

**KOLLMORGEN**  
**PLATINUM<sup>®</sup>** *DDL*  
*Direct Drive Linear*

A new dimension in performance with higher throughput, accuracy and zero maintenance.

Data  
Publication



## The Direct Drive Linear (DDL) Story

What is direct drive? Very simply it is the direct coupling of a linear motor (such as the Kollmorgen **PLATINUM® DDL**) to the driven load. With this configuration, all mechanical transmissions, such as ball/lead screws, rack & pinions, belts/pulleys, and gearboxes are eliminated. This in turn eliminates backlash and compliance and other problems associated with these mechanical transmissions.

### The DDL Benefits:

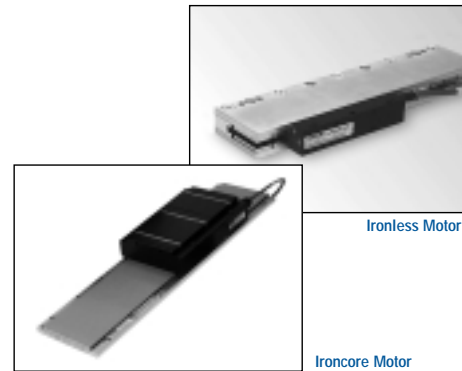
- ZERO maintenance
- No ball screws, gearboxes, rack & pinions, belts/pulleys
- Zero backlash and compliance
- High stiffness
- High positional accuracy
- Compact mechanical assembly
- Reduced parts count in machine
- Very smooth velocity
- Quiet operation

The **PLATINUM DDL** linear motor line provides a new dimension in performance with higher throughput, accuracy, and zero maintenance.

## Kollmorgen PLATINUM DDL

Kollmorgen supplied its first linear motors in the late 1970's for use in precision X-Y tables and coating systems. These were brush DC motors using the Kollmorgen patented push-through commutator bar method. This led to development in the early 1980's of the brushless versions of the linear motor which were used in film processing applications where smooth, high stiffness, linear motion was required. During the past 10 years, advances in permanent magnet material, power semiconductors, and microprocessor technology have been the enablers for increased performance and lower costs for linear motors.

These developments have been refined into the Kollmorgen **PLATINUM DDL** product line of easily applied, cost effective linear motor components. The product line consists of two fundamental constructions, **Ironless** and **Ironcore**. The Ironless motors have no attractive force between the frameless components and have Zero cogging for ultra smooth motion. The Ironcore motors provide the highest force per frame size. They feature a patented anti-cogging design which yields extremely smooth operation from these high force motors.



### Standard Features:

#### Ironless:

- Peak force 60 to 1600 N (13.6 to 360 lbf)
- Continuous force 21 to 450 N (4.6 to 101 lbf)
- Zero cogging
- Zero attractive force
- Smooth motion for speed as low as 1 micron/second (0.00004 in/sec)
- Low mass coil assembly for high acceleration

#### Ironcore:

- Peak force IC series: 190 to 15625 N (43 to 3513 lbf)
- Continuous force IC series: 73 to 12023 N (16 to 2703 lbf)
- Peak force ICD series: 170 to 1130 N (38 to 254 lbf)
- Continuous force ICD series: 57 to 315 N (13 to 71 lbf)
- Patented anti-cogging technique for minimal cogging without magnet skewing
- High motor constant (Km)
- High force density
- ICD Series Advantage:
  - Very low profile
  - Low attraction force
  - Suitable to replace many Ironless applications

#### All Motors:

- Zero contact, zero maintenance, brushless design
- 3 phase sinusoidal commutation
- Peak accelerations easily above 10 g's
- High position accuracy and resolution
- Very low settling time
- Low thermal losses
- Modular magnet design

#### Standard Options:

- Hall effect feedback
- Thermal protection
  - Thermistor
  - Thermostat (Ironcore)
- Supplemental air or water cooling (Ironcore)
- Cable options
- Magnet way covers for easy cleaning (Ironcore)
- FM approved, hazardous environment

## INTRODUCTION

## How to Use this Data Publication

This data publication makes the selection of a high performance linear motor simple! It includes a wide variety of linear motor components and cables that will adapt to your application needs. The linear motor selection guide at the back of this book is organized to lead you to the right motor quickly. The magnet ways for the Ironless, ICD and Ironcore motors are presented at the end of their respective sections so you can match any coil with any length of magnet assembly. To complete your sizing, use the model number ordering sheet at the back of this publication to build your part number as you size the motor.

### Easy Selection process:

1. Determine peak and continuous force required for your applications (see our applications section on pages 60-64 or use MOTIONEERING®, Danaher Motion's sizing and selection software)
2. Use the motor selection guide on pages 65 and 66 of this Data Publication to choose your motor
3. Refer to the appropriate pages in the data publication for technical details
4. Build model number for ordering using page 67

### Kollmorgen PLATINUM DDL Motors are Manufactured under one or more of the following patents:

4,369,383 4,644,199 4,749,921 5,910,691 5,411,808  
5,519,266 5,642,013 6,160,327 WO 96/15574 and others.

**Kollmorgen PLATINUM DDL motors have been reviewed, tested, and found to be in conformity to the following standards:** EN 60034, EN 60204-1, IEC 34-1. Product has been reviewed per EN 60950, EN 60529, IEC 721-3, NEMA MG7, UL1004, UL547, and UL674.

**The Kollmorgen PLATINUM DDL motors comply with the Low Voltage Directive 73/23/EEC for installation in a machine.** Safety depends upon installing and configuring Motor per the manufacturer's recommendations. The machine in which this product is to be installed must conform to the provisions of EC directive 89/336/EEC. The installer is responsible for ensuring that the end product complies with all the relevant laws in the country where the equipment is installed.

## The Data Publication is organized in the following sections:

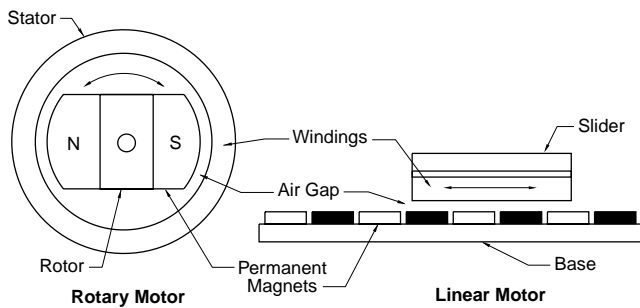
	Pages
Linear Motor Technology	4-5
Ironless technical data electrical/mechanical specifications mechanical outlines of coil assemblies	6-14
Ironless magnet ways technical data mechanical outline of magnet ways typical installation of magnet assemblies	14-17
ICD technical data electrical/mechanical specifications mechanical outlines of coil assemblies	18-24
ICD magnet ways technical data mechanical outline of magnet ways typical installation of magnet assemblies	22-24
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**KOLLMORGEN**  
**PLATINUM® DDL**  
Direct Drive Linear

**CE** EN60034-1  
EN60204-1

## What is a Linear Servomotor?

Kollmorgen's PLATINUM® DDL Series motors are frameless permanent magnet, three phase brushless servomotors. Fundamentally, a linear motor is a rotary motor that is rolled out flat.



Rotary Motor Rolled Out Flat

The two primary components of permanent magnet brushless rotary motors are the stator (primary coils) and the rotor (secondary or rotating magnets). In brushless linear motors the rotor is rolled out flat to become the magnet track (also called the magnet way). The primary coils of the rotary motor are rolled out flat to become the coil assembly (also sometimes called the slider). In most brushless linear motor applications it is typical for the magnet way to be stationary and the coil assembly to be in motion, because of the relative masses of the two components. But it is also perfectly acceptable and sometimes advantageous to reverse this arrangement. The basic electromagnetic operating principles are the same in either case and are identical to those of a rotary motor.

Two types of linear motors are available, **Ironcore** and **Ironless**. Each one provides characteristics and features that are optimal depending upon the application. **Ironcore** motors have coils wound on silicon steel laminations, to maximize the generated force, with a single sided magnet way. Using a patented electromagnetic design, Kollmorgen PLATINUM DDL linear motors have the highest rated force per size, a high Km motor constant (equals low thermal losses), and low cogging forces without the need for skewing of the magnets. The high thrust forces possible with these motors make them ideal for accelerating and moving high masses, and maintaining stiffness during machining or process forces. **Ironless** motors have no iron, or slots for the coils to be wound on. Therefore, these motors have zero

cogging, a very light mass, and absolutely no attractive forces between the coil assembly and the magnet way. These characteristics are ideal for applications requiring very low bearing friction, high acceleration of lighter loads, and for maximizing constant velocity, even at ultra low speeds. The modular magnet ways consists of a double row of magnets to maximize the generated thrust force and to provide a flux return path for the magnetic circuit.

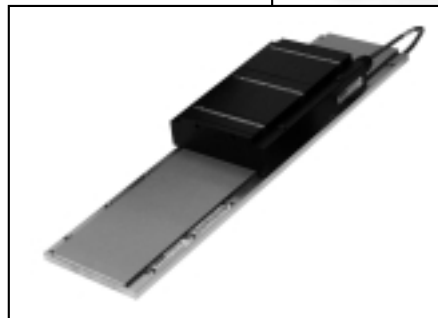
### Feedback Types:

All brushless motors require feedback for commutation. The conventional rotary motor typically utilizes a resolver mounted on the rear of the motor or Hall effect devices mounted integrally in the coil windings. For a linear motor, commutation feedback can also be accomplished with a variety of methods. Digital or linear Hall effect devices are available from Kollmorgen for the PLATINUM DDL series which allow the drive electronics to commutate the linear motors in a manner identical to rotary motors.

For exceptionally smooth motion requirements, sinusoidal



drive electronics such as the Kollmorgen SERVOSTAR® series, using digital Hall effects, provide sinusoidal drive currents to the motor for the best constant force and velocity performance. As an alternative, it is typical for linear motor applications to



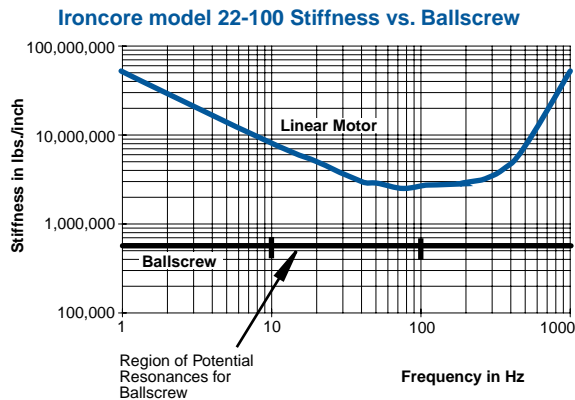
have a linear encoder present in the system for position feedback. It is increasingly common today for drive amplifiers, such as the Kollmorgen SERVOSTAR Digital amplifier, to derive the necessary commutation information directly from this linear encoder, either with or without supplemental digital Hall effect devices on startup. Other types of

feedback used on linear motor applications include linear Inductosyns, laser interferometers, and LVDT's.

## INTRODUCTION

**Advantages of Linear motors:****High Stiffness**

In a linear motor system the motor is connected directly to the moving load. Therefore, there is no backlash and practically no compliance between the motor and the load. When the motor moves the load moves instantly. Shown in the graph is a comparison showing the very high dynamic stiffness of a Kollmorgen ironcore linear motor vs. a typical ground ball screw.

**Wide Speed Range**

Since the frameless parts of the linear motor are non-contact, and no limitations of a mechanical transmission are present, both very high speeds and very low speeds are easily obtainable. Speeds are truly not limited by the motor. Instead, by eliminating the mechanical transmission, speed becomes limited by other elements in the system such as the linear bearings, and the achievable bandwidth from any feedback devices. Application speeds of greater than 5 meters per second (200 in./sec.) or less than 1 micron per second (.00004 in./sec.) are typically achievable. In comparison, mechanical transmissions such as ball screws are commonly limited to linear speeds of 0.5 to 0.7 meters per second (20-30 in./sec.) because of resonances and wear. In addition to a wide speed range, linear motors, both ironcore and ironless, have excellent constant velocity characteristics, typically better than  $\pm 0.01\%$  speed variation.

**High System Dynamics**

In addition to high speed capability, direct drive linear motors are capable of very high accelerations. Limited only by the system bearings, accelerations of 3 to 5g's are quite typical for the larger motors and accelerations exceeding 10g's are easily achievable for smaller motors.

