of coil temperature for a particular motion profile.
1) Thermal time constant is time it takes for motor temperature to reach 63% of its final value after a step change in power.
2) Thermal resistance is the number of degrees (Celsius) of temperature rise in the winding per watt of power dissipated determined experimentally.

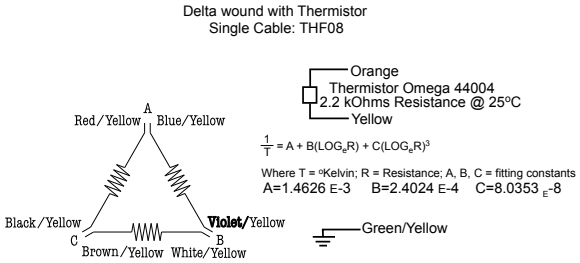
Mechanical

Model	Units	210-1	210-2	210-3	210-4
Coil Weight	kg (lb)	0.16 (0.35)	0.27 (0.60)	0.39 (0.86)	0.51 (1.12)
Coil Length	mm (in)	81.3 (3.20)	142.2 (5.60)	203.2 (8.00)	264.2 (10.4)
Attractive Force	N (lbf)	0	0	0	0
Electrical Pitch Length [1]	mm (in)	60.96 (2.40)	60.96 (2.40)	60.96 (2.40)	60.96 (2.40)

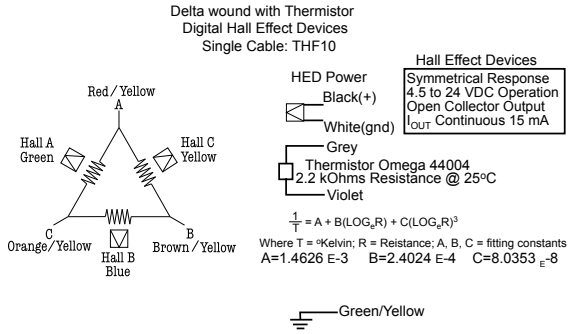
1) Electrical pitch length is distance coil must travel to complete 360° electrical cycle.

Wiring Options

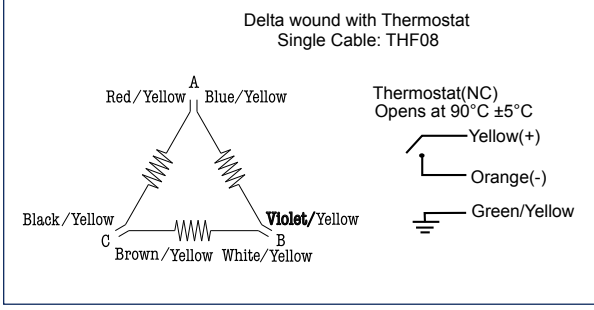
WD1



WD4

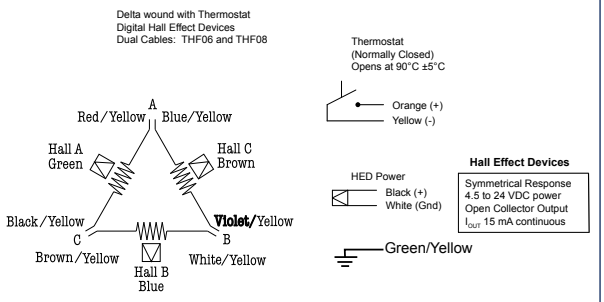


WD2

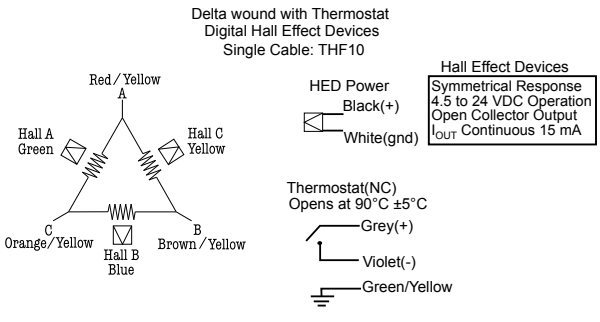


WD7

Preferred configuration with Parker Drives



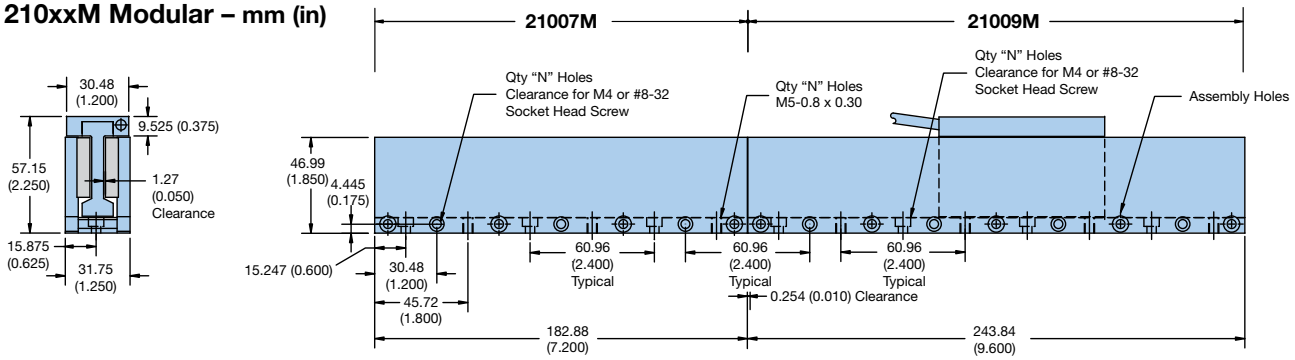
WD3



I-Force Ironless 210 Series

Magnet Track Dimensions

210xxM Modular – mm (in)



	210xxM Modular
Incremental Length – mm (in)	60.96 (2.4)
Minimum Length – mm (in)	121.92 (4.8)
Maximum Length – mm (in) (for single piece)	1219.2 (48)
Weight – kg/m (lbs/ft)	8.22 (5.50)

Modular Track Combinations With 21007M and 21009M Sections

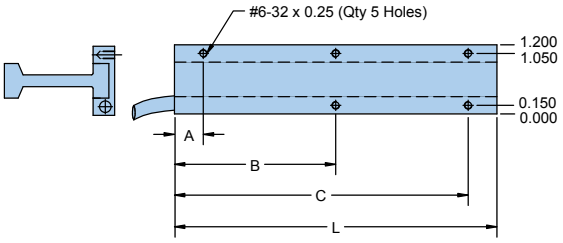
Length (L)*		Quantity	
mm	**in**	**21007M**	**21009M**
182.9	**7.2**	1	0
243.8	**9.6**	0	1
365.8	**14.4**	2	0
426.7	**16.8**	1	1
487.7	**19.2**	0	2
548.6	**21.6**	3	0
609.6	**24.0**	2	1
670.6	**26.4**	1	2
731.5	**28.8**	0	3
792.5	**31.2**	3	1
853.4	**33.6**	2	2
914.4	**36.0**	1	3
975.4	**38.4**	0	4
1036.3	**40.8**	3	2
1097.3	**43.2**	2	3
1158.2	**45.6**	1	4
1219.2	**48.0**	0	5

*Length is unlimited by combining modular track sections.

Motor Coil Dimensions

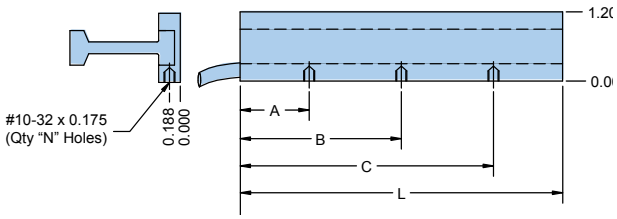
Imperial Mounting Options

Top Mounting (A)



Coil Size/Mounting Code	Dimensions (in)			
	L	A	B	C
210-1A	3.20	0.50	1.60	2.70
210-2A	5.60	0.50	2.80	5.10
210-3A	8.00	0.50	4.00	7.50
210-4A	10.40	0.50	5.20	9.90

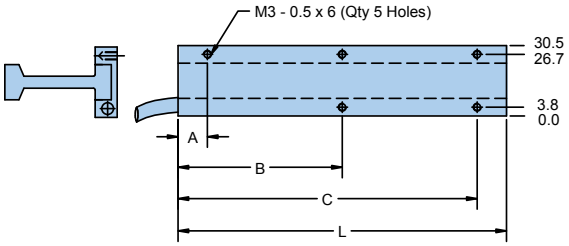
Side Mounting (B)



Coil Size/Mounting Code	Dimensions (in)				
	L	N	A	B	C
210-1B	3.20	2	1.950	2.950	—
210-2B	5.60	2	1.625	3.975	—
210-3B	8.00	3	2.438	4.000	5.562
210-4B	10.40	3	2.600	5.200	7.800

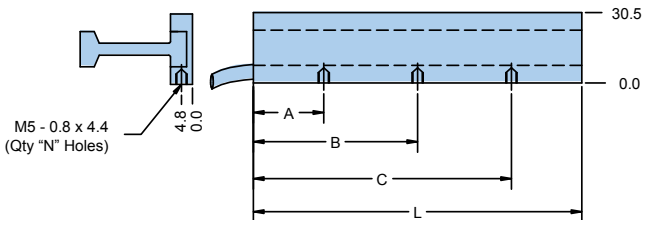
Metric Mounting Options

Top Mounting (M)



Coil Size/Mounting Code	Dimensions (mm)			
	L	A	B	C
210-1M	81.3	12.7	40.6	68.6
210-2M	142.2	12.7	71.1	129.5
210-3M	203.2	12.7	101.6	190.5
210-4M	264.2	12.7	132.1	251.5

Side Mounting (N)



Coil Size/Mounting Code	Dimensions (mm)				
	L	N	A	B	C
210-1N	81.3	2	49.5	74.9	—
210-2N	142.2	2	41.3	101.0	—
210-3N	203.2	3	61.9	101.6	141.3
210-4N	264.2	3	66.0	132.1	198.1

I-Force Ironless 310 Series

Performance

Model	Units	310-1	310-2	310-3	310-4	310-5	310-6
Peak Force [1]	N (lb)	218.9 (49.2)	409.3 (92.0)	600.0 (135.1)	790.0 (177.2)	980.0 (220.3)	1170.0 (263.2)
Continuous Force [2]	N (lb)	49.0 (11.0)	91.6 (20.6)	133.9 (30.1)	176.2 (39.6)	219.3 (49.3)	262.0 (58.9)
Peak Power	W	1077	1885	2693	3500	4308	5116
Continuous Power	W	54	94	135	179	215	256

1) Peak force and current based on 5% duty cycle and one second duration.
2) Continuous force and current based on coil winding temperature maintained at 100 ºC.

Electrical

Model	Units	310-1		310-2			310-3			310-4			310-5			310-6		
Winding	Series/Parallel/Triple	**S**	**P**	**S**	**P**	**T**	**S**	**P**	**T**	**S**	**P**	**T**	**S**	**P**	**T**	**S**	**P**	**T**
Peak Current	A pk sine	16.1	32.2	15.0	30.0	45.0	14.7	29.4	44.1	14.5	29.0	43.5	14.4	28.8	43.2	14.3	28.6	42.9
	RMS	11.4	22.8	10.6	21.2	31.8	10.4	20.8	31.2	10.3	20.5	30.8	10.2	20.4	30.5	10.1	20.2	30.3
Continuous Current	A pk sine	3.6	7.2	3.4	6.8	10.2	3.3	6.6	9.9	3.2	6.4	9.6	3.2	6.4	9.6	3.2	6.4	9.6
	RMS	2.5	5.1	2.4	4.8	7.2	2.5	4.7	7.0	2.3	4.5	6.8	2.3	4.5	6.8	2.3	4.5	6.8
Force Constant [1]	N/A peak	13.7	6.8	27.3	13.6	9.1	40.9	20.5	13.6	54.7	27.4	18.2	68.1	34.0	22.7	81.8	40.9	27.3
	lb/A peak	3.1	1.5	6.1	3.1	2.0	9.2	4.6	3.1	12.3	6.2	4.1	15.3	7.7	5.1	18.4	9.2	6.1
Back EMF [2]	V/m/s	15.7	7.8	31.5	15.7	10.5	47.2	23.6	15.7	63.0	31.5	21.0	78.7	39.4	26.2	94.5	47.2	31.5
	V/in/s	0.40	0.20	0.80	0.40	0.27	1.20	0.60	0.40	1.60	0.80	0.53	2.00	1.00	0.67	2.40	1.20	0.80
Resistance @ 25°C (phase-to-phase) [3]	ohms	4.0	1.0	8.1	2	0.87	12.1	3	1.3	16.1	3.87	1.74	20.2	4.84	2.17	24.2	5.8	2.6
Inductance (phase-to-phase) [4]	mH	3.0	0.8	6.0	1.5	0.7	9.0	2.3	1.0	12.0	3.0	1.3	15.0	3.8	1.7	18.0	4.5	2.0
Electrical Time Constant [5]	ms	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Motor Constant [6]	N/√W	6.67	6.67	9.43	9.43	9.43	11.57	11.57	11.57	13.34	13.34	13.34	14.95	14.95	14.95	16.37	16.37	16.37
	lb/√W	1.50	1.50	2.12	2.12	2.12	2.60	2.60	2.60	3.00	3.00	3.00	3.36	3.36	3.36	3.68	3.68	3.68
Terminal Voltage (max.) [7]	VDC	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330

1) Force constant is peak of resistive force produced by 1.0 amp thru one motor lead and 0.5 amps thru other two leads. Also, Back EMF (V/in/sec) * 7.665 = Force constant (lb/amp).
2) Back EMF measured between any two motor leads while moving at constant velocity. Value is amplitude or 0-Peak of sine wave produced.
3) Resistance measured between any two motor leads with motor connected in Delta winding at 25 ºC. For temperature at 100 ºC, multiply resistance by 1.295 (75 ºC rise * 0.393%/ºC).
4) Inductance measured using 1 Kz with the motor in the magnetic field.
5) Electrical time constant is time it takes for motor value to reach 63% of its final current after a step change in voltage.
6) Motor constant is a measure of efficiency. Calculated by dividing the force constant by the square root of the motor resistance at maximum operating temperature.
7) Consult factory for use with non-Parker amplifiers.

Thermal*

Model	Units	310-1	310-2	310-3	310-4	310-5	310-6
Thermal Resistance Wind-Amb [1]	°C/W	1.39	0.79	0.56	0.43	0.35	0.29
Thermal Time Constant (min.) [2]		7.5	7.5	7.5	7.5	7.5	7.5
Maximum Winding Temperature	°C	100	100	100	100	100	100

* Use Parker's MotionSizer software for the most accurate estimate of coil temperature for a particular motion profile.
1) Thermal time constant is time it takes for motor temperature to reach 63% of its final value after a step change in power.
2) Thermal resistance is the number of degrees (Celsius) of temperature rise in the winding per watt of power dissipated determined experimentally.

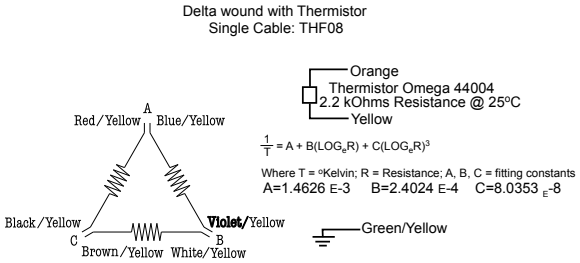
Mechanical

Model	Units	310-1	310-2	310-3	310-4	310-5	310-6
Coil Weight	kg (lb)	0.31 (0.69)	0.55 (1.22)	0.80 (1.75)	1.03 (2.27)	1.27 (2.80)	1.53 (3.36)
Coil Length	mm (in)	81.3 (3.20)	142.2 (5.60)	203.2 (8.00)	264.2 (10.4)	325.1 (12.8)	386.1 (15.2)
Attractive Force	N (lbf)	0	0	0	0	0	0
Electrical Pitch Length [1]	mm (in)	60.96 (2.40)	60.96 (2.40)	60.96 (2.40)	60.96 (2.40)	60.96 (2.40)	60.96 (2.40)

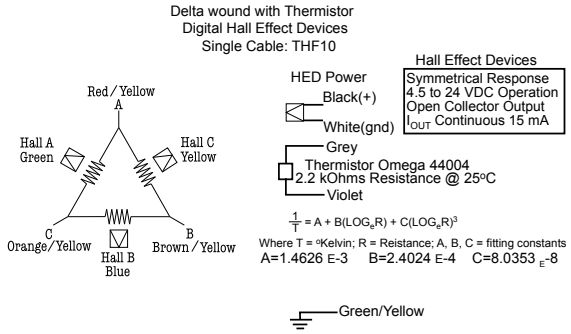
1) Electrical pitch length is distance coil must travel to complete 360° electrical cycle.

Wiring Options

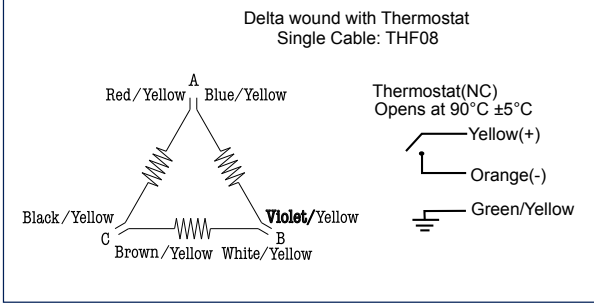
WD1



WD4

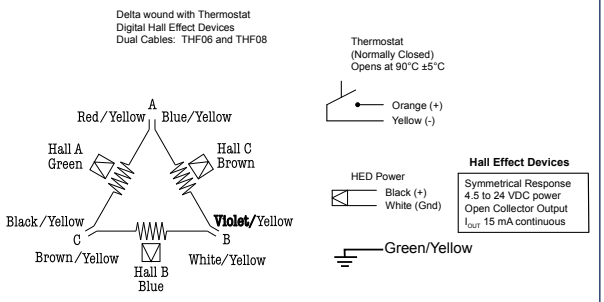


WD2

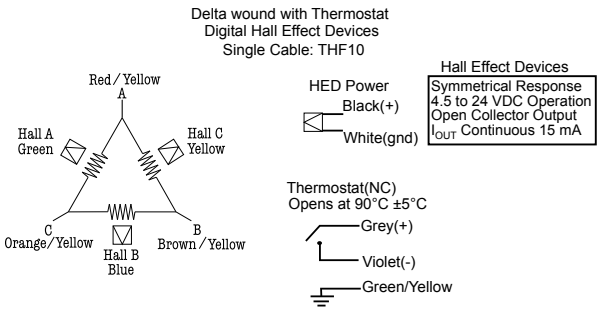


WD7

Preferred configuration with Parker Drives



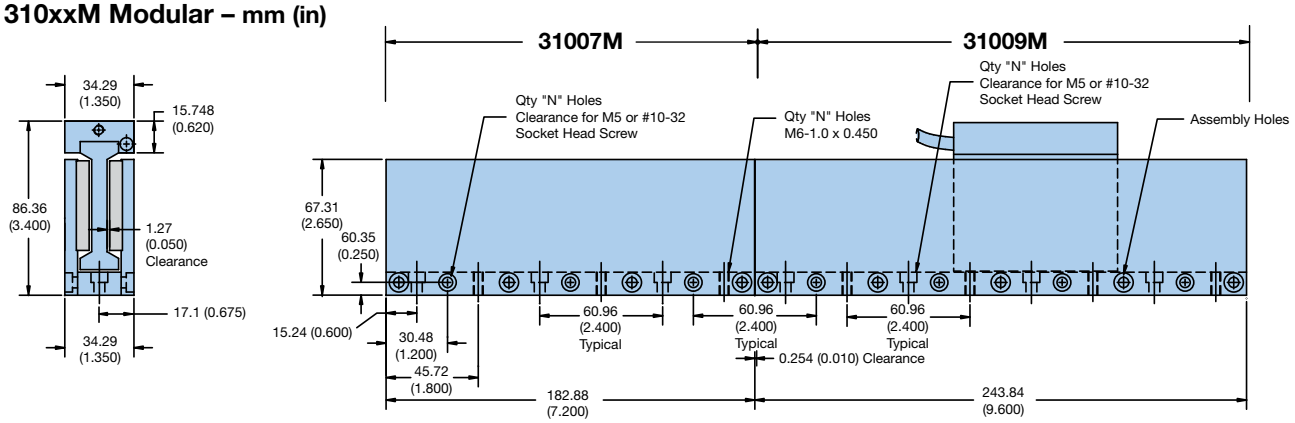
WD3



I-Force Ironless 310 Series

Magnet Track Dimensions

310xxM Modular – mm (in)



	310xxM Modular
Incremental Length – mm (in)	60.96 (2.4)
Minimum Length – mm (in)	121.92 (4.8)
Maximum Length – mm (in) (for single piece)	1584.96 (62.4)
Weight – kg/m (lbs/ft)	12.7 (8.50)

Modular Track Combinations With 31007M and 31009M Sections

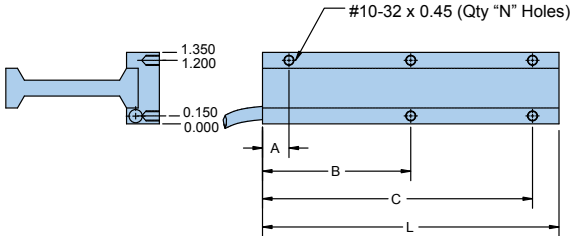
Length (L)*		Quantity	
mm	in	31007M	31009M
182.9	7.2	1	0
243.8	9.6	0	1
365.8	14.4	2	0
426.7	16.8	1	1
487.7	19.2	0	2
548.6	21.6	3	0
609.6	24.0	2	1
670.6	26.4	1	2
731.5	28.8	0	3
792.5	31.2	3	1
853.4	33.6	2	2
914.4	36.0	1	3
975.4	38.4	0	4
1036.3	40.8	3	2
1097.3	43.2	2	3
1158.2	45.6	1	4
1219.2	48.0	0	5

*Length is unlimited by combining modular track sections.

Motor Coil Dimensions

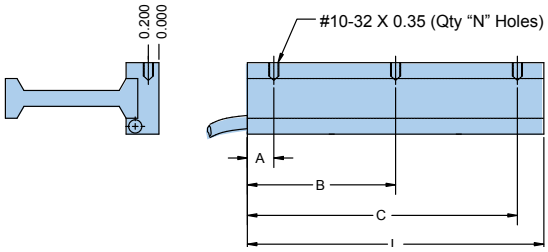
Imperial Mounting Options

Top Mounting (A)



Coil Size/Mounting Code	Dimensions (in)				
	L	N	A	B	C
310-1A	3.20	5	0.50	1.60	2.70
310-2A	5.60	5	0.50	2.80	5.10
310-3A	8.00	5	0.50	4.00	7.50
310-4A	10.40	5	0.50	5.20	9.90
310-5A	12.80	5	0.50	6.40	12.30
310-6A	15.20	5	1.70	7.60	13.50

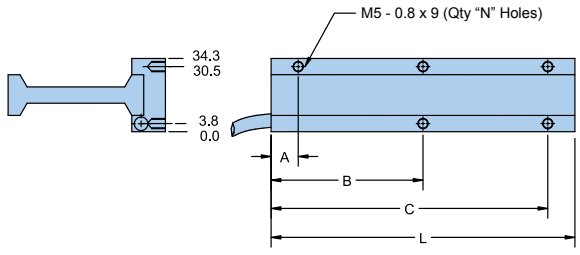
Side Mounting (B)



Coil Size/Mounting Code	Dimensions (in)				
	L	N	A	B	C
310-1B	3.20	3	0.5	1.6	2.7
310-2B	5.60	3	0.5	2.8	5.1
310-3B	8.00	3	0.5	4.0	7.5
310-4B	10.40	3	0.5	5.2	9.9
310-5B	12.80	3	0.5	6.40	12.30
310-6B	15.20	3	1.70	7.60	13.50

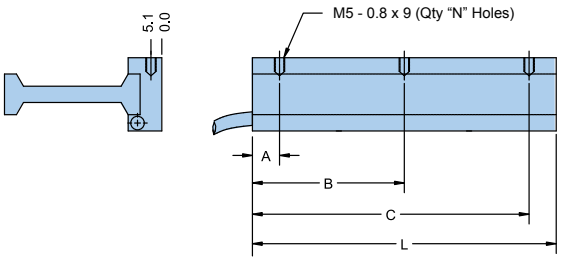
Metric Mounting Options

Top Mounting (M)



Coil Size/Mounting Code	Dimensions (mm)				
	L	N	A	B	C
310-1M	81.3	5	12.7	40.6	68.6
310-2M	142.2	5	12.7	71.1	129.5
310-3M	203.2	5	12.7	101.6	190.5
310-4M	264.2	5	12.7	132.1	251.5
310-5M	325.1	5	12.7	162.6	312.4
310-6M	386.1	5	43.2	193.0	342.9

Side Mounting (N)



Coil Size/Mounting Code	Dimensions (mm)				
	L	N	A	B	C
310-1N	81.3	3	12.7	40.6	68.6
310-2N	142.2	3	12.7	71.12	129.5
310-3N	203.2	3	12.7	101.6	190.5
310-4N	264.2	3	12.7	132.1	251.5
310-5N	325.1	3	12.7	162.6	312.4
310-6N	386.1	3	43.2	193.0	342.9

I-Force Ironless 410 Series

Performance

Model	Units	410-2	410-3	410-4	410-6	410-8
Peak Force [1]	N (lb)	1041.4 (234.1)	1523.6 (342.5)	2006.3 (451.0)	2967.2 (667.0)	3928.1 (883.0)
Continuous Force [2]	N (lb)	233.1 (52.4)	340.8 (76.6)	448.9 (100.9)	663.7 (149.2)	878.6 (197.5)
Peak Power	W	2835	4050	5265	7695	10125
Continuous Power	W	142	203	263	385	506

1) Peak force and current based on 5% duty cycle and one second duration.
2) Continuous force and current based on coil winding temperature maintained at 100 ºC.

Electrical

Model	Units	410-2			410-3			410-4			410-6			410-8		
Winding	Series/Parallel/Triple	**S**	**P**	**T**	**S**	**P**	**T**	**S**	**P**	**T**	**S**	**P**	**T**	**S**	**P**	**T**
Peak Current	A pk sine	19.1	38.2	57.3	18.6	37.2	55.8	18.4	36.8	55.2	18.1	36.2	54.3	18.0	36.0	54.0
	RMS	13.5	27.0	40.5	13.2	23.6	39.5	13.0	26.0	39.0	12.8	25.6	38.4	12.7	25.5	38.2
Continuous Current	A pk sine	4.3	8.6	12.9	4.2	8.4	12.6	4.1	8.2	12.3	4.1	8.2	12.3	4.0	8.0	12.0
	RMS	3.0	6.1	9.1	3.0	5.9	8.9	2.9	5.8	8.7	2.9	5.8	8.7	2.8	5.7	8.5
Force Constant [1]	N/A peak	54.5	27.3	18.2	81.8	40.9	27.3	109.0	54.5	36.3	163.7	81.8	54.6	218.4	109.2	72.8
	lb/A peak	12.3	6.1	4.1	18.4	9.2	6.1	24.5	12.3	8.2	36.8	18.4	12.3	49.1	24.6	16.4
Back EMF [2]	V/m/s	63.0	31.5	21.0	94.5	47.2	31.5	126.0	63.0	42.0	189.0	94.5	63.0	252.0	126.0	84.0
	V/in/s	1.60	0.80	0.53	2.40	1.20	0.80	3.20	1.60	1.07	4.80	2.40	1.60	6.40	3.20	2.13
Resistance @ 25°C (phase-to-phase) [3]	ohms	8.0	2.0	0.9	12.0	3.0	1.3	16.0	4.0	1.8	24.0	6.0	2.7	32.0	8.0	3.6
Inductance (phase-to-phase) [4]	mH	10.0	2.5	1.1	15.0	3.8	1.7	20.0	5.0	2.2	30.0	7.5	3.3	40.0	10.0	4.4
Electrical Time Constant [5]	ms	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Motor Constant [6]	N/√W	19.57	19.57	19.57	23.98	23.98	23.98	27.67	27.67	27.67	33.90	33.90	33.90	39.14	39.14	39.14
	lb/√W	4.40	4.40	4.40	5.39	5.39	5.39	6.22	6.22	6.22	7.62	7.62	7.62	8.80	8.80	8.80
Terminal Voltage (max.) [7]	VDC	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330

1) Force constant is peak of resistive force produced by 1.0 amp thru one motor lead and 0.5 amps thru other two leads. Also, Back EMF (V/in/sec) * 7.665 = Force constant (lb/amp).
2) Back EMF measured between any two motor leads while moving at constant velocity. Value is amplitude or 0-Peak of sine wave produced.
3) Resistance measured between any two motor leads with motor connected in Delta winding at 25 ºC. For temperature at 100 ºC, multiply resistance by 1.295 (75 ºC rise * 0.393%/ºC).
4) Inductance measured using 1 Kz with the motor in the magnetic field.
5) Electrical time constant is time it takes for motor value to reach 63% of its final current after a step change in voltage.
6) Motor constant is a measure of efficiency. Calculated by dividing the force constant by the square root of the motor resistance at maximum operating temperature.
7) Consult factory for use with non-Parker amplifiers.

Thermal*

Model	Units	410-2	410-3	410-4	410-6	410-8
Thermal Resistance Wind-Amb [1]	°C/W	0.53	0.37	0.26	0.19	0.15
Thermal Time Constant (min.) [2]		15.1	15.1	15.1	15.1	15.1
Maximum Winding Temperature	°C	100	100	100	100	100

* Use Parker's MotionSizer software for the most accurate estimate of coil temperature for a particular motion profile.
1) Thermal time constant is time it takes for motor temperature to reach 63% of its final value after a step change in power.
2) Thermal resistance is the number of degrees (Celsius) of temperature rise in the winding per watt of power dissipated determined experimentally.