**Smooth Operation and Positional Accuracy**

Both ironless and ironcore motors exhibit very smooth motion profiles due to the inherent motor design of the Kollmorgen PLATINUM® DDL series. Cogging, which

is a component of force, is greatly reduced in the ironcore designs and is zero in the ironless designs. As a result, these direct drive linear motors provide very low force and velocity ripple for ultra smooth motion. Positioning accuracies are limited only by the feedback resolution, and sub-micron resolutions are commonly achievable.

**Unlimited Travel**

Kollmorgen Platinum DDL series magnet ways are made in 5 modular sections: 64mm, 128mm, 256mm, 512mm and 1024mm long. Each module can be added in unlimited numbers to any other module to allow for unlimited travel. Whether the travel required is 1 millimeter (0.04 inches) or 100 meters (330 feet), the PLATINUM DDL series can accommodate the need.

**No Wear or Maintenance**

Linear motors have few components, therefore the need for ball screw components such as nuts, bearing blocks, couplings, motor mounts and the need to maintain these components have been eliminated. Very long life and clean operation, with no lubrication or maintenance of these parts are the result.

**Integration of Components is much simpler**

Frameless linear motors require much fewer components than rotary motors with mechanical transmissions. A 0.8mm airgap (0.031 inches) for the ironcore design and 0.5mm airgap (0.020 inches) for the ironless design is the only alignment of the frameless linear motor components that is necessary. No critical alignments are required as with ball screws. Straightness of travel as provided by the system linear bearings is more than sufficient for the Kollmorgen linear motors.

**Typical Applications for Linear Motors Include:****Machine Tool**

Drilling  
Milling  
Grinding  
Laser cutting  
Cam grinding

**Semiconductor**

Wafer handling process  
Wafer inspection  
Wafer slicing  
Tab bonding  
Wire bonding  
Ion implantation  
Lithography

**Textile**

Carpet tufting

**Measurement/Inspection**

Coordinate Measurement Machines

**Electronic Assembly**

Pick-and-place machines  
Component insertion  
Screen printers  
Adhesive dispensers  
PC board inspection, drilling

**Other applications include:****Flight Simulators****Acceleration sleds****Catapult****G-Force measurement**

## PERFORMANCE SPECIFICATIONS

## 06 Series Ironless - Non-cooled

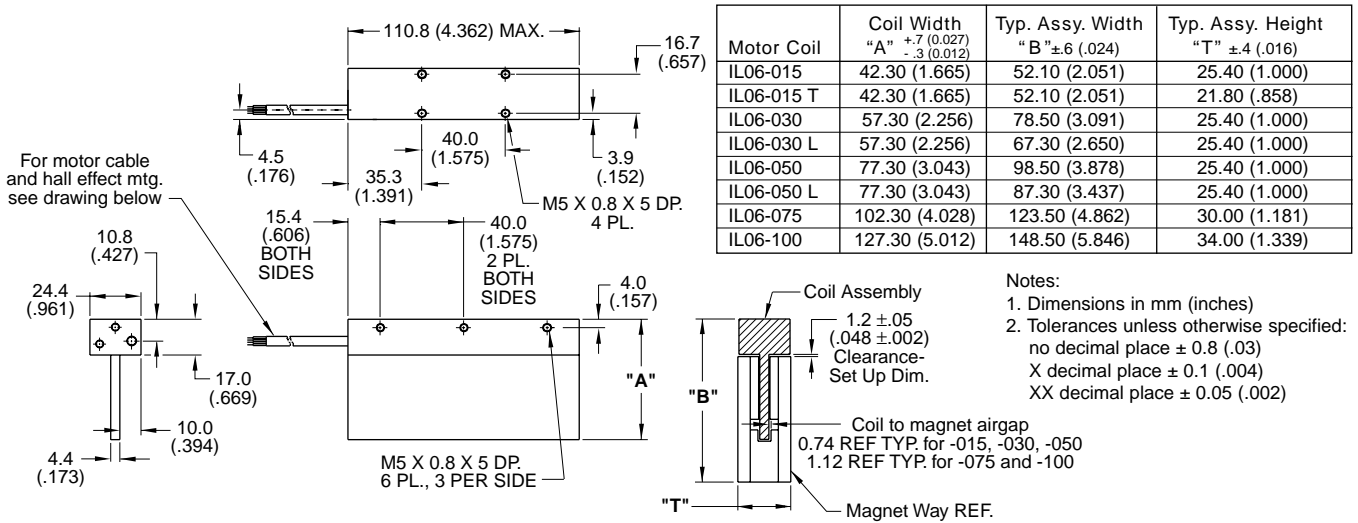
Rated Performance	Symbol	Units	IL06-015		IL06-030		IL06-050		IL06-075		IL06-100	
Peak force	$F_p$	N	60		120		200		300		400	
			lbf		13.6		27		45		68	
Continuous force @Tmax see note 1.	$F_c$	N	21		38		61		87		113	
			lbf		4.6		9		14		19	
Motor constant @ 25°C	$K_m$	$N/\sqrt{W}$	3.3		5.6		8.0		10.2		12.1	
Max. Cont. power dissipation	$P_c$	W	53		65		83		101		121	
<b>Electrical Specifications</b>												
			<b>Winding Code</b>		<b>A1</b>	<b>A4</b>	<b>A1</b>	<b>A4</b>	<b>A1</b>	<b>A4</b>	<b>A1</b>	<b>A4</b>
Peak current	$I_p$	Arms	7.2	14.4	7.1	14.2	7.0	14.0	7.0	14.0	7.0	14.0
Continuous Current @Tmax	$I_c$	Arms	2.5	4.9	2.3	4.5	2.1	4.3	2.0	4.1	2.0	4.0
Electrical resistance @25°C±10%	$R_m$	Ohms L-L	4.2	1.1	6.1	1.5	8.6	2.2	11.7	2.9	14.7	3.7
Electrical inductance ±20%	L	mH L-L	0.50	0.13	1.30	0.33	3.00	0.75	5.00	1.25	7.00	1.75
Back EMF constant @25°C±10%	$K_e$	Vpeak/m/s L-L	6.9	3.4	13.7	6.9	23.3	11.6	34.9	17.5	46.5	23.3
		Vpeak/in/sec L-L	0.17	0.09	0.35	0.17	0.59	0.30	0.89	0.44	1.18	0.59
Force constant @25°C±10%	$K_f$	N/Arms	8.4	4.2	16.8	8.4	28.5	14.3	42.8	21.4	57.0	28.5
		lbf / Arms	1.9	0.9	3.8	1.9	6.4	3.2	9.6	4.8	12.8	6.4
<b>Mechanical Specifications</b>												
Coil Assembly Mass ±15%	$M_c$	kg	0.23		0.27		0.32		0.38		0.45	
		lbs	0.5		0.6		0.7		0.8		1.0	
<b>Magnetic Way Type</b>			<b>MW</b>		<b>MW</b>		<b>MW</b>		<b>MW075</b>		<b>MW100</b>	
<b>Magnetic Way Mass ±15%</b>	$M_w$	kg/m	015	015T	030	030L	050	050L				
		lb/in	5.1	4.2	9.4	7.3	12.2	10.2	18.9		27.3	
			0.28	0.23	0.51	0.40	0.68	0.56	1.05		1.51	
<b>Figures of Merit &amp; Additional Data</b>												
Electrical time constant	$T_e$	ms	0.12		0.21		0.35		0.43		0.48	
Max.Theoretical Acceleration	$A_{max}$	$g's$	26.8		45.2		63.6		80.6		90.7	
Magnetic attraction	$F_a$	kN	0		0		0		0		0	
		lbf	0		0		0		0		0	
Thermal Resistance												
- coils to external structure	$R_{th}$	°C/Watt	1.97		1.61		1.26		1.04		0.87	
Max. Allowable Coil Temp.	$T_{max}$	°C	130		130		130		130		130	

## Notes:

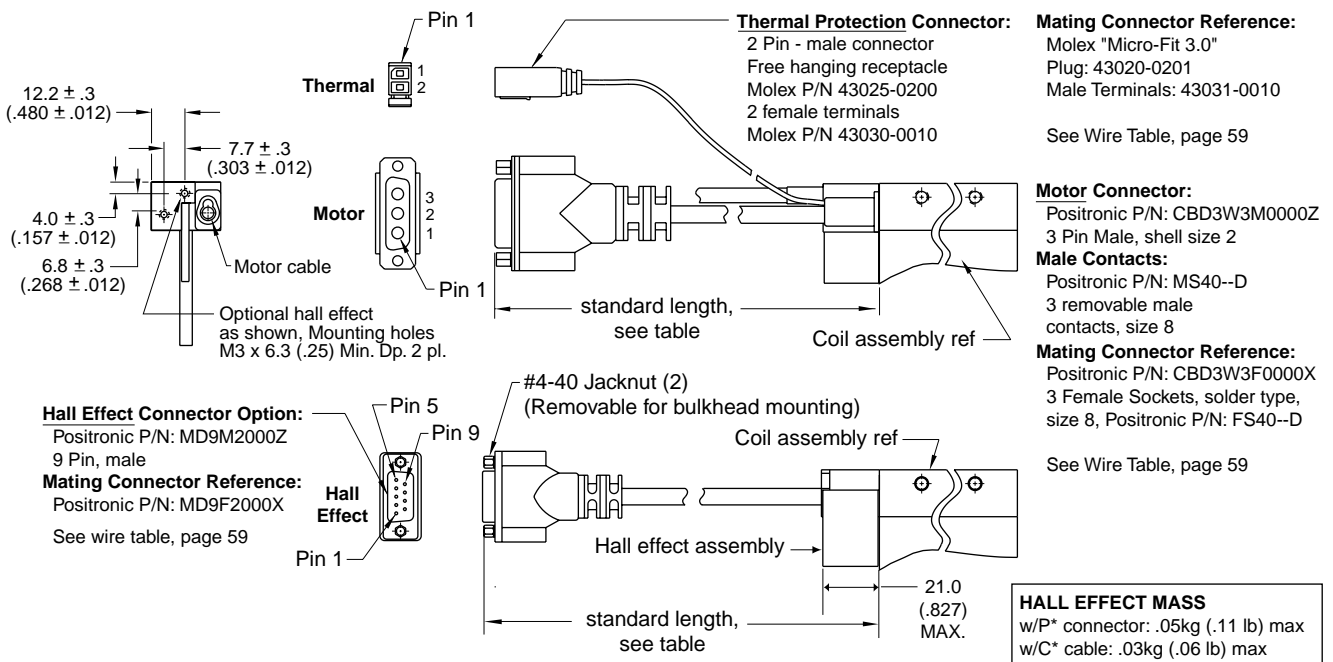
- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to:  $F_c = K_m \times \text{Square Root}(P_w)$ ; where  $P_w$  = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply  $F_c$  divided by the force constant  $K_f$ .
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

## DIMENSIONS

### IL06-xxx



## TERMINATION AND HALL EFFECT OPTIONS



Connector Option	
Connector	Length
P1	400 (16)
P2	200 (8)
P3	100 (4)

Flying Lead Option	
Leads	Length
C1	400 (16)
C2	200 (8)
C3	100 (4)