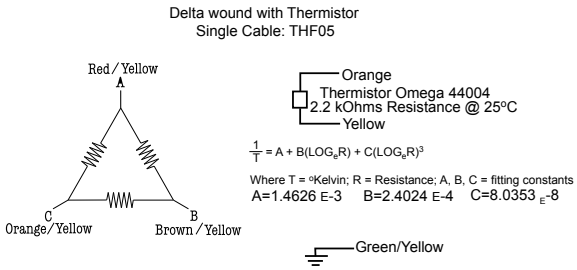
Mechanical

Model	Units	410-2	410-3	410-4	410-6	410-8
Coil Weight	kg (lb)	1.59 (3.5)	2.27 (5.0)	2.95 (6.5)	4.32 (9.5)	5.68 (12.5)
Coil Length	mm (in)	199.1 (7.84)	284.5 (11.20)	369.8 (14.56)	540.5 (21.28)	711.2 (28.00)
Attractive Force	N (lbf)	0	0	0	0	0
Electrical Pitch Length [1]	mm (in)	85.34 (3.36)	85.34 (3.36)	85.34 (3.36)	85.34 (3.36)	85.34 (3.36)

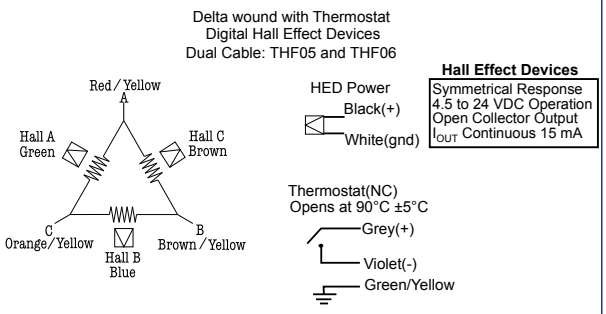
1) Electrical pitch length is distance coil must travel to complete 360° electrical cycle.

Wiring Options

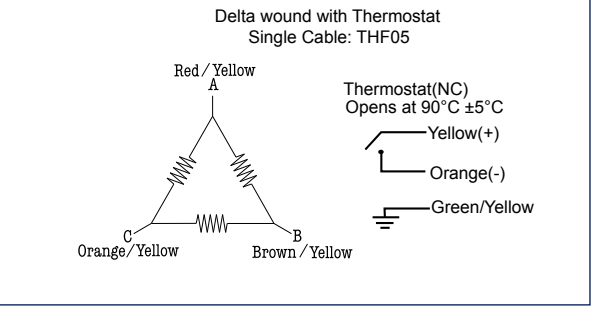
WD1



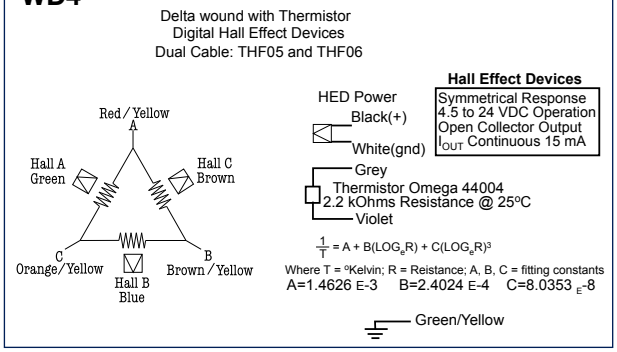
WD3 Preferred configuration with Parker Drives



WD2



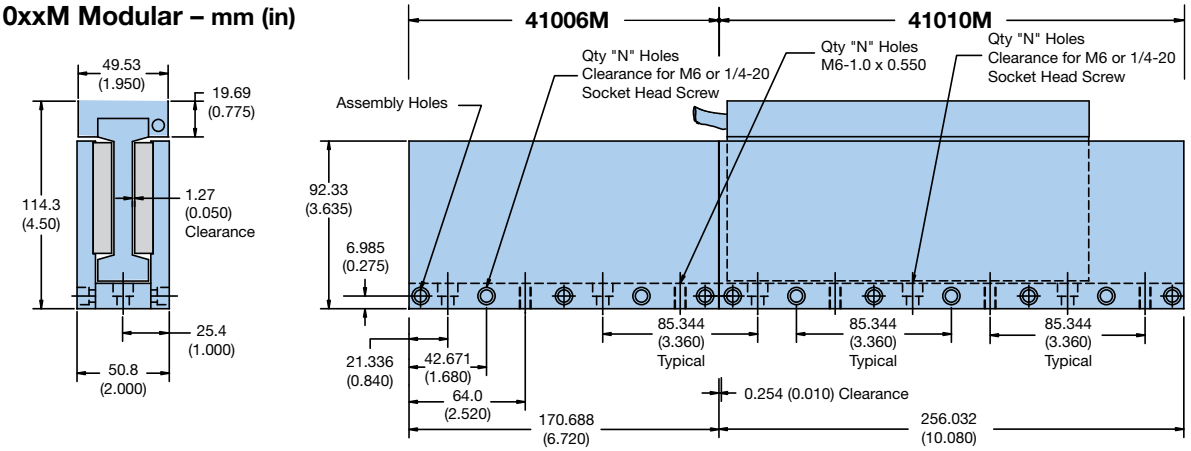
WD4



I-Force Ironless 410 Series

Magnet Track Dimensions

410xxM Modular – mm (in)



	410xxM Modular
Incremental Length – mm (in)	85.3 (3.36)
Minimum Length – mm (in)	170.7 (6.72)
Maximum Length – mm (in) (for single piece)	1622.8 (63.89)
Weight – kg/m (lbs/ft)	29.9 (20.0)

Modular Track Combinations With 41006M and 41010M

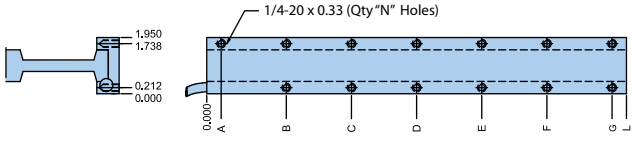
Length (L)*		Quantity	
mm	in	41006M	41010M
170.69	6.72	1	0
256.03	10.08	0	1
341.38	13.44	2	0
426.72	16.80	1	1
512.06	20.16	0	2
597.41	23.52	2	1
682.75	26.88	1	2
768.10	30.24	0	3
853.44	33.60	2	2
938.78	36.96	1	3
1024.13	40.32	0	4
1109.47	43.68	2	3
1194.82	47.04	1	4
1280.16	50.40	0	5
1365.50	53.76	2	4
1450.85	57.12	1	5
1536.19	60.48	0	6
1621.54	63.84	2	5
1706.88	67.20	1	6
1792.22	70.56	0	7
1877.57	73.92	2	6
1962.91	77.28	1	7
2048.26	80.64	0	8
2133.60	84.00	2	7
2218.94	87.36	1	8
2304.29	90.72	0	9
2389.63	94.08	2	8

*Length is unlimited by combining modular track sections.

Motor Coil Dimensions

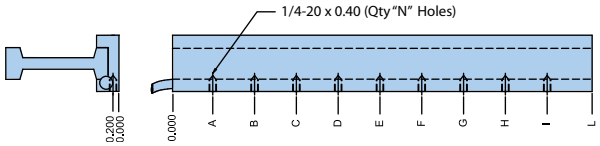
Imperial Mounting Options

Top Mounting (A)



Coil Size/ Mounting Code	Dimensions (in)								
	L	N	A	B	C	D	E	F	G
410-2A	7.84	5	0.50	3.92	7.34	-	-	-	-
410-3A	11.20	9	0.50	1.60	5.60	9.60	10.70	-	-
410-4A	14.56	9	0.50	3.28	7.28	11.28	14.06	-	-
410-6A	21.28	13	0.50	2.64	6.64	10.64	14.64	18.64	20.78
410-8A	28.00	13	2.00	6.00	10.00	14.00	18.00	22.00	26.00

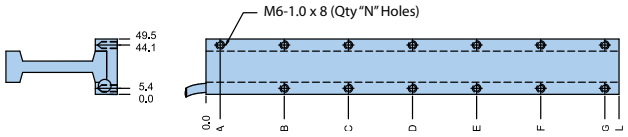
Side Mounting (B)



Coil Size/ Mounting Code	Dimensions (in)										
	L	N	A	B	C	D	E	F	G	H	I
410-2B	7.84	3	2.90	4.90	6.90	-	-	-	-	-	-
410-3B	11.20	3	4.10	7.10	10.10	-	-	-	-	-	-
410-4B	14.56	4	2.78	5.78	8.78	11.78	-	-	-	-	-
410-6B	21.28	6	3.14	6.14	9.14	12.14	15.14	18.14	-	-	-
410-8B	28.00	9	3.50	6.50	9.50	12.50	15.50	18.50	21.50	24.50	27.50

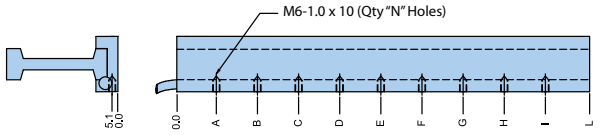
Metric Mounting Options

Top Mounting (M)



Coil Size/ Mounting Code	Dimensions (in)								
	L	N	A	B	C	D	E	F	G
410-2M	199.1	5	12.7	99.6	186.4	-	-	-	-
410-3M	284.5	9	12.7	40.6	142.2	243.8	271.8	-	-
410-4M	369.8	9	12.7	83.3	184.9	286.5	357.1	-	-
410-6M	540.5	13	12.7	67.1	168.7	270.3	371.9	473.4	527.8
410-8M	711.2	13	50.8	152.4	254.0	355.6	457.2	558.8	660.4

Side Mounting (N)



Coil Size/ Mounting Code	Dimensions (in)										
	L	N	A	B	C	D	E	F	G	H	I
410-2N	199.1	3	73.7	124.5	175.3	-	-	-	-	-	-
410-3N	284.5	3	104.1	180.3	256.5	-	-	-	-	-	-
410-4N	369.8	4	70.6	146.8	223.0	299.2	-	-	-	-	-
410-6N	540.5	7	79.7	156.0	232.2	308.4	384.6	460.8	536.9	-	-
410-8N	711.2	9	88.9	165.1	241.3	317.5	393.7	469.9	546.1	622.3	698.5

How to order

Fill in an order code from each of the numbered fields to create a complete Motor Coil and Magnet Track order number.

Motor Coil

Order Example:

①	②	③	④	⑤	⑥	⑦
410	- 2	M	- NC	- WD3	S - 8	- K

① **Series**
110
210
310
410

② **Coil Size**

1	One pole
2	Two poles
3	Three poles
4	Four poles
5	Five poles
6	Six poles
8	Eight poles

③ **Mounting**

A	Imperial top mount
B	Imperial side mount
M	Metric top mount
N	Metric side mount

④ **Cooling**

NC	No cooling
AC	Air cooling (210&310&410 Only)
LC	Liquid cooling (310&410 Only)

⑤ **Wiring Options**
(Refer to the Wiring Options for each series Page.)
WD0
WD1
WD2
WD3
WD4
WD7

⑥ **Winding** (Refer to the Electrical table for each series Winding.)

S	Series
P	Parallel
T	Triple

⑦ **Cable Length**

xx	Specify in feet (8 ft standard)

Magnet Track

Order Example:

①	②
41010M	N

① **Series**

11007M	7.20” modular sections
11009M	9.60” modular sections
21007M	7.20” modular sections
21009M	9.60” modular sections
31007M	7.20” modular sections
31009M	9.60” modular sections
41006M	6.72” modular sections
41010M	10.08” modular sections

* Refer to the Modular table for each series Magnet track Dimensions.

② **Magnet Coating**

N	Nickel coating (standard)

I-Force Ironless ML50 Series

Performance

Model	Units	ML50-2	ML50-3	ML50-4	ML50-6	ML50-8	ML50-9
Peak Force [1]	N (lb)	847 (190.4)	1270 (285.6)	1694 (380.8)	2541 (571.1)	3387 (761.5)	3811 (856.7)
Continuous Force [2]	N (lb)	189 (42.6)	284 (63.9)	379 (85.1)	568 (127.7)	757 (170.3)	852 (191.6)
Peak Power	W	1560	2340	3120	4680	6240	7020
Continuous Power	W	78	117	156	234	312	351

1) Peak force and current based on 5% duty cycle and one second duration.
2) Continuous force and current based on coil winding temperature maintained at 100 ºC.

Electrical

Model	Units	ML50-2		ML50-3		ML50-4			ML50-6			ML50-8		ML50-9
Winding	Series/Parallel/Triple/ Double Triple	**S**	**P**	**S**	**T**	**S**	**P**	**D**	**S**	**P**	**T**	**P**	**D**	**T**
Peak Current	A pk sine	19.9	39.8	19.9	59.7	19.9	39.8	79.7	19.9	39.8	59.7	39.8	79.7	59.7
	RMS	14.1	28.1	14.1	42.2	14.1	28.1	53.4	14.1	28.1	42.2	28.1	53.4	42.2
Continuous Current	A pk sine	4.5	8.9	4.5	13.4	4.5	8.9	17.8	4.5	8.9	13.4	8.9	17.8	13.4
	RMS	3.2	6.3	3.2	9.5	3.2	6.3	12.6	3.2	6.3	9.5	6.3	12.6	9.5
Force Constant [1]	N/A peak	42.5	21.3	63.8	21.3	85.0	42.5	21.3	127.6	63.8	42.5	85.0	42.5	63.8
	lb/A peak	9.6	4.8	14.3	4.8	19.1	9.6	4.8	28.7	14.3	9.6	19.1	9.6	14.3
Back EMF [2]	V/m/s	49.1	24.5	73.6	24.5	98.2	49.1	24.5	147.3	73.6	49.1	98.2	49.1	73.6
	V/in/s	1.2	0.6	1.9	0.6	2.5	1.2	0.6	3.7	1.9	1.2	2.5	1.2	1.9
Resistance @ 25°C (phase-to-phase) [3]	ohms	4.1	1.0	6.1	0.7	8.1	2.0	0.5	12.2	3.0	1.4	4.1	1.0	2.0
Inductance (phase-to-phase) [4]	mH	3.3	0.8	5.0	0.6	6.6	1.7	0.4	9.9	2.5	1.1	3.3	0.8	1.7
Electrical Time Constant [5]	ms	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Motor Constant [6]	N/√W	21.4	21.4	26.3	26.3	30.3	30.3	30.3	37.1	37.1	37.1	42.9	42.9	45.5
	lb/√W	4.82	4.8	5.90	5.9	6.82	6.8	6.8	8.35	8.3	8.3	9.6	9.6	10.2
Terminal Voltage (max.) [7]	VDC	330	330	330	330	330	330	330	330	330	330	330	330	330

1) Force constant is peak of resistive force produced by 1.0 amp thru one motor lead and 0.5 amps thru other two leads. Also, Back EMF (V/in/sec) * 7.665 = Force constant (lb/amp).
2) Back EMF measured between any two motor leads while moving at constant velocity. Value is amplitude or 0-Peak of sine wave produced.
3) Resistance measured between any two motor leads with motor connected in Delta winding at 25 ºC. For temperature at 100 ºC, multiply resistance by 1.295 (75 ºC rise * 0.393%/ºC).
4) Inductance measured using 1 Kz with the motor in the magnetic field.
5) Electrical time constant is time it takes for motor value to reach 63% of its final current after a step change in voltage.
6) Motor constant is a measure of efficiency. Calculated by dividing the force constant by the square root of the motor resistance at maximum operating temperature.
7) Consult factory for use with non-Parker amplifiers.

Thermal*

Model	Units	ML50-2	ML50-3	ML50-4	ML50-6	ML50-8	ML50-9
Thermal Resistance Wind-Amb [1]	°C/W	0.96	0.64	0.48	0.32	0.24	0.21
Thermal Time Constant (min.) [2]		9.2	9.2	9.2	9.2	9.2	9.2
Maximum Winding Temperature	°C	100	100	100	100	100	100

* Use Parker's MotionSizer software for the most accurate estimate of coil temperature for a particular motion profile.
1) Thermal time constant is time it takes for motor temperature to reach 63% of its final value after a step change in power.
2) Thermal resistance is the number of degrees (Celsius) of temperature rise in the winding per watt of power dissipated determined experimentally.

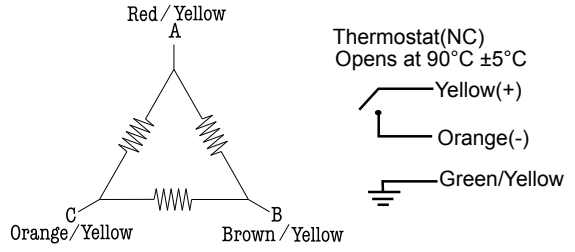
Mechanical

Model	Units	ML50-2	ML50-3	ML50-4	ML50-6	ML50-8	ML50-9
Coil Weight	kg (lb)	0.7 (1.6)	1.1 (2.4)	1.5 (3.2)	2.2 (4.8)	2.9 (6.4)	3.3 (7.2)
Coil Length (excluding connector module)	mm (in)	120 (4.724)	180 (7.087)	240 (9.449)	360 (14.173)	480 (18.898)	540 (21.600)
Attractive Force	N (lbf)	0	0	0	0	0	0
Electrical Pitch Length [1]	mm (in)	60.0 (2.36)	60.0 (2.36)	60.0 (2.36)	60.0 (2.36)	60.0 (2.36)	60.0 (2.36)

1) Electrical pitch length is distance coil must travel to complete 360° electrical cycle.

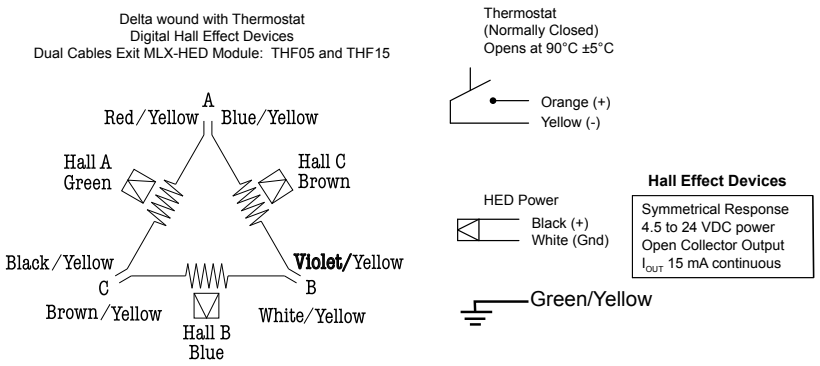
ML50 Wiring with MLX-CM Module

Delta wound with Thermostat
Single Cable Exits MLX-CM Module: THF05



ML50 Wiring with MLX-HED Module

Delta wound with Thermostat
Digital Hall Effect Devices
Dual Cables Exit MLX-HED Module: THF05 and THF15

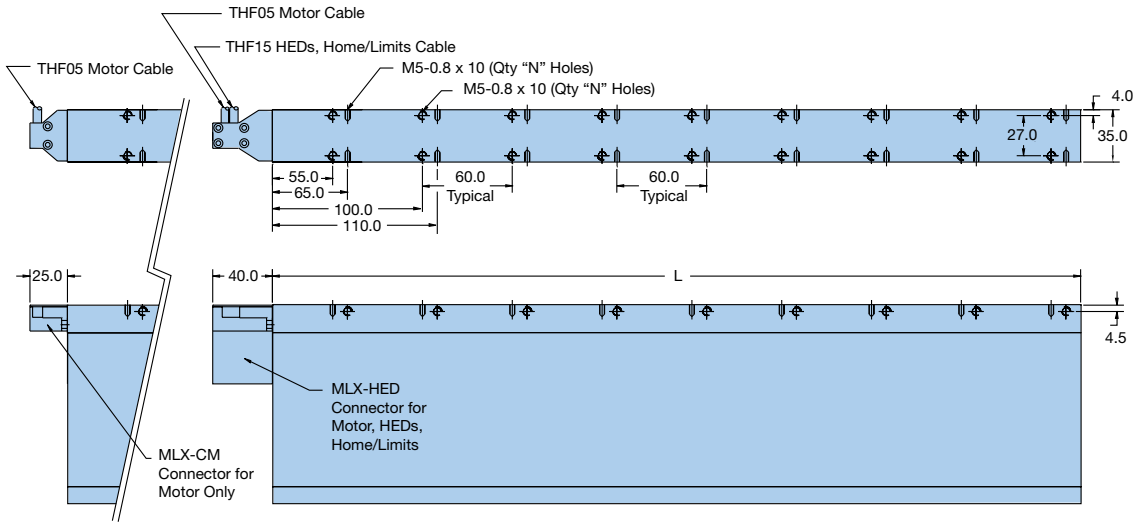


Module Funtion	THF15 Color Code
LIMIT_PWR	ORG
LIMIT_GND	VIO
HOME	BRN
+LIMIT	LGR/WHT
-LIMIT	LBL
HOME_SRC_PWR	RED
+LIMIT_SRC_PWR	GRY
-LIMIT_SRC_PWR	PNK
POLARITY_SELECT	TAN
HALL_PWR	BLK
HALL_GND	WHT
HALL_A	GRN
HALL_B	BLU
HALL_C	YEL

I-Force Ironless ML50 Series

Motor Coil Dimensions

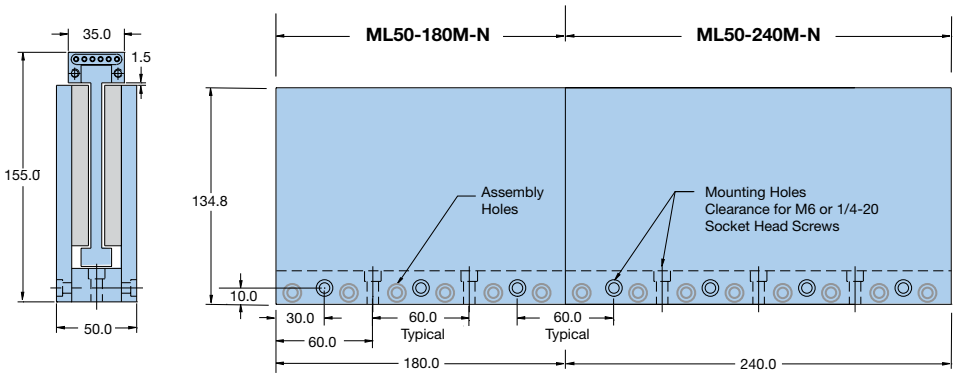
ML50-xE-NC-Mx Coil Assembly – mm



	L	N
ML50-2E	120	4
ML50-3E	180	6
ML50-4E	240	8
ML50-6E	360	12
ML50-8E	480	16
ML50-9E	540	18

Magnet Track Dimensions

ML50 Modular Tracks – mm



Incremental Length – mm	60
Minimum Length – mm	180
Maximum Length – mm (for single piece)	240
Weight – kg/m (lbs/ft)	37.9 (25.4)

How to order

Fill in an order code from each of the numbered fields to create a complete Motor Coil, Magnet Track and Connector Module order number.

Motor Coil

Order Example:

①	②	③	④	⑤	⑥
ML50	- 2	E	- NC	- M	S

① **Series**
ML50

② **Coil Size**

2	Two poles
3	Three poles
4	Four poles
6	Six poles
8	Eight poles
9	Nine poles

③ **Mounting**

E	Standard

④ **Cooling**

NC	No cooling

⑤ **Module Ready**

M	Receives connector module

⑥ **Winding**

S	Series
P	Parallel
T	Triple
D	Double Parallel

Magnet Track

Order Example:

①	②	③	④
ML50	- 240	M	- N

① **Series**
ML50

② **Track Length**

180	180 mm
240	240 mm

③ **Modular**

M	Standard

④ **Magnet Coating**

N	Nickel coating (standard)

Connector Module

Order Example:

①	②	③	④
MLX	- CM	- R	- 1

① **Series**
MLX

② **Device Description**

CM	Motor connector
HED	Motor connector, Digital HEDs, limit sensor

③ **Module Type**

R	Standard

④ **Cable Length**

1	1 meter (standard)
x	specify length (in meters)

RIPPED Ironcore Linear Motors

Parker RIPPED ironcore linear motors, with their patented anti-cog technology, produce the large forces needed for many industrial applications – without the roughness associated with traditional ironcore linear motors. With forces ranging from 90 N continuous up to 7,435 N peak, the RIPPED family is well suited for a broad range of extremely demanding applications.

Parker offers modular magnet tracks for unrestricted travel length. The RIPPED motor connector modules allow quick and easy installation while reducing overall maintenance costs. Ultra-high-flex cables come standard.

Virtually cog-free operation combined with powerful ironcore technology make the RIPPED family of motors a superior choice for affordable high-force, ultra-smooth motion.

Features and Benefits

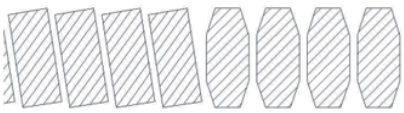
- **Ideal for high force applications**
- **Patented ultra-smooth anti-cog technology**
- **Internal thermal cutout switch protects coil**
- **Built-in cable strain relief**
- **Two lengths of modular magnet tracks allow unlimited length of travel**
- **Please contact Parker application engineer for IP65**

Ironcore advantages

- **High force per size — uses laminations to concentrate the flux field**
- **Lower cost — open face design only uses one row of magnets**
- **Laminations and large surface area allows good heat dissipation**

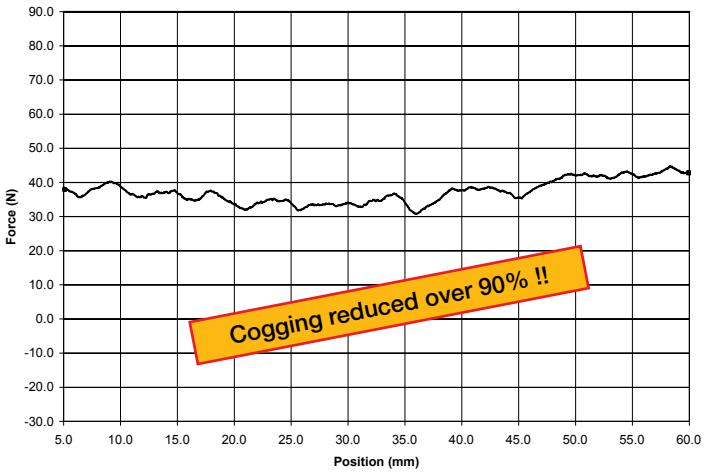
Ironcore Disadvantages Compared to I-Force Ironless Linear Motors

- **Normal attractive force — 5 to 13 times greater than force generated**
- **Cogging — limits the smoothness of motion and creates velocity ripple. This is counteracted by Parker's patented anti-cog technology**

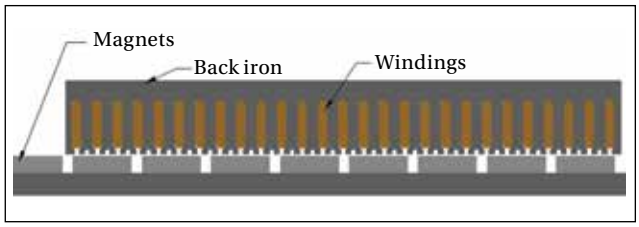


Skewed & Shaped Magnets

Patent Anti-Cog Design



Ironcore Design Features



Ironcore motors consist of a forcer which rides over a single magnet rail. The forcer is made of copper windings wrapped around iron laminations. The back iron provides an efficient path for the magnetic flux to circulate between the motor and the magnet rail. In addition, there is an efficient path for heat to escape the motor.

This ironcore design allows for extremely high forces and efficient cooling. In fact, the ironcore design offers the highest force available per unit volume. Finally, the ironcore design is economically attractive because only one row of magnet material is required.

One of the drawbacks of the ironcore design is that the motor has a high attractive force between the forcer and the magnet track. The attractive force can range from 5 to 13 times the rated force of the motor. This force must be supported by the bearing system of the motor. In addition, the high attractive force makes installation more challenging than other linear motor designs.

Another drawback of the ironcore design is the presence of cogging forces. Cogging occurs when the iron laminations exert a horizontal force on the motor in order to line up with their preferred positions over the magnets. Cogging limits the smoothness of motion systems because the force generated by the motor must change with position in order to maintain a constant velocity.

Parker has developed a patented anti-cog technology that virtually eliminates cogging and allows ironcore motors to be used in applications where only ironless motors were considered before. This offers the machine builder a powerful combination of extremely high force and smooth operation in an economical package.

Ripped Ironcore motor selection

Model	R5	R7	R10	R16
Cross Section - H x W mm (in)	37.5 x 55 (1.476) x (2.165)	37.5 x 70 (1.476 x 2.756)	58 x 100 (2.28 x 3.94)	58 x 160 (2.28 x 6.30)
Continuous Force - N (lbs)	90 (22)	462 (104)	1121 (252)	2230 (501)
Peak Force - N (lbs)	325 (73)	1761 (396)	4097 (921)	7435 (1671)
Maximum Track Length - mm	160 or 240	160 or 240	180 or 240	180 or 240
Cooling	-	-	-	-
Digital Hall Effect Devices	Optional	Optional	Optional	Optional

RIPPED Ironcore R5 Series

Performance *

Model	Units	R5-1	R5-2
Peak Force [1]	N (lb)	190 (43)	325 (73)
Continuous Force [2]	N (lb)	40 (9)	90 (20)
Peak Power	W	1920	2806
Continuous Power	W	96	140

* Specifications are based on the maintaining the air gap between the coil and track shown in the drawings. Refer to www.parkermotion.com for motor performance curves at different air gaps.
1) Peak force and current based on 5% duty cycle and one second duration.
2) Continuous force and current based on coil winding temperature maintained at 100 ºC.