Note:  
Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57

## PERFORMANCE SPECIFICATIONS

## 12 Series Ironless - Non-cooled

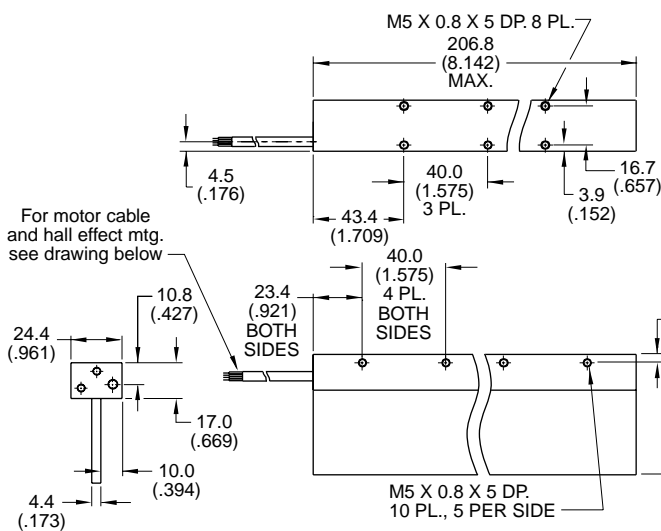
Rated Performance	Symbol	Units	IL12-015			IL12-030			IL12-050			IL12-075			IL12-100	
Peak force	F <sub>P</sub>	N	120			240			400			600			800	
		lbf	27			54			90			135			180	
Continuous force @Tmax see note 1.	F <sub>C</sub>	N	41			76			122			174			226	
		lbf	9			17			28			39			51	
Motor constant @ 25°C	K <sub>m</sub>	N/√W	4.8			7.8			11.3			14.5			17.2	
Max. Cont. power dissipation	P <sub>c</sub>	W	107			131			167			202			242	
<b>Electrical Specifications</b>																
		<b>Winding Code</b>	<b>A1</b>	<b>A2</b>	<b>A4</b>	<b>A1</b>	<b>A2</b>	<b>A4</b>	<b>A1</b>	<b>A2</b>	<b>A4</b>	<b>A1</b>	<b>A2</b>	<b>A4</b>	<b>A2</b>	<b>A4</b>
Peak current	I <sub>p</sub>	Arms	7.1	14.3	28.6	7.1	14.2	28.5	7.0	14.0	28.1	7.0	14.0	28.1	14.0	28.1
Continuous Current @Tmax	I <sub>c</sub>	Arms	2.4	4.9	9.8	2.3	4.5	9.0	2.1	4.3	8.6	2.0	4.1	8.1	4.0	7.9
Electrical resistance @25°C±10%	R <sub>m</sub>	Ohms L-L	8.5	2.1	0.5	12.2	3.1	0.8	17.2	4.3	1.1	23.3	5.8	1.5	7.4	1.8
Electrical inductance ±20%	L	mH L-L	1.00	0.25	0.06	2.60	0.65	0.16	6.00	1.50	0.38	10.00	2.50	0.63	3.50	0.88
Back EMF constant @25°C±10%	K <sub>e</sub>	Vpeak/m/s L-L	13.7	6.9	3.4	27.5	13.8	6.9	46.5	23.3	11.6	69.8	34.9	17.5	46.5	23.3
		Vpeak/in/sec L-L	0.35	0.17	0.09	0.70	0.35	0.17	1.18	0.59	0.30	1.77	0.89	0.44	1.18	0.59
Force constant @25°C±10%	K <sub>f</sub>	N/Arms	16.8	8.4	4.2	33.7	16.9	8.4	57.0	28.5	14.3	85.5	42.8	21.4	57.0	28.5
		lbf / Arms	3.8	1.9	0.9	7.6	3.8	1.9	12.8	6.4	3.2	19.2	9.6	4.8	12.8	6.4
<b>Mechanical Specifications</b>																
Coil Assembly Mass ±15%	M <sub>c</sub>	kg	0.35			0.42			0.52			0.65			0.77	
		lbs	0.8			0.9			1.1			1.4			1.7	
<b>Magnetic Way Type</b>																
			<b>MW</b>			<b>MW</b>			<b>MW</b>			<b>MW075</b>			<b>MW100</b>	
			<b>015</b>	<b>015T</b>	<b>030</b>	<b>030L</b>	<b>050</b>	<b>050L</b>								
Magnetic Way Mass ±15%	M <sub>w</sub>	kg/m	5.1	4.2	9.4	7.3	12.2	10.2							18.9	27.3
		lbs/in	0.28	0.23	0.51	0.40	0.68	0.56							1.05	1.51
<b>Figures of Merit &amp; Additional Data</b>																
Electrical time constant	T <sub>e</sub>	ms	0.12			0.21			0.35			0.43			0.48	
Max.Theoretical Acceleration	A <sub>max</sub>	g's	35.0			58.2			78.4			94.1			106.0	
Magnetic attraction	F <sub>a</sub>	kN	0			0			0			0			0	
		lbf	0			0			0			0			0	
Thermal Resistance																
- coils to external structure	R <sub>th</sub>	°C/Watt	0.984			0.804			0.629			0.519			0.433	
Max. Allowable Coil Temp.	T <sub>max</sub>	°C	130			130			130			130			130	

## Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to: Fc = Km x Square Root (Pw); where Pw = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

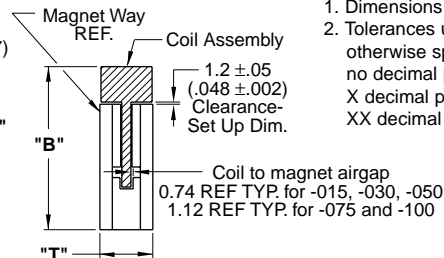
## DIMENSIONS

### IL12-xxx

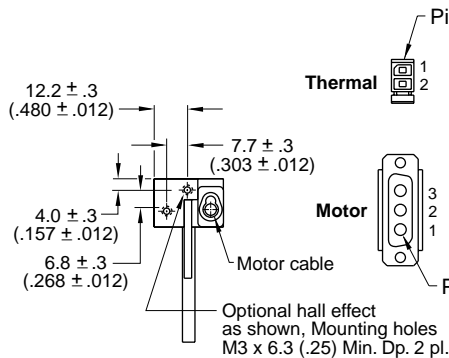


Motor Coil	Coil Width "A" $+7$ $-3$ (0.027) (0.012)	Typ. Assy. Width "B" $\pm 6$ (.024)	Typ. Assy. Height "T" $\pm 4$ (.016)
IL06-015	42.30 (1.665)	52.10 (2.051)	25.40 (1.000)
IL06-015 T	42.30 (1.665)	52.10 (2.051)	21.80 (.858)
IL06-030	57.30 (2.256)	78.50 (3.091)	25.40 (1.000)
IL06-030 L	57.30 (2.256)	67.30 (2.650)	25.40 (1.000)
IL06-050	77.30 (3.043)	98.50 (3.878)	25.40 (1.000)
IL06-050 L	77.30 (3.043)	87.30 (3.437)	25.40 (1.000)
IL06-075	102.30 (4.028)	123.50 (4.862)	30.00 (1.181)
IL06-100	127.30 (5.012)	148.50 (5.846)	34.00 (1.339)

- Notes:
1. Dimensions in mm (inches)
  2. Tolerances unless otherwise specified:  
no decimal place  $\pm 0.8$  (.03)  
X decimal place  $\pm 0.1$  (.004)  
XX decimal place  $\pm 0.05$  (.002)



## TERMINATION AND HALL EFFECT OPTIONS



**Thermal Protection Connector:**  
2 Pin - male connector  
Free hanging receptacle  
Molex P/N 43025-0200  
2 female terminals  
Molex P/N 43030-0010

**Mating Connector Reference:**  
Molex "Micro-Fit 3.0"  
Plug: 43020-0201  
Male Terminals: 43031-0010  
See Wire Table, page 59

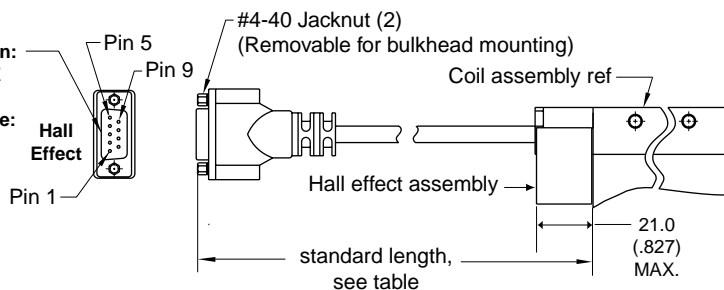
**Motor Connector:**  
Positronic P/N: CBD3W3M0000Z  
3 Pin Male, shell size 2

**Male Contacts:**  
Positronic P/N: MS40--D  
3 removable male contacts, size 8

**Mating Connector Reference:**  
Positronic P/N: CBD3W3F0000X  
3 Female Sockets, solder type, size 8, Positronic P/N: FS40--D  
See Wire Table, page 59

**Hall Effect Connector Option:**  
Positronic P/N: MD9M2000Z  
9 Pin, male

**Mating Connector Reference:**  
Positronic P/N: MD9F2000X  
See wire table, page 59



**HALL EFFECT MASS**  
w/P\* connector: .05kg (.11 lb) max  
w/C\* cable: .03kg (.06 lb) max

Connector Option	
Connector	Length
P1	400 (16)
P2	200 (8)
P3	100 (4)

Flying Lead Option	
Leads	Length
C1	400 (16)
C2	200 (8)
C3	100 (4)

Note:  
Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57

## PERFORMANCE SPECIFICATIONS

## 18 Series Ironless - Non-cooled

Rated Performance	Symbol	Units	IL18-015				IL18-030				IL18-050			
			A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4
Peak force	$F_p$	N	180				360				600			
		lbf	40				81				135			
Continuous force @Tmax see note 1.	$F_c$	N	62				114				184			
		lbf	14				26				41			
Motor constant @ 25°C	$K_m$	N/√W	5.8				9.7				13.8			
Max. Cont. power dissipation	$P_c$	W	160				196				251			
<b>Electrical Specifications</b>														
		<b>Winding Code</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A4</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A4</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A4</b>
Peak current	$I_p$	Arms	7.1	14.2	21.3	42.6	7.1	14.3	21.4	42.8	7.0	14.0	21.0	42.1
Continuous Current @Tmax	$I_c$	Arms	2.4	4.9	7.3	14.7	2.3	4.5	6.8	13.6	2.2	4.3	6.5	12.9
Electrical resistance @25°C±10%	$R_m$	Ohms L-L	12.7	3.2	1.4	0.4	18.2	4.6	2.0	0.5	25.7	6.4	2.9	0.7
Electrical inductance ±20%	L	mH L-L	1.50	0.38	0.17	0.04	3.80	0.95	0.42	0.11	9.00	2.25	1.00	0.25
Back EMF constant @25°C±10%	$K_e$	Vpeak/m/s L-L	20.7	10.3	6.9	3.4	41.2	20.6	13.7	6.9	69.8	34.9	23.3	11.6
		Vpeak/in/sec L-L	0.52	0.26	0.17	0.09	1.05	0.52	0.35	0.17	1.77	0.89	0.59	0.30
Force constant @25°C±10%	$K_f$	N/Arms	25.3	12.7	8.4	4.2	50.5	25.3	16.8	8.4	85.5	42.8	28.5	14.3
		lbf/Arms	5.7	2.8	1.9	0.9	11.4	5.7	3.8	1.9	19.2	9.6	6.4	3.2
<b>Mechanical Specifications</b>														
Coil Assembly Mass ±15%	$M_c$	kg	0.46				0.57				0.72			
		lbs	1.0				1.3				1.6			
<b>Magnetic Way Type</b>			<b>MW</b>				<b>MW</b>				<b>MW</b>			
			<b>015</b>	<b>015T</b>	<b>030</b>	<b>030L</b>	<b>050</b>	<b>050L</b>						
<b>Magnetic Way Mass ±15%</b>	$M_w$	kg/m	5.1	4.2	9.4	7.3	12.2	10.2						
		lbs/in	0.28	0.23	0.51	0.40	0.68	0.56						
<b>Figures of Merit &amp; Additional Data</b>														
Electrical time constant	$T_e$	ms	0.12				0.21				0.35			
Max.Theoretical Acceleration	$A_{max}$	g's	40.2				64.5				84.9			
Magnetic attraction	$F_a$	kN	0				0				0			
		lbf	0				0				0			
Thermal Resistance														
- coils to external structure	$R_{th}$	°C/Watt	0.656				0.536				0.419			
Max. Allowable Coil Temp.	$T_{max}$	°C	130				130				130			

## Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to:  $F_c = K_m \times \text{Square Root}(P_w)$ ; where Pw = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

## PERFORMANCE SPECIFICATIONS

### 18 Series Ironless - Non-cooled

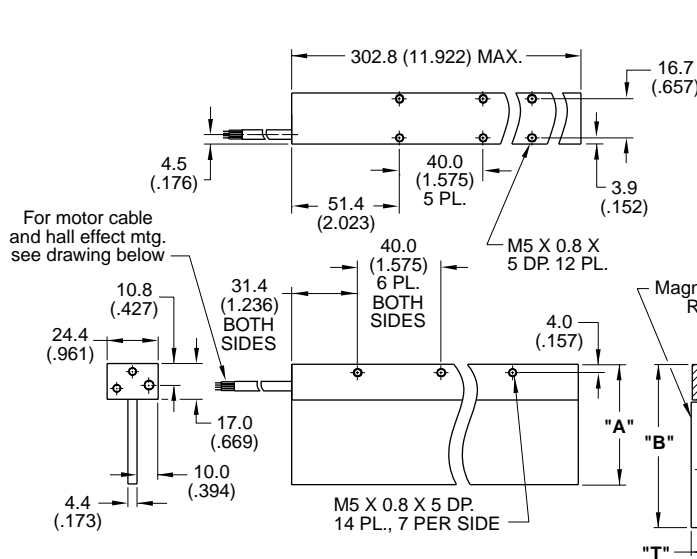
Rated Performance	Symbol	Units	IL18-075				IL18-100			
Peak force	F <sub>p</sub>	N	900				1200			
		lbf	202				270			
Continuous force @Tmax see note 1.	F <sub>c</sub>	N	260				338			
		lbf	59				76			
Motor constant @ 25°C	K <sub>m</sub>	N/√W	17.7				21.0			
Max. Cont. power dissipation	P <sub>c</sub>	W	303				363			
<b>Electrical Specifications</b>										
		<b>Winding Code</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A4</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A4</b>
Peak current	I <sub>p</sub>	Arms	7.0	14.0	21.0	42.1	7.0	14.0	21.0	42.1
Continuous Current @Tmax	I <sub>c</sub>	Arms	2.0	4.1	6.1	12.2	2.0	4.0	5.9	11.9
Electrical resistance @25°C±10%	R <sub>m</sub>	Ohms L-L	35.0	8.8	3.9	1.0	44.2	11.1	4.9	1.2
Electrical inductance ±20%	L	mH L-L	15.0	3.75	1.67	0.42	21.0	5.25	2.33	0.58
Back EMF constant @25°C±10%	K <sub>e</sub>	Vpeak/m/s L-L	105	52.4	34.9	17.5	140	69.9	46.6	23.3
		Vpeak/in/sec L-L	2.66	1.33	0.89	0.44	3.55	1.77	1.18	0.59
Force constant @25°C±10%	K <sub>f</sub>	N/Arms	128	64.2	42.8	21.4	171	85.6	57.0	28.5
		lbf/Arms	28.8	14.4	9.6	4.8	38.5	19.2	12.8	6.4
<b>Mechanical Specifications</b>										
Coil Assembly Mass ±15%	M <sub>c</sub>	kg	0.91				1.10			
		lbs	2.0				2.4			
<b>Magnetic Way Type</b>			<b>MW075</b>				<b>MW100</b>			
<b>Magnetic Way Mass ±15%</b>	M <sub>w</sub>	kg/m	18.9				27.3			
		lbs/in	1.05				1.51			
<b>Figures of Merit &amp; Additional Data</b>										
Electrical time constant	T <sub>e</sub>	ms	0.43				0.48			
Max.Theoretical Acceleration	A <sub>max</sub>	g's	101				111			
Magnetic attraction	F <sub>a</sub>	kN	0				0			
		lbf	0				0			
Thermal Resistance										
- coils to external structure	R <sub>th</sub>	°C/Watt	0.35				0.29			
Max. Allowable Coil Temp.	T <sub>max</sub>	°C	130				130			

**Notes:**

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to: Fc = Km x Square Root (Pw); where Pw = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

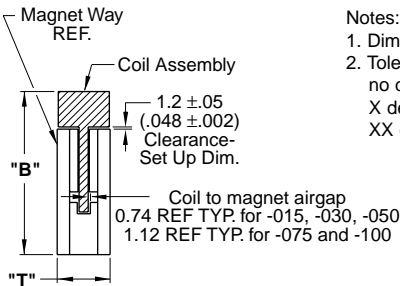
DIMENSIONS

IL18-xxx



Motor Coil	Coil Width "A" $+7 (0.027)$ $-3 (0.012)$	Typ. Assy. Width "B" $\pm 6 (.024)$	Typ. Assy. Height "T" $\pm 4 (.016)$
IL06-015	42.30 (1.665)	52.10 (2.051)	25.40 (1.000)
IL06-015 T	42.30 (1.665)	52.10 (2.051)	21.80 (.858)
IL06-030	57.30 (2.256)	78.50 (3.091)	25.40 (1.000)
IL06-030 L	57.30 (2.256)	67.30 (2.650)	25.40 (1.000)
IL06-050	77.30 (3.043)	98.50 (3.878)	25.40 (1.000)
IL06-050 L	77.30 (3.043)	87.30 (3.437)	25.40 (1.000)
IL06-075	102.30 (4.028)	123.50 (4.862)	30.00 (1.181)
IL06-100	127.30 (5.012)	148.50 (5.846)	34.00 (1.339)

- Notes:
1. Dimensions in mm (inches)
  2. Tolerances unless otherwise specified:  
no decimal place  $\pm 0.8 (.03)$   
X decimal place  $\pm 0.1 (.004)$   
XX decimal place  $\pm 0.05 (.002)$



TERMINATION AND HALL EFFECT OPTIONS

**Thermal Protection Connector:**  
2 Pin - male connector  
Free hanging receptacle  
Molex P/N 43025-0200  
2 female terminals  
Molex P/N 43030-0010

**Motor Connector:**  
Positronic P/N: CBD3W3M0000Z  
3 Pin Male, shell size 2

**Mating Connector Reference:**  
Molex "Micro-Fit 3.0"  
Plug: 43020-0201  
Male Terminals: 43031-0010

See Wire Table, page 59

**Hall Effect Connector Option:**  
Positronic P/N: MD9M2000Z  
9 Pin, male

**Mating Connector Reference:**  
Positronic P/N: MD9F2000X  
See wire table, page 59

**HALL EFFECT MASS**  
w/P\* connector: .05kg (.11 lb) max  
w/C\* cable: .03kg (.06 lb) max

**Mating Connector Reference:**  
Positronic P/N: CBD3W3F0000X  
3 Female Sockets, solder type, size 8, Positronic P/N: FS40--D

See Wire Table, page 59

Connector Option	
Connector	Length
P1	400 (16)
P2	200 (8)
P3	100 (4)

Flying Lead Option	
Leads	Length
C1	400 (16)
C2	200 (8)
C3	100 (4)

Note:  
Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57

## PERFORMANCE SPECIFICATIONS

### 24 Series Ironless - Non-cooled

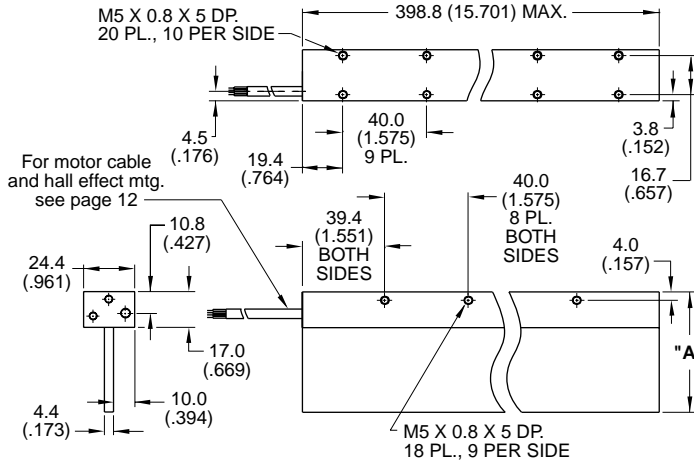
Rated Performance	Symbol	Units	IL24-015			IL24-030			IL24-050			IL24-075				IL24-100			
Peak force	F <sub>P</sub>	N	240			480			800			1200				1600			
		lbf	54			108			180			270				360			
Continuous force @Tmax see note 1.	F <sub>C</sub>	N	83			152			245			348				450			
		lbf	19			34			55			78				101			
Motor constant @ 25°C	K <sub>m</sub>	N/√W	6.7			11.2			15.9			20.6				24.4			
Max. Cont. power dissipation	P <sub>c</sub>	W	213			261			333			405				484			
<b>Electrical Specifications</b>																			
		<b>Winding Code</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A4</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A4</b>
Peak current	I <sub>P</sub>	Arms	7.1	14.2	28.4	7.1	14.2	28.5	7.0	14.0	28.1	7.0	14.0	28.0	56.1	7.0	14.0	28.1	56.1
Continuous Current @Tmax	I <sub>C</sub>	Arms	2.4	4.9	9.8	2.3	4.5	9.0	2.1	4.3	8.6	2.0	4.1	8.1	16.3	2.0	3.9	7.9	15.8
Electrical resistance @25°C±10%	R <sub>m</sub>	Ohms L-L	16.9	4.2	1.1	24.3	6.1	1.5	34.3	8.6	2.1	46.6	11.7	2.9	0.73	58.9	14.7	3.7	0.92
Electrical inductance ±20%	L	mH L-L	2.00	0.50	0.13	5.10	1.28	0.32	12.0	3.00	0.75	20.0	5.00	1.25	0.31	28.0	7.00	1.75	0.44
Back EMF constant @25°C±10%	K <sub>e</sub>	Vpeak/m/s L-L	27.5	13.8	6.9	55.0	27.5	13.8	93.1	46.5	23.3	140	69.9	34.9	17.5	186	93.1	46.6	23.3
		Vpeak/in/sec L-L	0.70	0.35	0.17	1.40	0.70	0.35	2.36	1.18	0.59	3.55	1.77	0.89	0.44	4.73	2.37	1.18	0.59
Force constant @25°C±10%	K <sub>f</sub>	N/Arms	33.7	16.9	8.4	67.4	33.7	16.9	114	57.0	28.5	171	85.6	42.8	21.4	228	114	57.0	28.5
		lbf / Arms	7.6	3.8	1.9	15.2	7.6	3.8	25.6	12.8	6.4	38.5	19.2	9.6	4.8	51.3	25.6	12.8	6.4
<b>Mechanical Specifications</b>																			
Coil Assembly Mass ±15%	M <sub>c</sub>	kg	0.57			0.72			0.92			1.17				1.42			
		lbs	1.3			1.6			2.0			2.6				3.1			
<b>Magnetic Way Type</b>																			
			<b>MW</b>		<b>MW</b>		<b>MW</b>		<b>MW075</b>				<b>MW100</b>						
			<b>015</b>	<b>015T</b>	<b>030</b>	<b>030L</b>	<b>050</b>	<b>050L</b>											
Magnetic Way Mass ±15%	M <sub>w</sub>	kg/m	5.1	4.2	9.4	7.3	12.2	10.2	18.9				27.3						
		lbs/in	0.28	0.23	0.51	0.40	0.68	0.56	1.05				1.51						
<b>Figures of Merit &amp; Additional Data</b>																			
Electrical time constant	T <sub>e</sub>	ms	0.12			0.21			0.35			0.43				0.48			
Max.Theoretical Acceleration	A <sub>max</sub>	g's	42.9			68.0			88.7			105				115			
Magnetic attraction	F <sub>a</sub>	kN	0			0			0			0				0			
		lbf	0			0			0			0				0			
Thermal Resistance <sup>0.49</sup> - coils to external structure	R <sub>th</sub>	°C/Watt	0.49			0.40			0.32			0.26				0.22			
Max. Allowable Coil Temp.	T <sub>max</sub>	°C	130			130			130			130				130			

**Notes:**

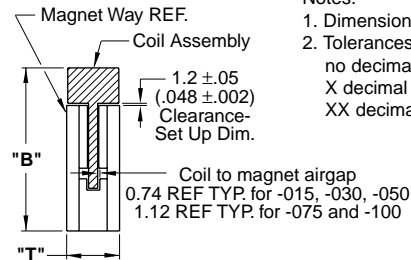
- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to: Fc = Km x Square Root (Pw); where Pw = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

DIMENSIONS

IL24-xxx



Motor Coil	Coil Width "A" $+7 (0.027)$ $-3 (0.012)$	Typ. Assy. Width "B" $\pm 6 (.024)$	Typ. Assy. Height "T" $\pm 4 (.016)$
IL06-015	42.30 (1.665)	52.10 (2.051)	25.40 (1.000)
IL06-015 T	42.30 (1.665)	52.10 (2.051)	21.80 (.858)
IL06-030	57.30 (2.256)	78.50 (3.091)	25.40 (1.000)
IL06-030 L	57.30 (2.256)	67.30 (2.650)	25.40 (1.000)
IL06-050	77.30 (3.043)	98.50 (3.878)	25.40 (1.000)
IL06-050 L	77.30 (3.043)	87.30 (3.437)	25.40 (1.000)
IL06-075	102.30 (4.028)	123.50 (4.862)	30.00 (1.181)
IL06-100	127.30 (5.012)	148.50 (5.846)	34.00 (1.339)

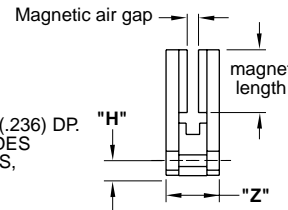
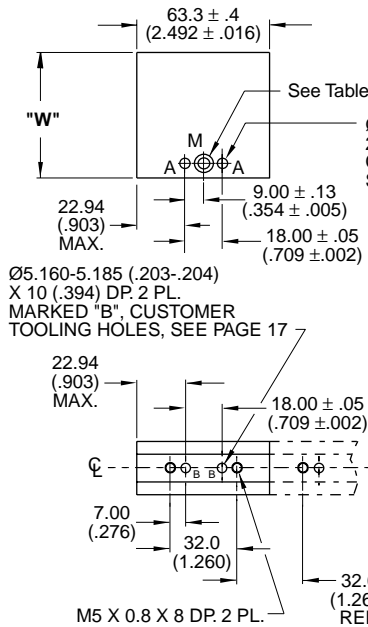


- Notes:
1. Dimensions in mm (inches)
  2. Tolerances unless otherwise specified:  
no decimal place  $\pm 0.8 (.03)$   
X decimal place  $\pm 0.1 (.004)$   
XX decimal place  $\pm 0.05 (.002)$

Ironless Magnet Ways

Magnet assemblies are modular and can be installed in multiples of same or alternate lengths (see page 17). Standard assembly lengths are shown below.