Electrical

Model	Units	R5-1	R5-2
Winding	Series/Parallel	**S**	**P**
Peak Current	A pk sine RMS	11.2 7.9	19.2 13.5
Continuous Current	A pk sine RMS	2.5 1.7	4.3 3.0
Force Constant [1]	N/A peak lb/A peak	22.5 5.1	22.5 5.1
Back EMF [2]	V/m/s V/in/s	22.83 0.58	27.4 0.69
Resistance @ 25°C (phase-to-phase) [3]	ohms	14.3	7.8
Inductance (phase-to-phase) [4]	mH	21.5	13.3
Electrical Time Constant [5]	ms	1.4	1.4
Motor Constant [6]	N/√W lb/√W	5.8 1.30	8.2 1.84
Terminal Voltage (max.)	VDC	330	330

1) The force constant gradually decreases at high current levels. At the peak current the force constant is reduced by 24%. Refer to www.parkermotion.com for motor performance curves at different current levels. TIPS sizing software accommodates the changing force constant with current in its algorithm.
2) Back EMF measured between any two motor leads while moving at constant velocity. Value is amplitude or 0-Peak of sine wave produced.
3) Resistance measured between any two motor leads with motor connected in Delta winding at 25 ºC. For temperature at 100 ºC, multiply resistance by 1.295 (75 ºC rise * 0.393%/ºC).
4) Inductance measured using 1 Kz with the motor in the magnetic field.
5) Electrical time constant is time it takes for motor value to reach 63% of its final current after a step change in voltage.
6) Motor constant is a measure of efficiency. Calculated by dividing the force constant by the square root of the motor resistance at maximum operating temperature.

Thermal*

Model	Units	R5-1	R5-2
Thermal Resistance Wind-Amb [1]	°C/W	0.78	0.53
Thermal Time Constant (min.) [2]		5.9	5.9
Maximum Winding Temperature	°C	100	100

* Use Parker's MotionSizer software for the most accurate estimate of coil temperature for a particular motion profile.
1) Thermal time constant is time it takes for motor temperature to reach 63% of its final value after a step change in power.
2) Thermal resistance is the number of degrees (Celsius) of temperature rise in the winding per watt of power dissipated determined experimentally.

Mechanical

Model	Units	R5-1	R5-2
Coil Weight	kg (lb)	0.6	3.0 (6.7)
Coil Length	mm (in)	130 (5.118)	190 (7.480)
Attractive Force	N (lbf)	667 (150)	979 (220)
Electrical Pitch Length [1]	mm (in)	40 (1.575)	40 (1.575)

1) Electrical pitch length is distance coil must travel to complete 360º electrical cycle.

RIPPED Ironcore R7 Series

Performance*

Model	Units	R7-1	R7-2	R7-3
Peak Force [1]	N (lb)	587 (132)	1174 (264)	1761 (396)
Continuous Force [2]	N (lb)	154 (35)	308 (69)	462 (104)
Peak Power	W	3600	7200	10800
Continuous Power	W	180	360	540

* Specifications are based on the maintaining the air gap between the coil and track shown in the drawings. Refer to www.parkermotion.com for motor performance curves at different air gaps.
1) Peak force and current based on 5% duty cycle and one second duration.
2) Continuous force and current based on coil winding temperature maintained at 100 ºC.

Electrical

Model	Units	R7-1	R7-2		R7-3	
Winding	Series/Parallel/Triple	**S**	**S**	**P**	**S**	**T**
Peak Current	A pk sine	29.7	29.7	59.4	29.7	89.1
	RMS	21.0	21.0	42.0	21.0	63.0
Continuous Current	A pk sine	6.6	6.6	13.2	6.6	19.8
	RMS	4.6	4.6	9.3	4.6	14.0
Force Constant [1]	N/A peak	23.2	46.4	23.2	69.6	23.2
	lb/A peak	5.2	10.4	5.2	15.6	5.2
Back EMF [2]	V/m/s	26.8	53.5	26.8	80.3	26.8
	V/in/s	0.68	1.36	0.68	2.04	0.68
Resistance @ 25°C (phase-to-phase) [3]	ohms	4.0	8.0	2.0	12.0	1.33
Inductance (phase-to-phase) [4]	mH	6.1	12.2	3.1	18.3	2.0
Electrical Time Constant [5]	ms	1.5	1.5	1.5	1.5	1.5
Motor Constant [6]	N/√W	11.5	16.2	16.2	19.9	19.9
	lb/√W	2.58	3.65	3.65	4.47	4.47
Terminal Voltage (max.)	VDC	330	330	330	330	330

1) The force constant gradually decreases at high current levels. At the peak current the force constant is reduced by 24%. Refer to www.parkermotion.com for motor performance curves at different current levels. TIPS sizing software accommodates the changing force constant with current in its algorithm.
2) Back EMF measured between any two motor leads while moving at constant velocity. Value is amplitude or 0-Peak of sine wave produced.
3) Resistance measured between any two motor leads with motor connected in Delta winding at 25 ºC. For temperature at 100 ºC, multiply resistance by 1.295 (75 ºC rise * 0.393%/ºC).
4) Inductance measured using 1 Kz with the motor in the magnetic field.
5) Electrical time constant is time it takes for motor value to reach 63% of its final current after a step change in voltage.
6) Motor constant is a measure of efficiency. Calculated by dividing the force constant by the square root of the motor resistance at maximum operating temperature.

Thermal*

Model	Units	R7-1	R7-2	R7-3
Thermal Resistance Wind-Amb [1]	°C/W	0.42	0.21	0.14
Thermal Time Constant (min.) [2]		12.7	12.7	12.7
Maximum Winding Temperature	°C	100	100	100

* Use Parker's MotionSizer software for the most accurate estimate of coil temperature for a particular motion profile.
1) Thermal time constant is time it takes for motor temperature to reach 63% of its final value after a step change in power.
2) Thermal resistance is the number of degrees (Celsius) of temperature rise in the winding per watt of power dissipated determined experimentally.

Mechanical

Model	Units	R7-1	R7-2	R7-3
Coil Weight	kg (lb)	1.5 (3.3)	3.0 (6.7)	4.5 (10.0)
Coil Length	mm (in)	218.2 (8.59)	378.2 (14.89)	538.2 (21.19)
Attractive Force	N (lbf)	1557 (350)	3114 (700)	4671 (1050)
Electrical Pitch Length [1]	mm (in)	40 (1.575)	40 (1.575)	40 (1.575)

1) Electrical pitch length is distance coil must travel to complete 360º electrical cycle.

RIPPED Ironcore R10 Series

Performance*

Model	Units	R10-1	R10-2	R10-3
Peak Force [1]	N (lb)	1366 (307)	2731 (614)	4097 (921)
Continuous Force [2]	N (lb)	374 (84)	747 (168)	1121 (252)
Peak Power	W	6098	12196	18294
Continuous Power	W	305	610	915

* Specifications are based on the maintaining the air gap between the coil and track shown in the drawings. Refer to www.parkermotion.com for motor performance curves at different air gaps.
1) Peak force and current based on 5% duty cycle and one second duration.
2) Continuous force and current based on coil winding temperature maintained at 100 ºC.

Electrical

Model	Units	R10-1	R10-2		R10-3
Winding	Series/Parallel	**S**	**S**	**P**	**S**
Peak Current	A pk sine	35.1	35.1	70.2	35.1
	RMS	24.8	24.8	49.6	24.8
Continuous Current	A pk sine	7.8	7.8	15.6	7.8
	RMS	5.5	5.5	11.0	5.5
Force Constant [1]	N/A peak	47.7	95.5	47.7	143.2
	lb/A peak	10.7	21.5	10.7	32.2
Back EMF [2]	V/m/s	55.1	110.2	55.1	165.4
	V/in/s	1.40	2.80	1.40	4.20
Resistance @ 25°C (phase-to-phase) [3]	ohms	4.1	8.2	2.05	12.3
Inductance (phase-to-phase) [4]	mH	15.4	30.8	7.7	46.2
Electrical Time Constant [5]	ms	3	3	3	3
Motor Constant [6]	N/√W	21.4	30.3	30.3	37.1
	lb/√W	4.82	6.82	6.82	8.35
Terminal Voltage (max.)	VDC	330	330	330	330

1) The force constant gradually decreases at high current levels. At the peak current the force constant is reduced by 24%. Refer to www.parkermotion.com for motor performance curves at different current levels. TIPS sizing software accommodates the changing force constant with current in its algorithm.
2) Back EMF measured between any two motor leads while moving at constant velocity. Value is amplitude or 0-Peak of sine wave produced.
3) Resistance measured between any two motor leads with motor connected in Delta winding at 25 ºC. For temperature at 100 ºC, multiply resistance by 1.295 (75 ºC rise * 0.393%/ºC).
4) Inductance measured using 1 Kz with the motor in the magnetic field.
5) Electrical time constant is time it takes for motor value to reach 63% of its final current after a step change in voltage.
6) Motor constant is a measure of efficiency. Calculated by dividing the force constant by the square root of the motor resistance at maximum operating temperature.

Thermal*

Model	Units	R10-1	R10-2	R10-3
Thermal Resistance Wind-Amb [1]	°C/W	0.24	0.12	0.08
Thermal Time Constant (min.) [2]		14.6	14.6	14.6
Maximum Winding Temperature	°C	100	100	100

* Use Parker's MotionSizer software for the most accurate estimate of coil temperature for a particular motion profile.
1) Thermal time constant is time it takes for motor temperature to reach 63% of its final value after a step change in power.
2) Thermal resistance is the number of degrees (Celsius) of temperature rise in the winding per watt of power dissipated determined experimentally.

Mechanical

Model	Units	R10-1	R10-2	R10-3
Coil Weight	kg (lb)	4.5 (10.0)	9.1 (20.0)	13.6 (30.0)
Coil Length	mm (in)	305.5 (12.027)	545.5 (21.476)	785.5 (30.925)
Attractive Force	N (lbf)	3559 (800)	7117 (1600)	10675 (2400)
Electrical Pitch Length [1]	mm (in)	60 (2.362)	60 (2.362)	60 (2.362)

1) Electrical pitch length is distance coil must travel to complete 360º electrical cycle.

RIPPED Ironcore R16 Series

Performance*

Model	Units	R16-1	R16-2	R16-3
Peak Force [1]	N (lb)	2478 (557)	4955 (1114)	7433 (1671)
Continuous Force [2]	N (lb)	743 (167)	1487 (334)	2230 (501)
Peak Power	W	7065	14130	21195
Continuous Power	W	353	707	1060

* Specifications are based on the maintaining the air gap between the coil and track shown in the drawings. Refer to www.parkermotion.com for motor performance curves at different air gaps.
1) Peak force and current based on 5% duty cycle and one second duration.
2) Continuous force and current based on coil winding temperature maintained at 100 ºC.

Electrical

Model	Units	R16-1	R16-2		R16-3
Winding	Series/Parallel	**S**	**S**	**P**	**S**
Peak Current	A pk sine	34.8	35.1	69.8	34.8
	RMS	24.6	24.8	49.3	24.6
Continuous Current	A pk sine	7.8	7.8	15.6	7.8
	RMS	5.5	5.5	11.0	5.5
Force Constant [1]	N/A peak	95.5	190.9	95.5	286.4
	lb/A peak	21.5	42.9	21.5	64.4
Back EMF [2]	V/m/s	110.2	220.5	110.2	330.7
	V/in/s	2.80	5.60	2.80	8.40
Resistance @ 25°C (phase-to-phase) [3]	ohms	6.1	12.2	3.05	18.3
Inductance (phase-to-phase) [4]	mH	29.0	58.0	14.5	87.0
Electrical Time Constant [5]	ms	4.8	4.8	4.8	4.8
Motor Constant [6]	N/√W	39.6	55.9	55.9	68.5
	lb/√W	8.89	12.57	12.57	15.40
Terminal Voltage (max.)	VDC	330	330	330	330

1) The force constant gradually decreases at high current levels. At the peak current the force constant is reduced by 24%. Refer to www.parkermotion.com for motor performance curves at different current levels. TIPS sizing software accommodates the changing force constant with current in its algorithm.
2) Back EMF measured between any two motor leads while moving at constant velocity. Value is amplitude or 0-Peak of sine wave produced.
3) Resistance measured between any two motor leads with motor connected in Delta winding at 25 ºC. For temperature at 100 ºC, multiply resistance by 1.295 (75 ºC rise * 0.393%/ºC).
4) Inductance measured using 1 Kz with the motor in the magnetic field.
5) Electrical time constant is time it takes for motor value to reach 63% of its final current after a step change in voltage.
6) Motor constant is a measure of efficiency. Calculated by dividing the force constant by the square root of the motor resistance at maximum operating temperature.

Thermal*

Model	Units	R16-1	R16-2	R16-3
Thermal Resistance Wind-Amb [1]	°C/W	0.21	0.11	0.07
Thermal Time Constant (min.) [2]		37.1	37.1	37.1
Maximum Winding Temperature	°C	100	100	100

* Use Parker's MotionSizer software for the most accurate estimate of coil temperature for a particular motion profile.
1) Thermal time constant is time it takes for motor temperature to reach 63% of its final value after a step change in power.
2) Thermal resistance is the number of degrees (Celsius) of temperature rise in the winding per watt of power dissipated determined experimentally.

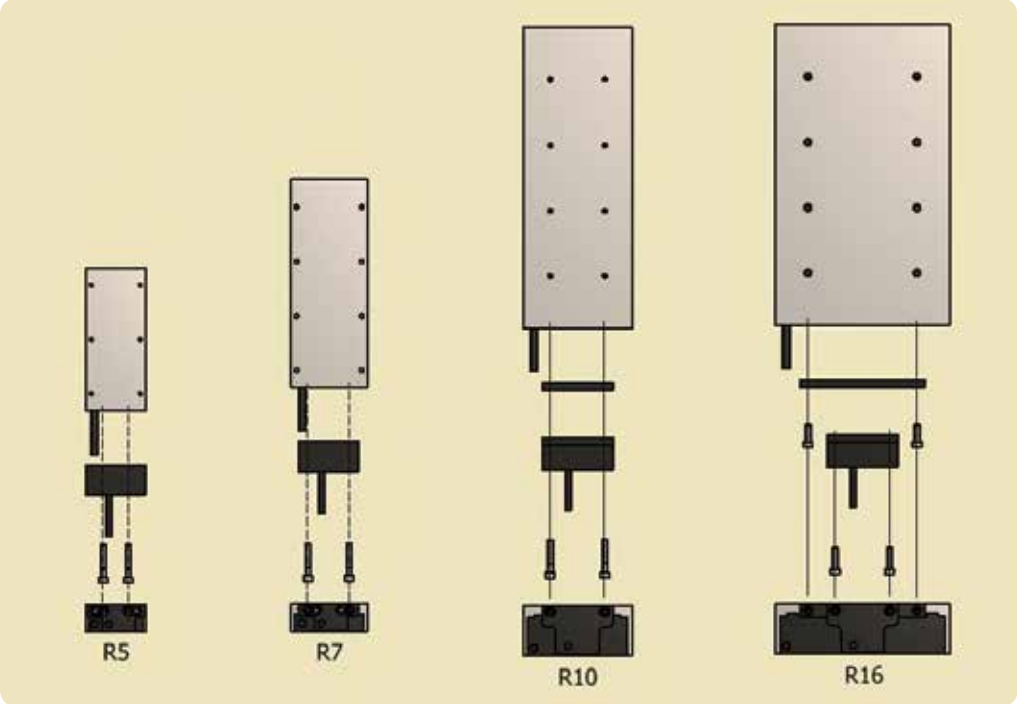
Mechanical

Model	Units	R16-1	R16-2	R16-3
Coil Weight	kg (lb)	9.1 (20.0)	18.2 (40.0)	27.3 (60.0)
Coil Length	mm (in)	305.5 (12.027)	545.5 (21.476)	785.5 (30.925)
Attractive Force	N (lbf)	7117 (1600)	14234 (3200)	21351 (4800)
Electrical Pitch Length [1]	mm (in)	60 (2.362)	60 (2.362)	60 (2.362)

1) Electrical pitch length is distance coil must travel to complete 360º electrical cycle.