MWxxx-0064



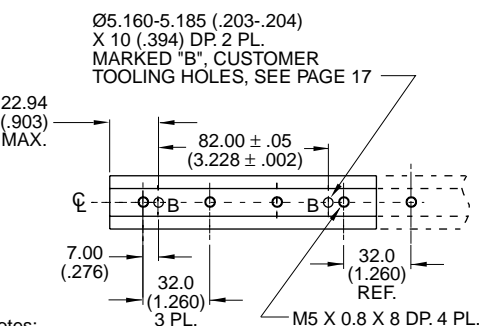
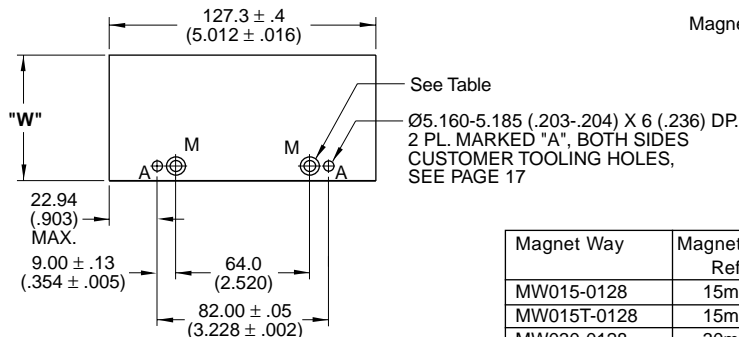
Magnet Way	Magnet Size Ref.	"H" $\pm .08 (.003)$	"W" $\pm .4 (.016)$	"Z" $\pm .4 (.016)$
MW015-0064	15mm	5.69 (.224)	33.80 (1.331)	25.40 (1.000)
MW015T-0064	15mm	5.69 (.224)	33.80 (1.331)	21.80 (.858)
MW030-0064	30mm	7.11 (.280)	60.20 (2.370)	25.40 (1.000)
MW030L-0064	30mm	5.69 (.224)	49.00 (1.929)	25.40 (1.000)
MW050-0064	50mm	7.11 (.280)	80.20 (3.158)	25.40 (1.000)
MW050L-0064	50mm	5.69 (.224)	69.00 (2.716)	25.40 (1.000)
MW075-0064	75mm	8.23 (.324)	105.20 (4.142)	30.00 (1.181)
MW100-0064	100mm	8.23 (.324)	130.20 (5.126)	34.00 (1.339)

Magnet Way	Hardware (Hex, Socket Head Cap)					
	Hole Dia. $\pm .13 (.005)$	C'bore Dia. $\pm .13 (.005)$	C'bore Depth $\pm .13 (.005)$	Metric	Inch	Bottom Mount Thread Option
MW015-0064	4.70 (.185)	7.80 (.307)	4.00 (.157)	M4	#8	M4 X 0.7 X 6.0 DP.
MW015T-0064	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW030-0064	5.70 (.224)	9.35 (.368)	5.79 (.228)	M5	#10	M5 X 0.8 X 8.0 DP.
MW030L-0064	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW050-0064	5.70 (.224)	9.35 (.368)	5.79 (.228)	M5	#10	M5 X 0.8 X 8.0 DP.
MW050L-0064	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW075-0064	5.70 (.224)	9.35 (.368)	7.95 (.313)	M5	#10	M5 X 0.8 X 8.0 DP.
MW100-0064	5.70 (.224)	9.35 (.368)	9.96 (.392)	M5	#10	M5 X 0.8 X 8.0 DP.

- Notes:
1. Dimensions in mm (inches)
  2. Tolerances unless otherwise specified:  
no decimal place  $\pm 0.8 (.03)$   
X decimal place  $\pm 0.1 (.004)$   
XX decimal place  $\pm 0.05 (.002)$

## DIMENSIONS

### MWxxx-0128

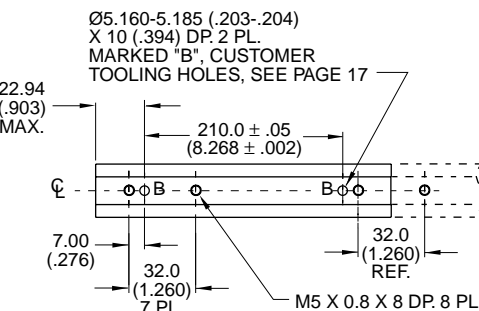
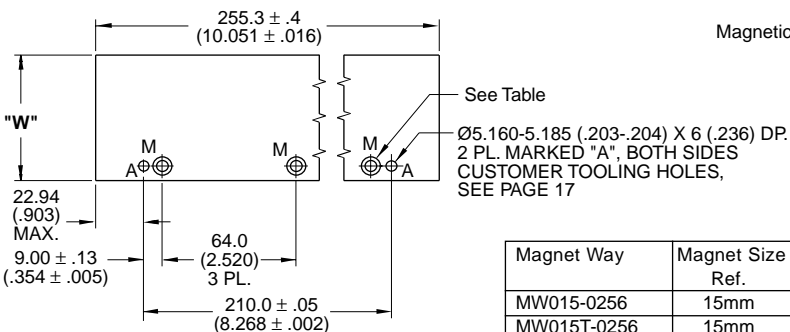


- Notes:
1. Dimensions in mm (inches)
  2. Tolerances unless otherwise specified:  
no decimal place  $\pm 0.8$  (.03)  
X decimal place  $\pm 0.1$  (.004)  
XX decimal place  $\pm 0.05$  (.002)

Magnet Way	Magnet Size Ref.	"H" $\pm .08$ (.003)	"W" $\pm .4$ (.016)	"Z" $\pm .4$ (.016)
MW015-0128	15mm	5.69 (.224)	33.80 (1.331)	25.40 (1.000)
MW015T-0128	15mm	5.69 (.224)	33.80 (1.331)	21.80 (.858)
MW030-0128	30mm	7.11 (.280)	60.20 (2.370)	25.40 (1.000)
MW030L-0128	30mm	5.69 (.224)	49.00 (1.929)	25.40 (1.000)
MW050-0128	50mm	7.11 (.280)	80.20 (3.158)	25.40 (1.000)
MW050L-0128	50mm	5.69 (.224)	69.00 (2.716)	25.40 (1.000)
MW075-0128	75mm	8.23 (.324)	105.20 (4.142)	30.00 (1.181)
MW100-0128	100mm	8.23 (.324)	130.20 (5.126)	34.00 (1.339)

Magnet Way	Hardware (Hex, Socket Head Cap)					
	Hole Dia. $\pm .13$ (.005)	C'bore Dia. $\pm .13$ (.005)	C'bore Depth $\pm .13$ (.005)	Metric	Inch	Bottom Mount Thread Option
MW015-0128	4.70 (.185)	7.80 (.307)	4.00 (.157)	M4	#8	M4 X 0.7 X 6.0 DP.
MW015T-0128	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW030-0128	5.70 (.224)	9.35 (.368)	5.79 (.228)	M5	#10	M5 X 0.8 X 8.0 DP.
MW030L-0128	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW050-0128	5.70 (.224)	9.35 (.368)	5.79 (.228)	M5	#10	M5 X 0.8 X 8.0 DP.
MW050L-0128	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW075-0128	5.70 (.224)	9.35 (.368)	7.95 (.313)	M5	#10	M5 X 0.8 X 8.0 DP.
MW100-0128	5.70 (.224)	9.35 (.368)	9.96 (.392)	M5	#10	M5 X 0.8 X 8.0 DP.

### MWxxx-0256



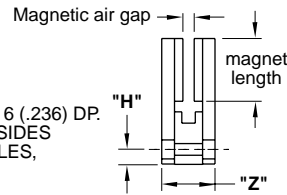
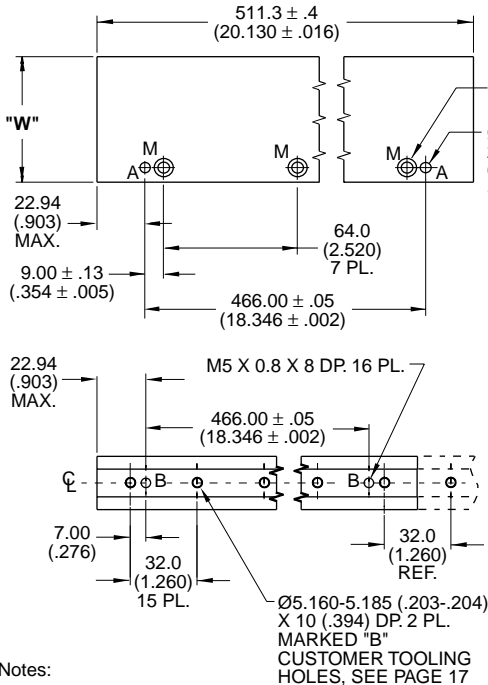
- Notes:
1. Dimensions in mm (inches)
  2. Tolerances unless otherwise specified:  
no decimal place  $\pm 0.8$  (.03)  
X decimal place  $\pm 0.1$  (.004)  
XX decimal place  $\pm 0.05$  (.002)

Magnet Way	Magnet Size Ref.	"H" $\pm .08$ (.003)	"W" $\pm .4$ (.016)	"Z" $\pm .4$ (.016)
MW015-0256	15mm	5.69 (.224)	33.80 (1.331)	25.40 (1.000)
MW015T-0256	15mm	5.69 (.224)	33.80 (1.331)	21.80 (.858)
MW030-0256	30mm	7.11 (.280)	60.20 (2.370)	25.40 (1.000)
MW030L-0256	30mm	5.69 (.224)	49.00 (1.929)	25.40 (1.000)
MW050-0256	50mm	7.11 (.280)	80.20 (3.158)	25.40 (1.000)
MW050L-0256	50mm	5.69 (.224)	69.00 (2.716)	25.40 (1.000)
MW075-0256	75mm	8.23 (.324)	105.20 (4.142)	30.00 (1.181)
MW100-0256	100mm	8.23 (.324)	130.20 (5.126)	34.00 (1.339)

Magnet Way	Hardware (Hex, Socket Head Cap)					
	Hole Dia. $\pm .13$ (.005)	C'bore Dia. $\pm .13$ (.005)	C'bore Depth $\pm .13$ (.005)	Metric	Inch	Bottom Mount Thread Option
MW015-0256	4.70 (.185)	7.80 (.307)	4.00 (.157)	M4	#8	M4 X 0.7 X 6.0 DP.
MW015T-0256	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW030-0256	5.70 (.224)	9.35 (.368)	5.79 (.228)	M5	#10	M5 X 0.8 X 8.0 DP.
MW030L-0256	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW050-0256	5.70 (.224)	9.35 (.368)	5.79 (.228)	M5	#10	M5 X 0.8 X 8.0 DP.
MW050L-0256	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW075-0256	5.70 (.224)	9.35 (.368)	7.95 (.313)	M5	#10	M5 X 0.8 X 8.0 DP.
MW100-0256	5.70 (.224)	9.35 (.368)	9.96 (.392)	M5	#10	M5 X 0.8 X 8.0 DP.

DIMENSIONS

MWxxx-0512

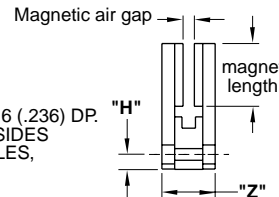
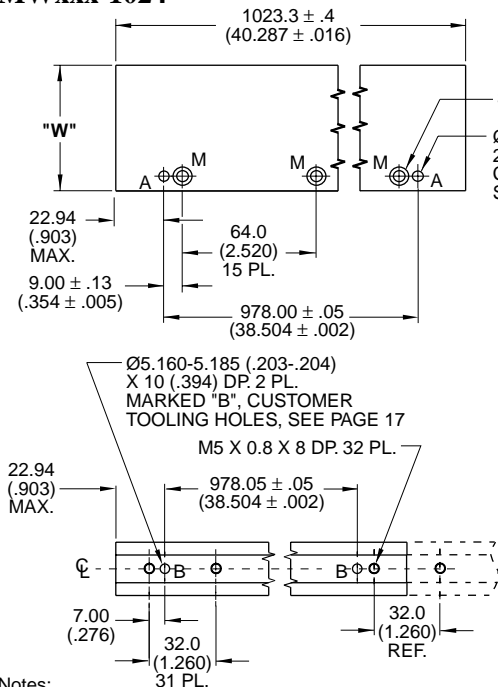


Magnet Way	Magnet Size Ref.	"H" ± .08 (.003)	"W" ± .4 (.016)	"Z" ± .4 (.016)
MW015-0512	15mm	5.69 (.224)	33.80 (1.331)	25.40 (1.000)
MW015T-0512	15mm	5.69 (.224)	33.80 (1.331)	21.80 (.858)
MW030-0512	30mm	7.11 (.280)	60.20 (2.370)	25.40 (1.000)
MW030L-0512	30mm	5.69 (.224)	49.00 (1.929)	25.40 (1.000)
MW050-0512	50mm	7.11 (.280)	80.20 (3.158)	25.40 (1.000)
MW050L-0512	50mm	5.69 (.224)	69.00 (2.716)	25.40 (1.000)
MW075-0512	75mm	8.23 (.324)	105.20 (4.142)	30.00 (1.181)
MW100-0512	100mm	8.23 (.324)	130.20 (5.126)	34.00 (1.339)

Magnet Way	Hardware (Hex, Socket Head Cap)					
	Hole Dia. ± .13 (.005)	C'bore Dia. ± .13 (.005)	C'bore Depth ± .13 (.005)	Metric	Inch	Bottom Mount Thread Option
MW015-0512	4.70 (.185)	7.80 (.307)	4.00 (.157)	M4	#8	M4 X 0.7 X 6.0 DP.
MW015T-0512	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW030-0512	5.70 (.224)	9.35 (.368)	5.79 (.228)	M5	#10	M5 X 0.8 X 8.0 DP.
MW030L-0512	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW050-0512	5.70 (.224)	9.35 (.368)	5.79 (.228)	M5	#10	M5 X 0.8 X 8.0 DP.
MW050L-0512	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW075-0512	5.70 (.224)	9.35 (.368)	7.95 (.313)	M5	#10	M5 X 0.8 X 8.0 DP.
MW100-0512	5.70 (.224)	9.35 (.368)	9.96 (.392)	M5	#10	M5 X 0.8 X 8.0 DP.

- Notes:
1. Dimensions in mm (inches)
  2. Tolerances unless otherwise specified:  
 no decimal place ± 0.8 (.03)  
 X decimal place ± 0.1 (.004)  
 XX decimal place ± 0.05 (.002)

MWxxx-1024



Magnet Way	Magnet Size Ref.	"H" ± .08 (.003)	"W" ± .4 (.016)	"Z" ± .4 (.016)
MW015-1024	15mm	5.69 (.224)	33.80 (1.331)	25.40 (1.000)
MW015T-1024	15mm	5.69 (.224)	33.80 (1.331)	21.80 (.858)
MW030-1024	30mm	7.11 (.280)	60.20 (2.370)	25.40 (1.000)
MW030L-1024	30mm	5.69 (.224)	49.00 (1.929)	25.40 (1.000)
MW050-1024	50mm	7.11 (.280)	80.20 (3.158)	25.40 (1.000)
MW050L-1024	50mm	5.69 (.224)	69.00 (2.716)	25.40 (1.000)
MW075-1024	75mm	8.23 (.324)	105.20 (4.142)	30.00 (1.181)
MW100-1024	100mm	8.23 (.324)	130.20 (5.126)	34.00 (1.339)

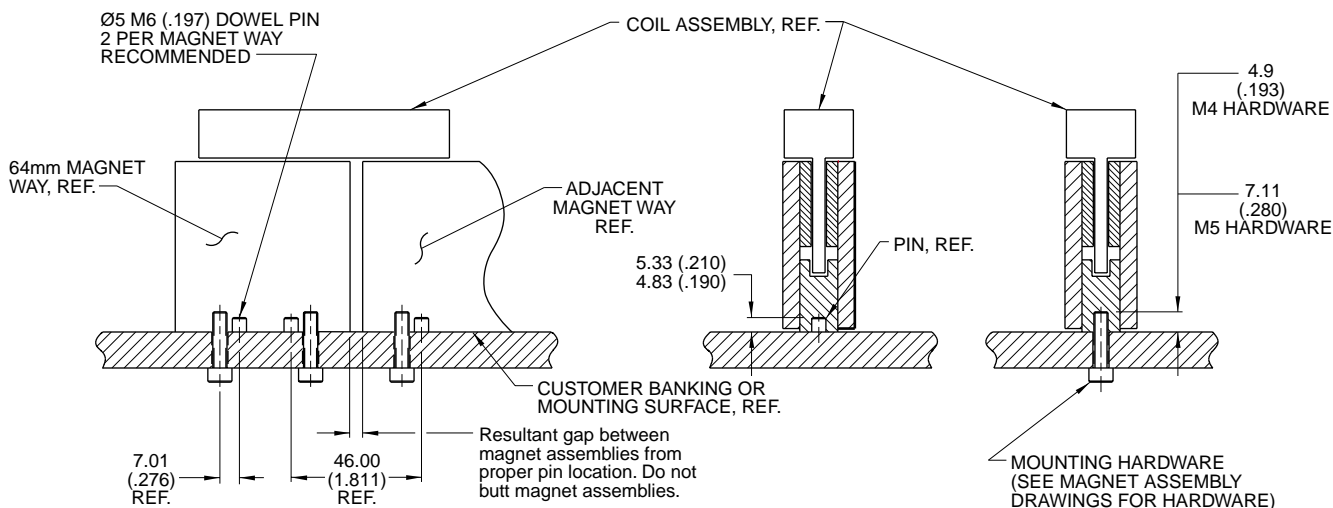
Magnet Way	Hardware (Hex, Socket Head Cap)					
	Hole Dia. ± .13 (.005)	C'bore Dia. ± .13 (.005)	C'bore Depth ± .13 (.005)	Metric	Inch	Bottom Mount Thread Option
MW015-1024	4.70 (.185)	7.80 (.307)	4.00 (.157)	M4	#8	M4 X 0.7 X 6.0 DP.
MW015T-1024	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW030-1024	5.70 (.224)	9.35 (.368)	5.79 (.228)	M5	#10	M5 X 0.8 X 8.0 DP.
MW030L-1024	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW050-1024	5.70 (.224)	9.35 (.368)	5.79 (.228)	M5	#10	M5 X 0.8 X 8.0 DP.
MW050L-1024	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW075-1024	5.70 (.224)	9.35 (.368)	7.95 (.313)	M5	#10	M5 X 0.8 X 8.0 DP.
MW100-1024	5.70 (.224)	9.35 (.368)	9.96 (.392)	M5	#10	M5 X 0.8 X 8.0 DP.

- Notes:
1. Dimensions in mm (inches)
  2. Tolerances unless otherwise specified:  
 no decimal place ± 0.8 (.03)  
 X decimal place ± 0.1 (.004)  
 XX decimal place ± 0.05 (.002)

## TYPICAL INSTALLATION OF IRONLESS MAGNET ASSEMBLIES

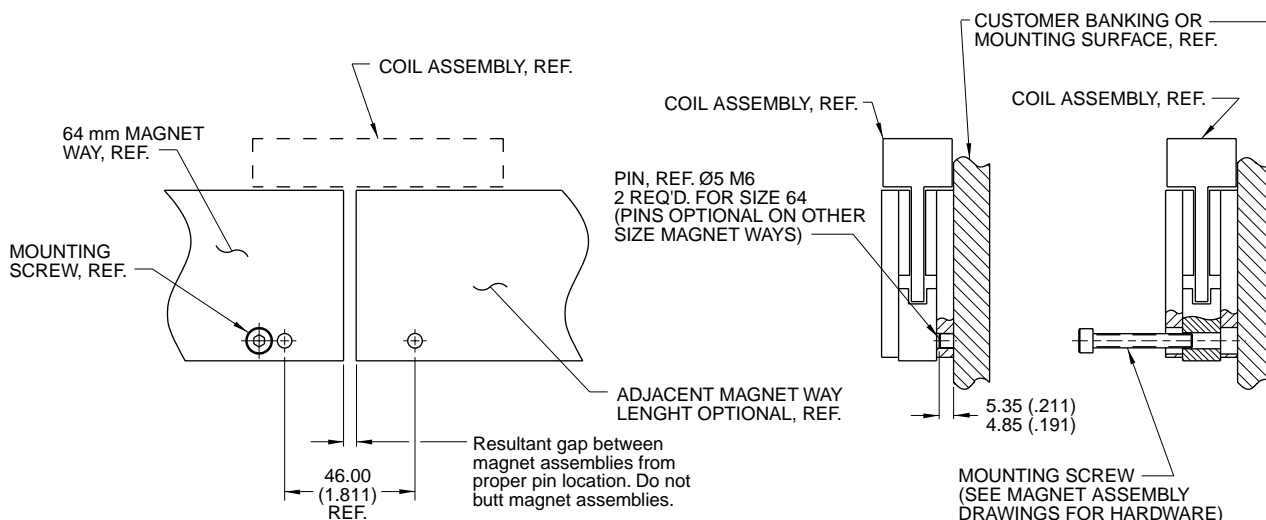
Magnet Way widths correspond to the mating coil assembly width. Magnet Way assemblies are modular and come in standard lengths: 64, 128, 256, 512, 1024 mm. Multiple magnet assemblies can be installed to obtain the desired length. Shown below is the method to mount multiple assemblies.

### Bottom mounting installation



Dimensions in mm(in)

### Side mounting installation



Dimensions in mm(in)