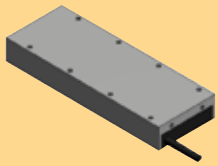
Hall Sensor Design

Design Overview

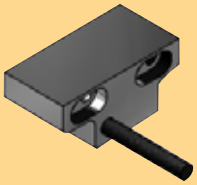


Design

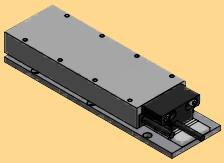
Coil



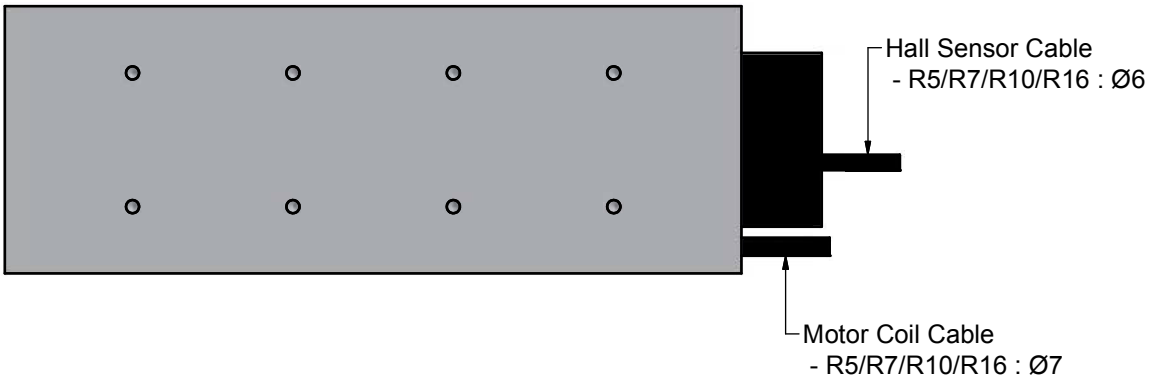
Hall Sensor



Assembly



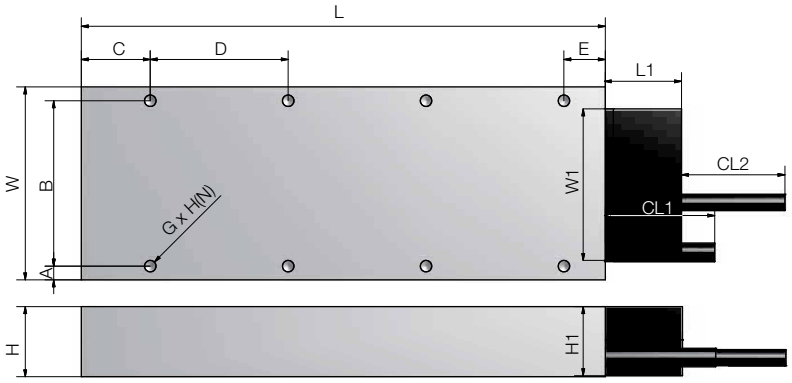
Cable			
Motor Coil Cable		**Hall Sensor Cable**	
Function	Color	Function	Color
U	Red/Yellow	+5V	Black
V	Brown/Yellow	GND	White
W	Orange/Yellow	HES C	Yellow
PE	Green/Yellow	HES B	Blue
Thermo+	Grey	HES A	Green
Thermo-	Violet	Shield	Shield



RIPPED Ironcore Series

Dimensions - mm

Motor Coil

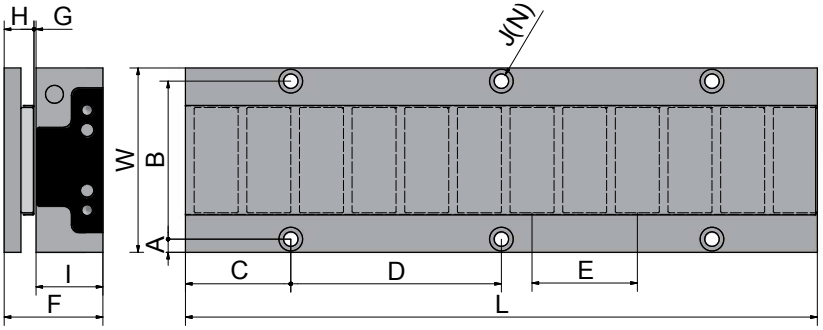


CL : Cable Length

Unit: mm

	MODEL	L	W	H	A	B	C	D	E	CL1	G x H (N)	L1	W1(BK)	H1	CL2	OAL
R5	R5-1A-HS	130	55	25.4	5	45	15	50	15	500	M4 x 0.7 (6)	28	55	25	500	158
	R5-2A-HP	190					25				M4 x 0.7 (8)					218
R7	R7-1A-HS	190	70	25.4	5	60	25	50	15	500	M5 x 0.8 (8)	28	55	25	500	218
	R7-2A-HS	350							25		M5 x 0.8 (14)					378
	R7-2A-HP	350									M5 x 0.8 (14)					378
	R7-3A-HS	510							35		M5 x 0.8 (20)					538
	R7-3A-HT	510									M5 x 0.8 (20)					538
R10	R10-1A-HS	275.5	100	46	25	50	47.75	60	47.75	500	M6 x 1.0 (8)	30	65 (65)	45	500	305.5
	R10-2A-HS	515.5									M6 x 1.0 (16)					545.5
	R10-2A-HP	515.5									M6 x 1.0 (16)					545.5
	R10-3A-HS	755.5									M6 x 1.0 (24)					785.5
R16	R16-1A-HS	275.5	160	46	30	100	47.75	60	47.75	500	M8 x 1.25 (8)	30	65 (115)	45	500	305.5
	R16-2A-HS	515.5									M8 x 1.25 (16)					545.5
	R16-2A-HP	515.5									M8 x 1.25 (16)					545.5
	R16-3A-HS	755.5									M8 x 1.25 (24)					785.5

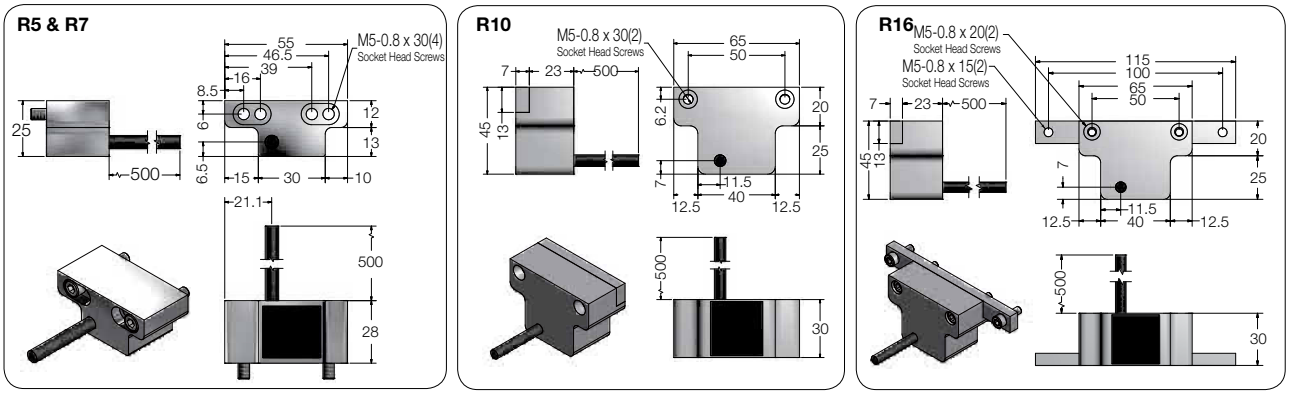
Magnet Track



Unit: mm

	MODEL	L	W	H	A	B	C	D	E	F	G	I	J (N)	Weight (kg/m)
R5	R5-160MC	160	55	11.3	5	45	40	80	40	37.5	0.8	25.4	M5 Socket Head Screw (4)	3.0
	R5-240MC	240											M5 Socket Head Screw (6)	
R7	R7-160MC	160	70	11.3	5	60	40	80	40	37.5	0.8	25.4	M5 Socket Head Screw (4)	4.57
	R7-240MC	240											M5 Socket Head Screw (6)	
R10	R10-180MC	180	95	11.3	7.5	80	30	60	60	58	0.7	46	M6 Button Head Screw (6)	6.51
	R10-240MC	240											M6 Button Head Screw (8)	
R16	R16-180MC	180	155	11.3	7.5	140	30	60	60	58	0.7	46	M6 Button Head Screw (6)	11.34
	R16-240MC	240											M6 Button Head Screw (8)	

Hall Sensor



RIPPED Ironcore Series

How to order

Fill in an order code from each of the numbered fields to create a complete Motor Coil, Magnet Track and Connector Module order number.

Coil with Hall Sensor

Order Example:

①	②	③	④	⑤
R5 –	1	A	– H	S

① **Series**
- **R5**
- **R7**
- **R10**
- **R16**

② **Coil Size**
- **1** One pole
- **2** Two poles
- **3** Three poles

③ **Mounting**
- **A** Standard

④ **Hall Sensor Ready**
- **H** Digital Hall Sensor

⑤ **Winding Type**
- **S** Series
- **P** Parallel
- **T** Triple

* Please contact Parker application engineer for HED module related questions

Order Code:

NO.	Order P/N	Remark
1	R5-1A-HS	Coil with Hall Sensor
2	R5-2A-HS	
3	R7-1A-HS	
4	R7-2A-HS	
5	R7-2A-HP	
6	R7-3A-HS	
7	R7-3A-HT	
8	R10-1A-HS	
9	R10-2A-HS	
10	R10-2A-HP	
11	R10-3A-HS	
12	R16-1A-HS	
13	R16-2A-HS	
14	R16-2A-HP	
15	R16-3A-HS	

* Note1) Specification is the same as the existing models.
Note2) It does not support triple models of R10 and R16.
Note3) Cable length is 500mm.

Magnet Track

Order Example:

①	②	③	④
R10 -	240	M	C

① **Series**
- **R5**
- **R7**
- **R10**
- **R16**

② **Track Length**
- **160** 160 mm (R5 & R7 only)
- **180** 180 mm (R10 and R16 only)
- **240** 240 mm (all models)

③ **Modular**
- **M** Standard

④ **Magnet Coating**
- **C** Magnet: Nikel Coating(Standard)
  Cover: Stainless Steel Cover (Standard)

Safety Precautions:

Use extreme caution in handling tracks. Ironcore Linear Motors contain exposed magnets and have an open magnetic field. Any ferrous metal, steel or iron, will be attracted to the magnet track. The amount of attractive force increases significantly as the distance from the magnet decreases. Severe injury may occur to fingers or hands if caught between the track and coil or other metal object.

Use extreme caution when installing the coil. The data sheet lists the attractive force between the coil and track. Refer to the "Motor Installation Guide" for proper installation instructions.

Any person with medical electronic implants should use extreme caution when near an open magnetic field.The magnetic field could interfere with the medical device's operation.

Any person working or handling the tracks should remove personal effects. Items such as jewelry, watches, keys and credit cards may be damaged or adversely affected by the magnetic field.

Ironcore E Type Linear Motor

Parker Linear motor Ironcore type is now available in two tier. Originally designed for outstanding anti-cogging features, Ripped series remain as killer product.

Newly designed Economical Ironcore coil has been slim down by eliminating the anti-cogging features as it is used in the market majorly.

Ironcore E-type will have slightly different characteristics in performance as well as in dimension.

Features and Benefits

- Newly improved coil design to have higher power density but keeping the same electrical pitch allows machine designer to keep the previous magnet track
- Redesigned Hall Sensor Module to have more slimmer dimension
- Simplified cable structure becomes more rigid and economy
- Aluminum top plate brings better heat dispassion
- PARKER Sizing Software latest motor database includes the economical Ironcore coils

Ironcore advantages

- High force per size -uses laminations to concentrate the flux field
- Lower cost — open face design only uses one row of magnets
- Laminations and large surface area allows good heat dissipation

Ironcore E Type Coil selection

Model	R5	R7	R10	R16
Cross Section – H x W mm	42.7 x 53	42.7x 68	62 x 98	62 x 158
Continuous Force – N	110	225	1,060	2,080
Peak Force – N	350	687	2,470	4,860
Maximum Track Length -mm	160 or 240	160 or 240	180 or 240	180 or 240
Cooling	-	-	-	-
Digital Hall Effect Devices	Optional	Optional	Optional	Optional

Ironcore R5-E Type

Performance*

Model	Units	R5-1E	R5-2E
Peak Force [1]	N	175	350
Continuous Force [2]	N	55	110
Peak Power	W	460	920
Continuous Power	W	40	80

* Specifications are based on the maintaining the air gap between the coil and track shown in the drawings.
1) Peak force and current based on 5% duty cycle and one second duration.
2) Continuous force and current based on coil winding temperature maintained at 100 °C.

Electrical

Model	Units	R5-1E	R5-2E	
Winding	Series/Parallel	**S**	**S**	**P**
Peak Current	$A_{pk\text{-}sine}$	11.2	11.2	22.2
	A_{rms}	7.9	7.9	15.7
Continuous Current	$A_{pk\text{-}sine}$	3.3	3.3	6.4
	A_{rms}	2.3	2.3	4.5
Force Constant	N/A_{rms}	24.4	48.9	24.4
	$N/A_{pk\text{-}sine}$	17.3	34.6	17.3
Back-EMF [1]	V/m/s	11.5	23	11.5
Resistance@20°C (Phase to Phase)	Ω	3.5	7	1.8
Inductance (Phase-to-Phase)	mH	14.8	29.6	7.4
Electrical Time Constant	ms	4.2	4.2	4.1
Motor Constant	$N/\sqrt{W}$	9.2	13.1	12.9
Terminal Voltage (max.)	VDC	330	330	330

1) Value is amplitude or 0-Peak of sine wave produced.

Mechanical

Model	Units	R5-1E	R5-2E	
Coil Weight	Kg	0.65	1.2	1.2
Coil Length	mm	120.5	200.5	200.5
Attractive Force	N	290	580	580
Electrical Pitch Length [1]	mm	40	40	40

1) Electrical pitch length is distance coil must travel to complete 360° electrical cycle.

Use Parker's MotionSizer software for the most accurate estimate of coil temperature for a particular motion profile.

Ironcore R7-E Type

Performance*

Model	Units	R7-1E	R7-2E	R7-3E
Peak Force [1]	N	229	458	687
Continuous Force [2]	N	75	150	225
Peak Power	W	510	1020	1530
Continuous Power	W	50	100	200

* Specifications are based on the maintaining the air gap between the coil and track shown in the drawings.
1) Peak force and current based on 5% duty cycle and one second duration.
2) Continuous force and current based on coil winding temperature maintained at 100 °C.

Electrical

Model	Units	R7-1E	R7-2E		R7-3E	
Winding	Series/Parallel	**S**	**S**	**P**	**S**	**T**
Peak Current	$A_{pk\text{-}sine}$	10.3	10.3	20.5	10.3	28.8
	A_{rms}	7.3	7.3	14.5	7.3	20.4
Continuous Current	$A_{pk\text{-}sine}$	3.3	3.3	6.4	3.3	9.6
	A_{rms}	2.3	2.3	4.5	2.3	6.8
Force Constant	N/A_{rms}	33	66.1	33	99.1	33
	$N/A_{pk\text{-}sine}$	23.3	46.7	23.3	70.1	23.3
Back-EMF [1]	V/m/s	15.6	31.1	15.6	46.7	15.6
Resistance@20°C (Phase to Phase)	Ω	4.5	9	2.3	13.5	1.5
Inductance (Phase-to-Phase)	mH	25.4	50.89	12.7	76.2	8.5
Electrical Time Constant	ms	5.6	5.6	5.5	5.6	5.7
Motor Constant	$N/\sqrt{W}$	11.1	15	15	15.9	18.4
Terminal Voltage (max.)	VDC	330	330	330	330	330

1) Value is amplitude or 0-Peak of sine wave produced.

Mechanical

Model	Units	R7-1E	R7-2E	R7-3E
Coil Weight	Kg	0.8	1.6	2.8
Coil Length	mm	120.5	200.5	280.5
Attractive Force	N	481	962	1443
Electrical Pitch Length [1]	mm	40	40	40

1) Electrical pitch length is distance coil must travel to complete 360° electrical cycle.

Use Parker's MotionSizer software for the most accurate estimate of coil temperature for a particular motion profile.

Ironcore R10-E Type

Performance*

Model	Units	R10-1E	R10-2E
Peak Force [1]	N	1,235	2,470
Continuous Force [2]	N	530	1,060
Peak Power	W	1890	3780
Continuous Power	W	210	420

* Specifications are based on the maintaining the air gap between the coil and track shown in the drawings.
1) Peak force and current based on 5% duty cycle and one second duration.
2) Continuous force and current based on coil winding temperature maintained at 100 °C.

Electrical

Model	Units	R10-1E	R10-2E	
Winding	Series/Parallel	**S**	**S**	**P**
Peak Current	$A_{pk\text{-}sine}$	28	28	56
	A_{rms}	19.8	19.8	39.6
Continuous Current	$A_{pk\text{-}sine}$	9.3	9.3	18.7
	A_{rms}	6.6	6.6	13.2
Force Constant	N/A_{rms}	80.3	160.6	80.3
	$N/A_{pk\text{-}sine}$	56.8	113.6	56.8
Back-EMF [1]	V/m/s	37.9	75.6	37.9
Resistance@20°C (Phase to Phase)	Ω	2	4	1
Inductance (Phase-to-Phase)	mH	25.6	51.2	12.8
Electrical Time Constant	ms	12.8	12.8	12.8
Motor Constant	$N/\sqrt{W}$	36.6	51.7	51.7
Terminal Voltage (max.)	VDC	330	330	330

1) Value is amplitude or 0-Peak of sine wave produced.

Mechanical

Model	Units	R10-1E	R10-2E
Coil Weight	Kg	5.8	10.4
Coil Length	mm	290.4	530.4
Attractive Force	N	1,994	3,988
Electrical Pitch Length [1]	mm	60	60

1) Electrical pitch length is distance coil must travel to complete 360° electrical cycle.

Use Parker's MotionSizer software for the most accurate estimate of coil temperature for a particular motion profile.

Ironcore R16-E Type

Performance*

Model	Units	R16-1E	R16-2E
Peak Force [1]	N	2,430	4,860
Continuous Force [2]	N	1,040	2,080
Peak Power	W	2290	4580
Continuous Power	W	260	510

* Specifications are based on the maintaining the air gap between the coil and track shown in the drawings.
1) Peak force and current based on 5% duty cycle and one second duration.
2) Continuous force and current based on coil winding temperature maintained at 100 °C.

Electrical

Model	Units	R16-1E	R16-2E	
Winding	Series/Parallel	**S**	**S**	**P**
Peak Current	$A_{pk\text{-}sine}$	26.7	26.7	53.4
	A_{rms}	18.9	18.9	37.8
Continuous Current	$A_{pk\text{-}sine}$	8.9	8.9	17.8
	A_{rms}	6.3	6.3	12.6
Force Constant	N/A_{rms}	165.1	330.2	165.1
	$N/A_{pk\text{-}sine}$	116.7	233.5	116.7
Back-EMF [1]	V/m/s	77.8	155.7	77.8
Resistance@20°C (Phase to Phase)	Ω	3.3	6.6	1.65
Inductance (Phase-to-Phase)	mH	48.2	96.4	24.1
Electrical Time Constant	ms	14.6	14.6	14.6
Motor Constant	$N/\sqrt{W}$	64.5	92.1	92.1
Terminal Voltage (max.)	VDC	330	330	330

1) Value is amplitude or 0-Peak of sine wave produced.

Mechanical*

Model	Units	R16-1E	R16-2E
Coil Weight	Kg	11.1	18.1
Coil Length	mm	290.4	530.4
Attractive Force	N	3,990	7,980
Electrical Pitch Length [1]	mm	60	60

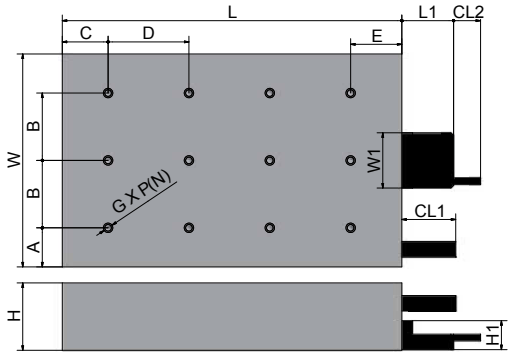
1) Electrical pitch length is distance coil must travel to complete 360° electrical cycle.

Use Parker's MotionSizer software for the most accurate estimate of coil temperature for a particular motion profile.

Ironcore E Type

Dimensions – mm

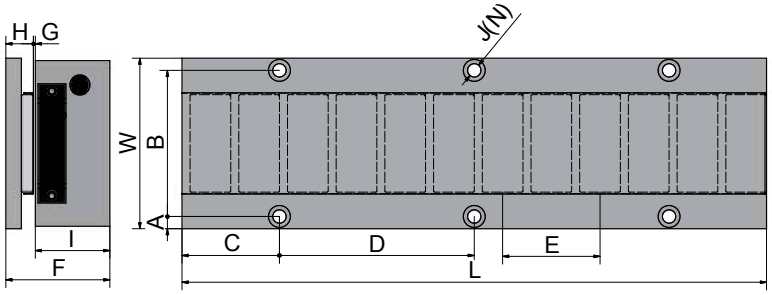
Motor Coil



Unit: mm

	Model	L	W	H	A	B	C	D	E	CL1	G X P (N)	L1	W1	H1	CL2	OAL
R5	R5-1E-KS	92	53	30.6	6	41	24	40	28	500	4-M5-DP6	28.5	49	11.5	500	120.5
	R5-2E-KS	172									8-M5-DP6					200.5
	R5-2E-KP										8-M5-DP6					
R7	R7-1E-KS	92	68	30.6	6	56	24	40	28	500	4-M5-DP6	28.5	49	11.5	500	120.5
	R7-2E-KS	172									8-M5-DP6					200.5
	R7-2E-KP															
	R7-3E-KS	252									12-M5-DP6					280.5
	R7-3E-KT															
R10	R10-1E-KS	252	98	50	24	50	34	60	38	500	8-M5-DP13.2	38.4	41	21.5	500	290.4
	R10-2E-KS	492									16-M6-DP13.2					530.4
	R10-2E-KP															
R16	R16-1E-KS	252	158	50	29	100	34	60	38	500	12-M6-DP13.2	38.4	41	21.5	500	290.4
	R16-2E-KS	492									24-M6-DP13.2					530.4
	R16-2E-KP															

Magnet Track

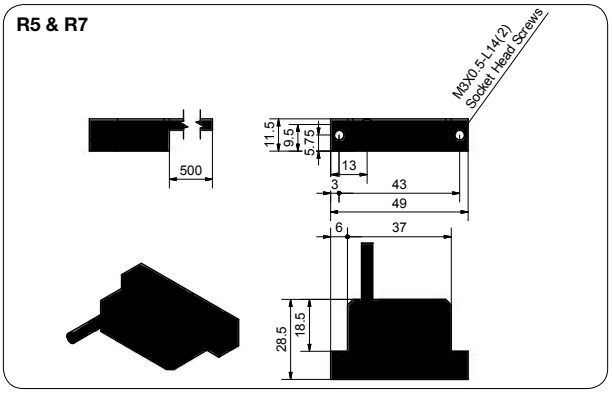


Unit: mm

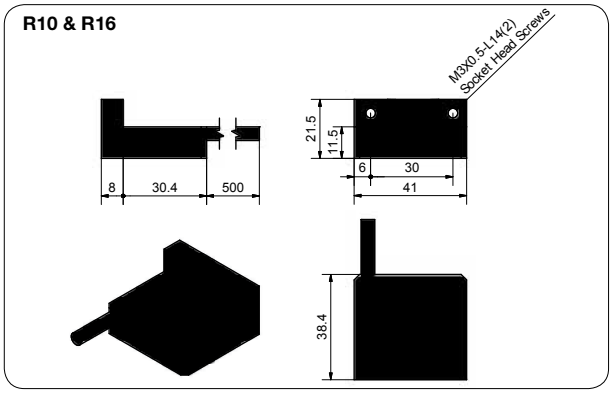
	Model	L	W	H	A	B	C	D	E	F	G	I	J(N)	Weight (kg/m)
R5	R5-160MC	160	55	11.3	5	45	40	80	40	42.7	0.8	25.4	M5 Socket Head Screw (4)	3.0
	R5-240MC	240											M5 Socket Head Screw (6)	
R7	R7-160MC	160	70	11.3	5	60	40	80	40	42.7	0.8	25.4	M5 Socket Head Screw (4)	4.57
	R7-240MC	240											M5 Socket Head Screw (6)	
R10	R10-180MC	180	95	11.3	7.5	80	30	60	60	62	0.7	46	M6 Button Head Screw (6)	6.51
	R10-240MC	240											M6 Button Head Screw (8)	
R16	R16-180MC	180	155	11.3	7.5	140	30	60	60	62	0.7	46	M6 Button Head Screw (6)	11.34
	R16-240MC	240											M6 Button Head Screw (8)	

Hall Sensor Dimension

R5 & R7

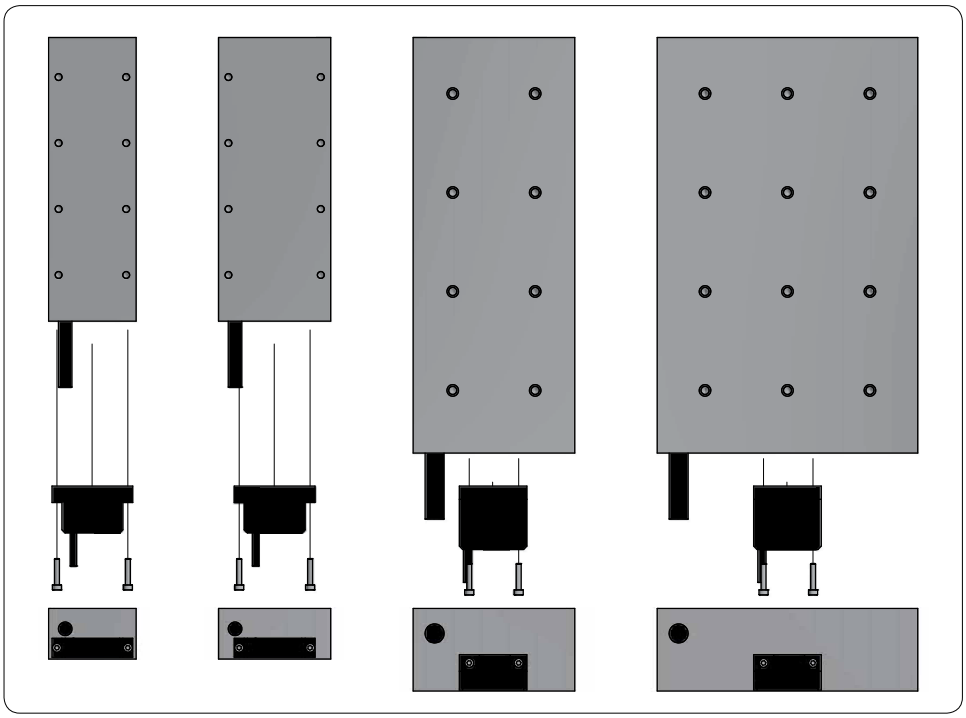


R10 & R16



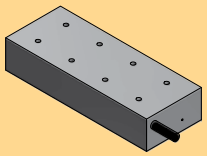
Ironcore E Type

Design Overview

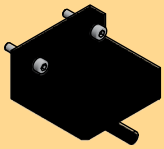


Design

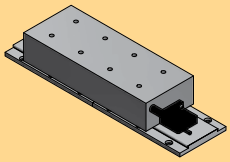
Motor Coil



Hall Sensor

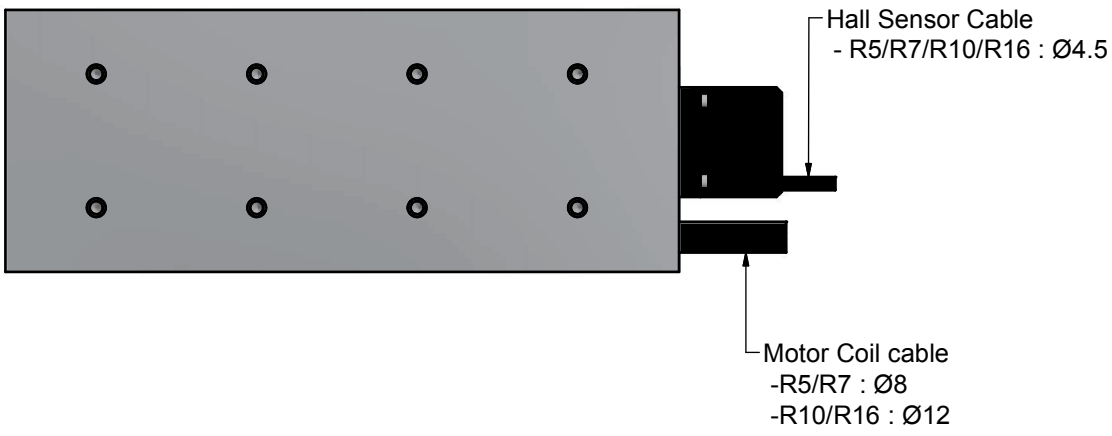


Assembly



Cable Information

Motor Coil Cable		Hall Sensor Cable	
Function	**Color**	**Function**	**Color**
U	Red	+5V	Red
V	Brown	GND	Black
W	Orange	Hall A	Blue
PE	Green	Hall B	Green
Thermistor	Gray	Hall C	White
Thermistor	Violet	Shield-	Shield



Ironcore E Type

How to order

Fill in an order code from each of the numbered fields to create a complete Motor Coil, Magnet Track and Connector Module order number.