## PERFORMANCE SPECIFICATIONS

## ICD05 Series Ironcore

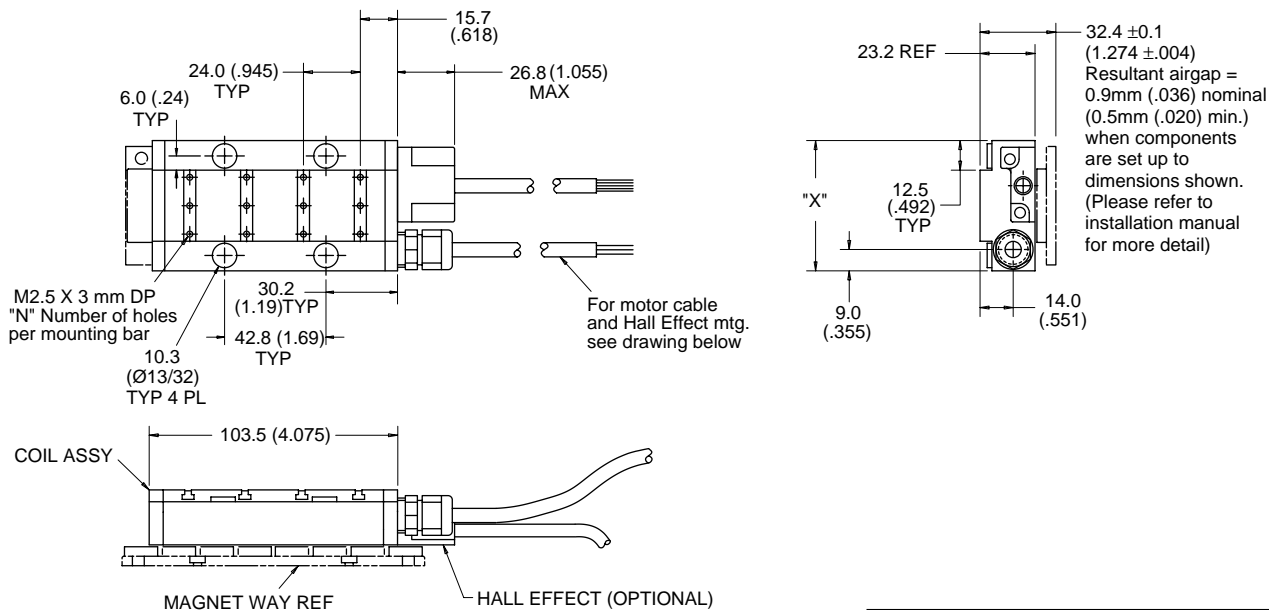
Rated Performance	Symbol	Units	ICD05-030		ICD05-050		ICD05-075		ICD05-100	
Peak force	$F_p$	N	170	280	425	550				
		lbf	38	63	96	124				
Continuous force @Tmax see note 1.	$F_c$	N	57	87	125	157				
		lbf	13	20	28	35				
Motor constant @ 130°C	$K_m$	$N/\sqrt{W}$	10.3	14.5	18.6	22.0				
		$lbf/\sqrt{W}$	2.3	3.3	4.2	4.9				
Motor constant @ 25°C	$K_{m25}$	$N/\sqrt{W}$	12.3	17.2	22.0	26.0				
		$lbf/\sqrt{W}$	2.8	3.9	4.9	5.9				
Max. Cont. power dissipation	$P_c$	W	30	36	46	51				
<b>Electrical Specifications</b>										
		<b>Winding Code</b>	<b>A1</b>	<b>A5</b>	<b>A1</b>	<b>A5</b>	<b>A1</b>	<b>A5</b>	<b>A1</b>	<b>A5</b>
Peak current	$I_p$	Arms	7.9	13.7	8.5	14.7	8.5	14.7	8.5	14.7
Continuous Current @Tmax	$I_c$	Arms	2.1	3.7	2.0	3.4	1.9	3.3	1.8	3.1
Electrical resistance										
@25°C±10%	$R_m$	Ohms L-L	3.2	1.1	4.5	1.5	6.1	2.0	7.7	2.6
Electrical inductance ±20%	L	mH L-L	9.1	3.0	14.4	4.8	21.0	7.0	27.6	9.2
Back EMF constant	$K_e$	Vpeak/m/s L-L	21.8	12.6	36.3	21.0	54.3	31.4	72.4	41.8
		Vpeak/in/sec L-L	0.55	0.32	0.92	0.53	1.38	0.80	1.84	1.06
Force constant @25°C±10%	$K_f$	N/Arms	26.7	15.4	44.5	25.7	66.5	38.4	88.7	51.2
		lbf / Arms	6.0	3.5	10.0	5.8	15.0	8.6	19.9	11.5
<b>Mechanical Specifications</b>										
Coil Assembly Mass ±15%	$M_c$	kg	0.62	0.95	1.36	1.71				
		lbs	1.4	2.1	3.0	3.8				
<b>Magnetic Way Type</b>			<b>MCD030</b>		<b>MCD050</b>		<b>MCD075</b>		<b>MCD100</b>	
Magnetic Way Mass ±15%M <sub>w</sub>		kg/m	2.70	3.93	5.48	7.04				
		lbs/in	0.15	0.22	0.31	0.39				
<b>Figures of Merit &amp; Additional Data</b>										
Electrical time constant	$T_e$	ms	2.9	3.2	3.4	3.6				
Max.Theoretical Acceleration	$A_{max}$	g's	28.0	30.2	31.9	32.8				
Magnetic attraction	$F_a$	kN	0.53	0.89	1.33	1.78				
		lbf	119	200	299	400				
Thermal Resistance										
- coils to external structure	$R_{th}$	°C/Watt	3.50	2.90	2.30	2.06				
Max. Allowable Coil Temp.	$T_{max}$	°C	130	130	130	130				

## Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to:  $F_c = K_m \times \text{Square Root}(P_w)$ ; where Pw = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.
- Winding Code A1 to A4 - WYE winding.  
Winding Code A5 to A8 - DELTA winding.

## DIMENSIONS

### ICD05-xxx



**Notes:**

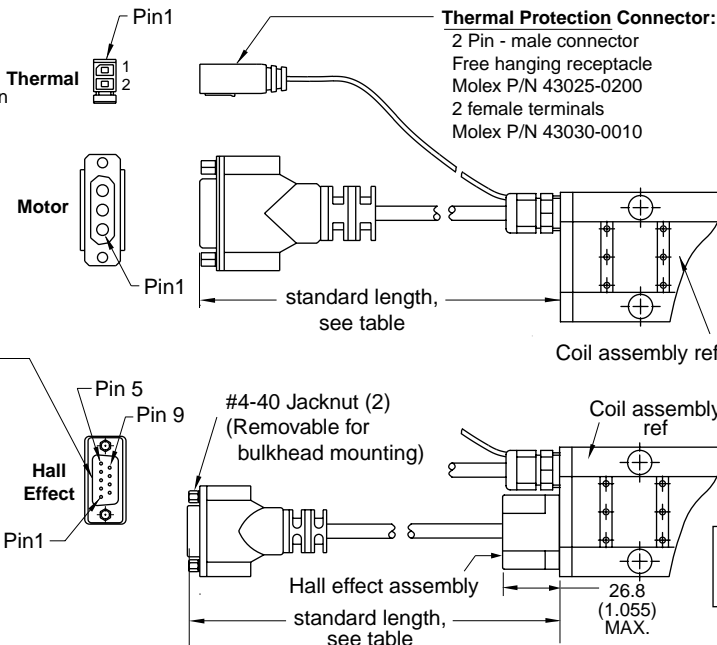
- Dimensions in mm (inches)
- Tolerances unless otherwise specified:
  - no decimal place ± 0.8 (.03)
  - X decimal place ± 0.1 (.004)
  - XX decimal place ± 0.05 (.002)

Motor Coil Type	Coil Width "X"	# Holes "N"
ICD05-030	55.0 (2.165) ± 1.0 (.04)	3
ICD05-050	75.0 (2.953) ± 1.0 (.04)	4
ICD05-075	100.0 (3.937) ± 1.0 (.04)	5
ICD05-100	125.0 (4.921) ± 1.0 (.04)	5

## TERMINATION AND HALL EFFECT OPTIONS

**Note:**

Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57

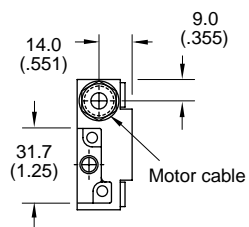


**Hall Effect Connector Option:**

Positronic P/N: MD9M2000Z  
9 Pin, male

**Mating Connector Reference:**

Positronic P/N: MD9F2000X



Connector Option	
Connector	Length
P1	400 (16)
P2	200 (8)
P3	100 (4)

Flying Lead Option	
Leads	Length
C1	400 (16)
C2	200 (8)
C3	100 (4)

## PERFORMANCE SPECIFICATIONS

## ICD10 Series Ironcore

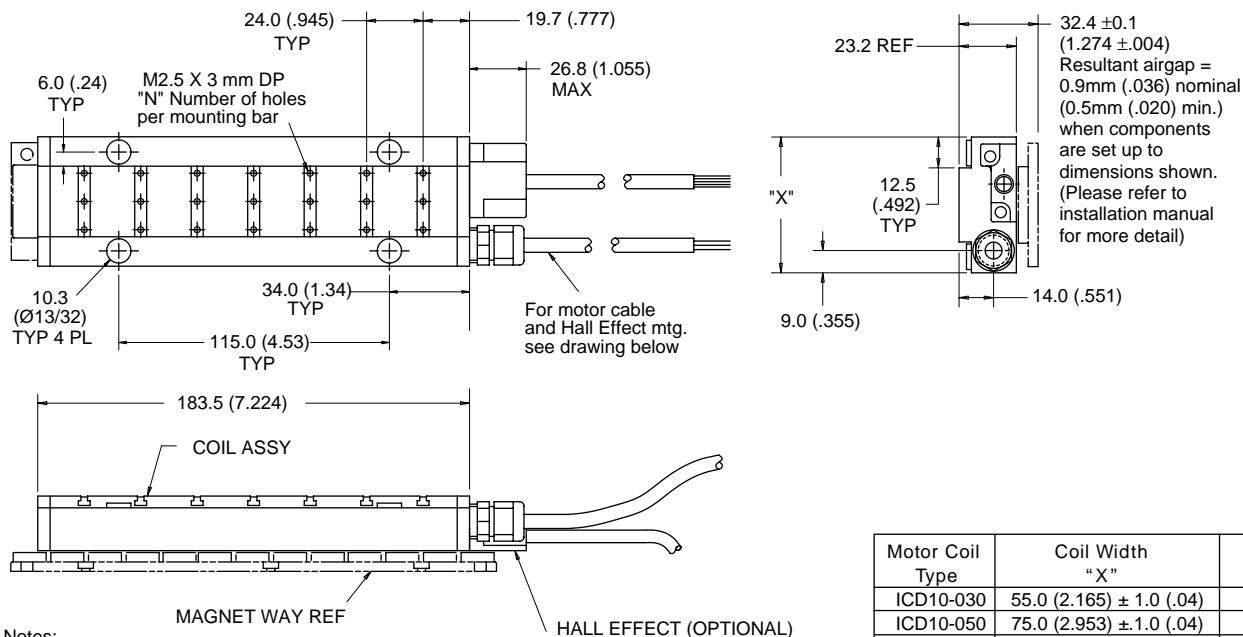
Rated Performance	Symbol	Units	ICD10-030				ICD10-050				ICD10-075				ICD10-100			
Peak force	F <sub>p</sub>	N	340				560				850				1130			
		lbf	76				126				191				254			
Continuous force @Tmax see note 1.	F <sub>c</sub>	N	104				171				246				315			
		lbf	23				38				55				71			
Motor constant @ 130°C	K <sub>m</sub>	N/√W	14.6				20.5				26.4				31.3			
		lbf/√W	3.3				4.6				5.9				7.0			
Motor constant @ 25°C	K <sub>m25</sub>	N/√W	17.3				24.3				31.3				37.1			
		lbf/√W	3.9				5.5				7.0				8.3			
Max. Cont. power dissipation	P <sub>c</sub>	W	51				69				87				101			
<b>Electrical Specifications</b>																		
			<b>Winding Code</b>															
			<b>A1</b>	<b>A4</b>	<b>A5</b>	<b>A8</b>	<b>A1</b>	<b>A4</b>	<b>A5</b>	<b>A8</b>	<b>A1</b>	<b>A4</b>	<b>A5</b>	<b>A8</b>	<b>A1</b>	<b>A4</b>	<b>A5</b>	<b>A8</b>
Peak current	I <sub>p</sub>	Arms	7.9	15.8	13.7	27.4	7.9	15.8	13.7	27.4	7.9	15.8	13.7	27.4	7.9	15.8	13.7	27.4
Continuous Current @Tmax	I <sub>c</sub>	Arms	1.9	3.9	3.4	6.8	1.9	3.8	3.3	6.6	1.8	3.7	3.2	6.4	1.8	3.5	3.1	6.1
Electrical resistance																		
@25°C±10%	R <sub>m</sub>	Ohms L-L	6.4	1.6	2.1	0.5	9.0	2.2	3.0	0.7	12.2	3.0	4.1	1.0	15.4	3.9	5.1	1.3
Electrical inductance ±20%	L	mH L-L	18.3	4.6	6.1	1.5	29.0	7.3	9.7	2.4	42.4	10.6	14.1	3.5	55.8	13.9	18.6	4.6
Back EMF constant	K <sub>e</sub>	Vpeak/m/s L-L	43.7	21.8	25.2	12.6	72.8	36.4	42.0	21.0	109.2	54.6	63.1	31.5	145.7	72.8	84.1	42.0
		Vpeak/in/sec L-L	1.11	0.55	0.64	0.32	1.85	0.92	1.07	0.53	2.77	1.39	1.60	0.80	3.70	1.85	2.14	1.07
Force constant @25°C±10%	K <sub>f</sub>	N/Arms	53.5	26.8	30.9	15.4	89.2	44.6	51.5	25.7	133.8	66.9	77.2	38.6	178.4	89.2	103.0	51.5
		lbf / Arms	12.0	6.0	6.9	3.5	20.1	10.0	11.6	5.8	30.1	15.0	17.4	8.7	40.1	20.1	23.2	11.6
<b>Mechanical Specifications</b>																		
Coil Assembly Mass ±15%	M <sub>c</sub>	kg	1.1				1.9				2.7				3.4			
		lbs	2.5				4.1				5.9				7.5			
<b>Magnetic Way Type</b>			<b>MCD030</b>				<b>MCD050</b>				<b>MCD075</b>				<b>MCD100</b>			
Magnetic Way Mass ±15%M <sub>w</sub>		kg/m	2.70				3.93				5.48				7.04			
		lbs/in	0.15				0.22				0.31				0.39			
<b>Figures of Merit &amp; Additional Data</b>																		
Electrical time constant	T <sub>e</sub>	ms	2.9				3.2				3.5				3.6			
Max.Theoretical Acceleration	A <sub>max</sub>	g's	30.7				30.7				32.5				33.7			
Magnetic attraction	F <sub>a</sub>	kN	1.06				1.78				2.66				3.56			
		lbf	238				400				598				800			
Thermal Resistance																		
- coils to external structure	R <sub>th</sub>	°C/Watt	2.05				1.52				1.21				1.04			
Max. Allowable Coil Temp.	T <sub>max</sub>	°C	130				130				130				130			

## Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to: Fc = Km x Square Root (Pw); where Pw = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.
- Winding Code A1 to A4 - WYE winding.  
Winding Code A5 to A8 - DELTA winding.