Coil with Hall Sensor

Order Example:

①	②	③	④	⑤
R5	– 1	E	– K	S

① **Series**
R5
R7
R10
R16

② **Coil Size**
1 One pole
2 Two poles
3 Three poles

③ **Mounting**
E Economical Type

④ **Hall Sensor Ready**
K Digital Hall Sensor

⑤ **Winding Type**
S Series
P Parallel
T Triple

Order Code:

NO.	Order P/N	Remark
1	R5-1E-KS	Coil with Hall Sensor
2	R5-2E-KS	
3	R7-1E-KS	
4	R7-2E-KS	
5	R7-2E-KP	
6	R7-3E-KS	
7	R7-3E-KT	
8	R10-1E-KS	
9	R10-2E-KS	
10	R10-2E-KP	
11	R16-1E-KS	
12	R16-2E-KS	
13	R16-2E-KP	

Note1) It does not support triple models of R10 and R16.
Note2) Cable length is 500mm.

Magnet Track

Order Example:

①	②	③	④
R10 -	240	M	C

① **Series**
R5
R7
R10
R16

② **Track Length**
160 160 mm (R5 & R7 only)
180 180 mm (R10 & R16 only)
240 240 mm (all models)

③ **Modular**
M Standard

④ **Magnet Coating**
C Magnet: Nikel Coating(Standard)
Cover: Stainless Steel Cover (Standard)

Safety Precautions:

Use extreme caution in handling tracks. Ironcore Linear Motors contain exposed magnets and have an open magnetic field. Any ferrous metal, steel or iron, will be attracted to the magnet track. The amount of attractive force increases significantly as the distance from the magnet decreases. Severe injury may occur to fingers or hands if caught between the track and coil or other metal object.

Use extreme caution when installing the coil. The data sheet lists the attractive force between the coil and track. Refer to the “Motor Installation Guide” for proper installation instructions.

Any person with medical electronic implants should use extreme caution when near an open magnetic field.The magnetic field could interfere with the medical device’s operation.

Any person working or handling the tracks should remove personal effects. Items such as jewelry, watches, keys and credit cards may be damaged or adversely affected by the magnetic field.

Parker Motion Control Package Solution

PAC (Parker Automation Controller) consolidates advanced logic, multi-axis motion, signal handling, and web-published visualization into one performance driven solution, thus eliminating the need for unnecessary hardware and communication links, and increasing developer efficiency.

OPERATION or MACHINE NETWORK

Customized Protocol via Ethernet (TCP/UDP) Modbus TCP EPC PROFIBUS PROFINET EtherNet/IP

CONTROLLER – PAC

- CNC Control
  - Three dimensional lines, arcs, elliptic arcs, parabolas, and splines
- Gantry Kinematics
  - XYZ, XYZθ, XYZθ w/ tool offset
  - T or H-Gantry systems w/ stationary axes and a belt
  - 5-axis transformation for XYZ and 2-axis tool head manipulator
- Robot Kinematics
  - 2 & 3 jointed SCARA robots
  - 4 axis palletizer robots
  - 6 DOF articulated robots
  - Parallel robots, including delta

- Standardized programming
  - IEC 61131 Programming
  - PLCopen Motion Control
  - DIN 66025 CNC G-code
- Web-Published Xpress Visualization
  - Graphics, Videos and Animations
  - Built-in Security Options
  - Recipe / Alarm Management
  - Remote Viewing/Management
  - Access from any web browser
- Android Remote Manager to Xpress
- IP Protection & Licensing
- Signal Handling, Advanced Logic

EtherCAT ***CANOpen Over EtherCAT*** ***Conventional Signals***

SERVO DRIVE – P series

- 16KHz current control
- 8KHz velocity/position control
- Automatic Gain Tuning
- Adaptive filter
- Safety • Multi-Axis feature

- Automatic motor phase correction
- Automatic hall correction
- Vibration suppression
- 64 motion profiles
- I/O control

BiSS INTERFACE EnDat 2.2 Tamagawa

Linear Motor & P Series Drive Packages

Ironless

Drive	Motor	Winding	Feedback
PD-04	210-1	S	Quadrature Incremental encoder BiSS-C (absolute) encoder EnDAT 2.2 SinCos
	210-2	S	
	210-3	S	
	210-4	S	
PD-10	110-1	S	Quadrature Incremental encoder BiSS-C (absolute) encoder EnDAT 2.2 SinCos
	110-2	S	
	210-1	P	
	210-2	P	
	210-3	P	
	210-4	P	
	310-1	S	
	310-2	S	
	310-2	P	
	310-3	S	
	310-4	S	
	310-5	S	
	310-6	S	
	410-2	S	
	410-3	S	
	410-4	S	
	410-6	S	
	410-8	S	

Drive	Motor	Winding	Feedback
PD-35	110-1	P	Quadrature Incremental encoder BiSS-C (absolute) encoder EnDAT 2.2 SinCos
	110-2	P	
	110-2	T	
	210-1	T	
	210-2	T	
	210-3	T	
	210-4	T	
	310-2	T	
	310-3	P	
	310-3	T	
	310-4	P	
	310-4	T	
	310-5	P	
	310-5	T	
	310-6	P	
	310-6	T	
	410-2	P	
	410-2	T	
	410-3	P	
	410-3	T	
	410-4	P	
	410-4	T	
	410-6	P	
	410-6	T	
	410-8	P	
	410-8	T	

Ironcore

Drive	Motor	Winding	Feedback
PD-04	R5-1A	S	Quadrature Incremental encoder BiSS-C (absolute) encoder EnDAT 2.2 SinCos
	R5-1E	S	
	R5-2E	S	
	R7-1E	S	
	R7-2E	S	
	R7-3E	S	
PD-10	R5-2A	P	Quadrature Incremental encoder BiSS-C (absolute) encoder EnDAT 2.2 SinCos
	R5-2E	P	
	R7-2E	P	
	R7-3E	T	
	R10-1E	S	
	R10-2E	S	
	R16-1E	S	
	R16-2E	S	

Drive	Motor	Winding	Feedback
PD-35	R7-1A	S	Quadrature Incremental encoder BiSS-C (absolute) encoder EnDAT 2.2 SinCos
	R7-2A	S	
	R7-2A	P	
	R7-3A	S	
	R7-3A	T	
	R10-1A	S	
	R10-2A	S	
	R10-2A	P	
	R10-3A	S	
	R16-1A	S	
	R16-2A	S	
	R16-2A	P	
	R16-3A	S	
	R10-2E	P	
	R16-2E	P	

Linear Motor-Driven Positioners

Visit our website for more information on Parker positioner products and integrated linear motor systems

T Series Smooth Motion I-Force Ironless Positioners

The Parker T Series linear positioners utilize our high-performance ironless linear motors in a pre-engineered, easily integrated, ready-to-run package. The T Series advantages include economical cost and design flexibility to accommodate customization.

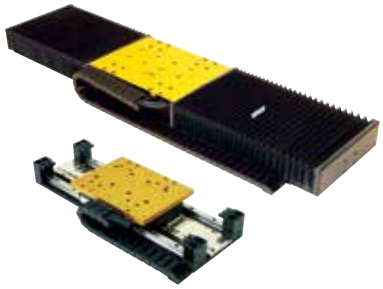
MX Series Miniature Linear Motor-Driven Positioners

Miniaturization of fiber optics, photonics, electronics and biomedical processes has driven the need for smaller and more efficient positioners. Parker's MX miniature stage, the smallest linear servo motor-driven positioner in the industry, is loaded with high-performance features for both rapid linear translation and precise positioning of lighter loads in small work envelopes.

LXR Series Precision Linear Motor-Driven Positioners

The 400LXR Series linear servo motor tables offer high acceleration, velocity, and precision with quick settling for superior throughput. Optimum performance is achieved by combining slotless linear motor technology with performance-matched feedback and mechanical elements. Offered in three widths and myriad options, the 400LXR Series can solve most high-performance applications.

TR Series High Force RIPPED Ironcore Positioners



The Parker TR Series linear positioners utilize our high-performance RIPPED ironcore linear motors to produce extremely smooth motion for use in many applications where ironless motors were traditionally needed. TR positioners utilize a dual-rail-bearing design for high normal loads.

LX Compact Width Linear Motor-Driven Positioners

The LX picks up where the MX leaves off, offering longer travels while maintaining a very small profile. Like the MX, the LX is designed to meet the rigors of today's 24/7 production demands.

Although it has a small profile, the LX is large on performance and reliability. At the heart of the LX is an innovative non-contact linear servo motor. This direct drive motor has been optimized for force, speed, and acceleration to deliver outstanding performance and response.

ETT Series Tubular type linear motor driven positioner

The ETT is the ideal choice for all kind of linear handling and pick & place applications requiring high dynamic performance. Being cost-effective and energy-efficient, ETT is also the right alternative to pneumatic cylinders in applications that demand greater flexibility and positional control, as well as precise control of force and speed. Full compliance to the DIN ISO 15552:2005-12 pneumatic cylinder flange standard helps to simplify the mechanical integration of ETT and reduces engineering effort.

Complete Motion Systems

Parker's Electromechanical Automation Division brings together leading brands in industrial and high-tech automation, including Bayside, Compumotor, CTC, Custom Servo Motor, Daedal, IPS and Trilogy. Designed for easy configuration to make a complete motion system — from miniature precision for life sciences to overhead gantries for the factory floor — these best-of-breed individual components are available separately, so you can build a motion system from the ground up, or as a complete motion system to make integration simple, fast and easy.

Total System Solutions

Parker's team of highly qualified application engineers, product development engineers, and system specialists can turn pneumatic, structural and electromechanical products into an integrated system solution. Moreover, Parker's Selectable Levels of Integration™ allows you to choose the appropriate system, subsystem, or component to meet your specific need.

24/7 Emergency Breakdown Support

The Parker product information center is available any time of the day or night at 1-800-C-Parker. Parker operators will connect you with a live, on-call representative who will identify replacement parts or services for all motion technologies.

The Power of Parker

In today's competitive, fast-moving economy, what good is an application that isn't ready on time? This is especially true when compressed design cycles make the quick delivery of critical components essential. With factories strategically located on five continents, Parker offers an unrivaled delivery record, getting solutions out our door and onto your floor faster than ever.

Parker also has the industry's largest global distribution network, with more than 8,600 distributors worldwide. Each of these locations maintains ample product inventory to keep your downtime to a minimum. And many distributors have in-house design capabilities to support your system and subsystem requirements.

Throughout the design process, Parker's factory-trained electromechanical engineers work hand in hand with you and day or night at 1-800-C-Parker. Parker operators will connect you with a live, on-call representative who will identify replacement parts or services for all motion technologies.

parkermotion.com

Parker's award-winning web site is your single source for:

- **Product information**
- **Downloadable catalogs**
- **Motion-sizing software**
- **3D design files**
- **Training materials**
- **Product-configuration software**
- **RFQ capabilities**
- **Videos and application reports**

Parker Asia Pacific

China
Sales Office
Shanghai office, 86-21-28995000
Parker Hannifin Motion&Control Co. Ltd.
280 Yunqiao Road, Jin Qiao Export Processing Zone,
Shanghai 201206, China

Sales Office
Guangzhou Office, 86-20 32121688
Parker Hannifin Motion&Control Co.Ltd.
Room 202, Building F, Guangdong Soft Science Park,
No 11, Caipin Road, Guangzhou Science City, Luo Gang
District, Guangzhou 510663, China

Sales Office
Beijing office, 86-10-6561-0520
Parker Hannifin Motion&Control Co.Ltd.
Suite 8B01, 8th Floor, Hanwei Plaza,7 Guanghua Road,
Chaoyang District, Beijing 100004, P.R.China

Motion Systems Group China
Parker Hannifin Hydraulic (Shanghai) Co. Ltd.
Automation Business Unit
No.299 Tuo Qing Road Qingpu District Shanghai
China 201799

Japan
Sales Office
PHJ Tokyo office, +81 3 4574 6600
Tokyo Front Terrace 16F
2-3-14, Higashi Shinagawa, Shinagawa-Ku
Tokyo 140-0002, Japan

Motion Systems Division Japan
Tsukuba Plant, +81 296 44 4218
850, Hanya Shimotsuma-Shi
Ibaraki 304-0005 Japan

Korea
Sales Office
Seoul Office, 82-2-559-0400
11F, U-Space 1B Daewangpangyo-ro 660,
Bundang-gu, Seongnam, Gyeonggi-do, 13494, Korea

Motion Systems Division Korea
Jang An Plant, 82-31-359-0700
Parker Korea Ltd.
23, Jangangongdan 1-gil, Jangan-myeon,
Hwaseong-si, Gyeonggi-do, 18579, Korea

India
Sales Office
PHI Chennai Sales office, 91-44-43910799
Parker Hannifin India Private. Limited,
Plot no. P41/2, Eight Avenue, Domestic Tariff Area,
Mahindra world city, Chengalpattu, Kanchipuram
District, Pin : 603002, Tamil Nadu, India

Motion Systems Group India
PHI Chennai MWC Plant, 91-44-43910703
Parker Hannifin India Private. Limited,
Plot no. P41/2, Eight Avenue, Domestic Tariff Area,
Mahindra world city, Chengalpattu, Kanchipuram
District, Pin : 603002, Tamil Nadu, India

Taiwan
Sales Office
Taipei Office, 886-2-2298-8987
Parker Hannifin Taiwan Co., Ltd.
8F., No.22 Wuquan 7th Road., Wugu Dist., New Taipei City, 248,
Taiwan (R.O.C)

Thailand
Sales Office
Bangkok Office, 66-2-186-7000
Parker Hannifin (Thailand) Co., Ltd.
1265 Rama 9 Road, Suanluang Bangkok 10250 Thailand

Singapore
Sales Office
Office: 65-6887-6300
Parker Hannifin Singapore Pte Ltd.
11th Fourth Chin Bee Road Singapore 619702

Malaysia
Sales Office
Selangor Office, 603-7849-0800
Parker Hannifin Industrial (M) Sdn Bhd
No.11 Persiaran Pasak Bumi
Seksyen U8, Bukit Jelutong Industrial Park
40150 Shah Alam, Selangor, Malaysia

Indonesia
Sales Office
Office: 62-21-2977-7900
PT. Parker Hannifin Indonesia
Techno Park Block G3/15-16
BSD (Bumi Serpong Damai) Tangerang 15314 Banten- Indonesia

Vietnam
Sales Office
Office: 84-8-3999-1600
Parker Hannifin Vietnam Co., Ltd.
No. 43R/10 Ho Van Hue Street,
Phu Nhuan District, Ho Chi Minh City, Vietnam

Australia
Sales Office
Office: 61-2-9634-7777
Parker Hannifin (Australia) Automation Department
9 Carrington Rd Castle Hill, NSW, 2154 Australia

New Zealand
Sales Office
Office: 64-9-574-1744
Parker Hannifin (NZ) Ltd.
5 Bowden Road, Mt Wellington 1060, Auckland, New Zealand

This catalogue is offered to you by;

Catalog 96-028778-01 Rev C
2018. 5