## DIMENSIONS

### ICD10-xxx



**Notes:**

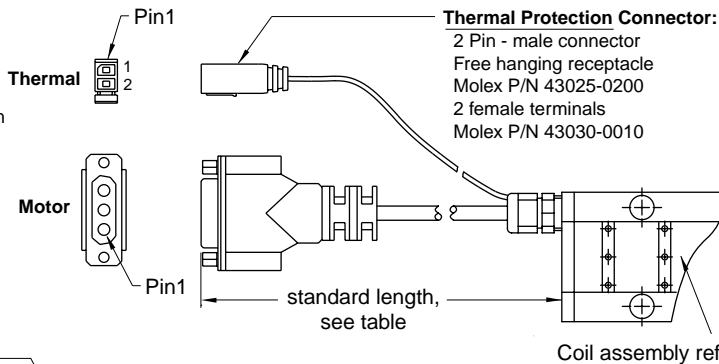
1. Dimensions in mm (inches)
2. Tolerances unless otherwise specified:  
no decimal place ± 0.8 (.03)  
X decimal place ± 0.1 (.004)  
XX decimal place ± 0.05 (.002)

Motor Coil Type	Coil Width "X"	# Holes "N"
ICD10-030	55.0 (2.165) ± 1.0 (.04)	3
ICD10-050	75.0 (2.953) ± 1.0 (.04)	4
ICD10-075	100.0 (3.937) ± 1.0 (.04)	5
ICD10-100	125.0 (4.921) ± 1.0 (.04)	5

## TERMINATION AND HALL EFFECT OPTIONS

**Note:**

Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57



**Thermal Protection Connector:**  
2 Pin - male connector  
Free hanging receptacle  
Molex P/N 43025-0200  
2 female terminals  
Molex P/N 43030-0010

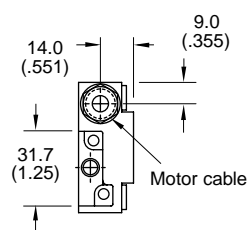
**Mating Connector Reference:**  
Molex "Micro-Fit 3.0"  
Plug: 43020-0201  
Male Terminals: 43031-0010

**Motor Connector:**  
Positronic P/N: CBD3W3M0000Z  
3 Pin, Male shell, size 2  
**Male Contacts:**  
Positronic P/N: MS40--D  
3 removable male contacts, size 8

**Mating Connector Reference:**  
Positronic P/N: CBD3W3F0000X  
3 Female Sockets, solder type, size 8, Positronic P/N: FS40--D

**HALL EFFECT MASS**  
w/P\* connector: .07 kg (.15 lb) max  
w/C\* cable: .03 kg (.07 lb) max

**Hall Effect Connector Option:**  
Positronic P/N: MD9M2000Z  
9 Pin, male  
**Mating Connector Reference:**  
Positronic P/N: MD9F2000X



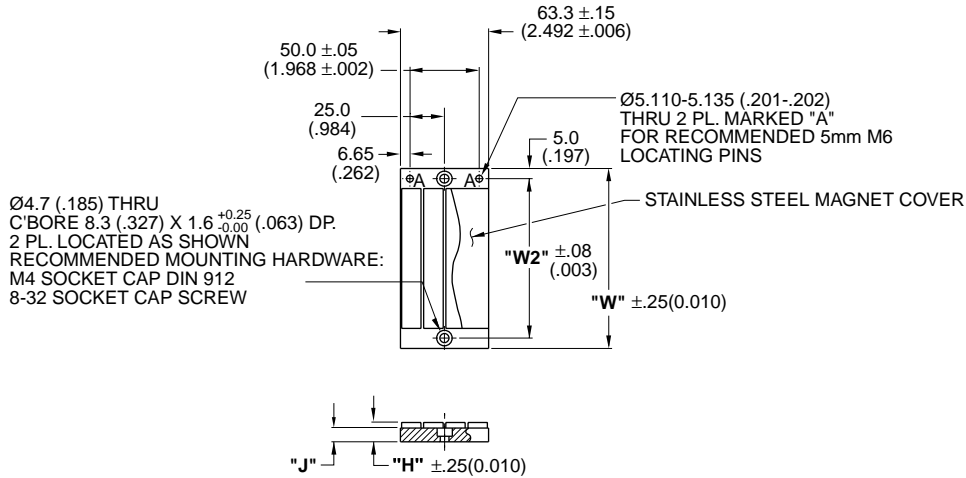
Connector Option	
Connector	Length
P1	400 (16)
P2	200 (8)
P3	100 (4)

Flying Lead Option	
Leads	Length
C1	400 (16)
C2	200 (8)
C3	100 (4)

DIMENSIONS

Magnet assemblies are modular and can be installed in multiples of same or alternate lengths (see page 24). Standard assembly lengths are shown below.

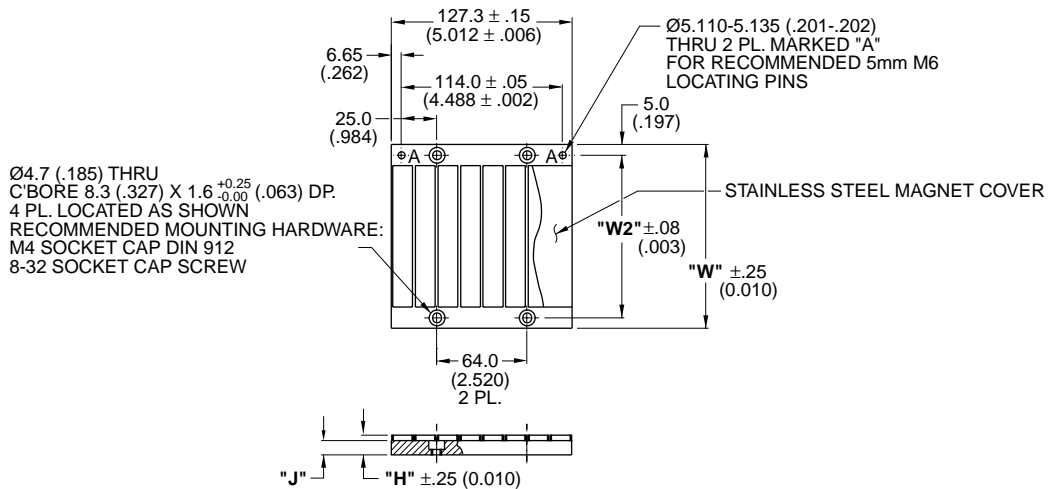
MCDxx-0064



Type	"W"	"W2"	"J"	"H"
MCD030-0064-001	55.0 (2.165)	45.0 (1.772)	4.0 (.157)	8.25 (.325)
MCD050-0064-001	75.0 (2.953)	65.0 (2.559)	4.0 (.157)	8.25 (.325)
MCD075-0064-001	100.0 (3.937)	90.0 (3.543)	4.0 (.157)	8.25 (.325)
MCD100-0064-001	125.0 (4.921)	115.0 (4.528)	4.0 (.157)	8.25 (.325)

Dimensions in mm(in)

MCDxx-0128

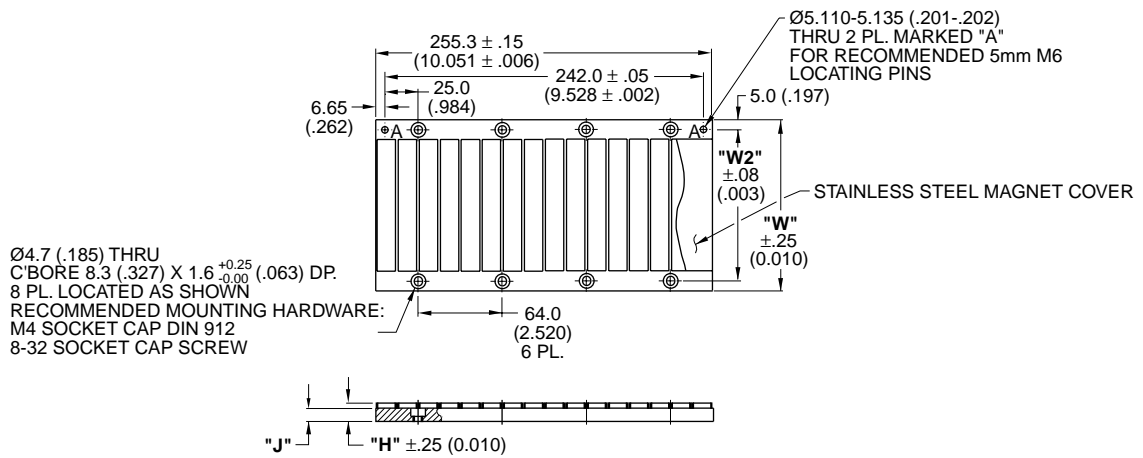


Type	"W"	"W2"	"J"	"H"
MCD030-0128-001	55.0 (2.165)	45.0 (1.772)	4.0 (.157)	8.25 (.325)
MCD050-0128-001	75.0 (2.953)	65.0 (2.559)	4.0 (.157)	8.25 (.325)
MCD075-0128-001	100.0 (3.937)	90.0 (3.543)	4.0 (.157)	8.25 (.325)
MCD100-0128-001	125.0 (4.921)	115.0 (4.528)	4.0 (.157)	8.25 (.325)

Dimensions in mm(in)

## DIMENSIONS

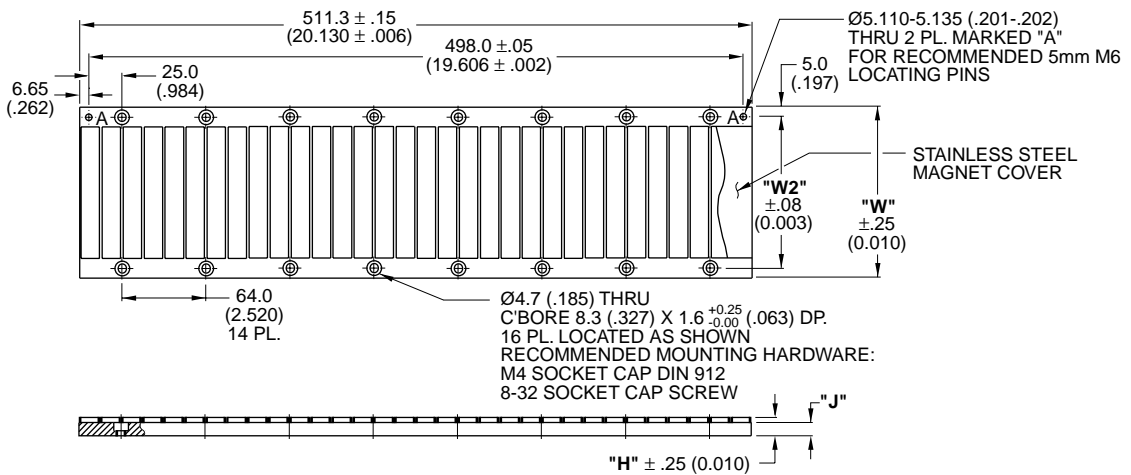
### MCDxx-0256



Dimensions in mm(in)

Type	"W"	"W2"	"J"	"H"
MCD030-0256-001	55.0 (2.165)	45.0 (1.772)	4.0 (.157)	8.25 (.325)
MCD050-0256-001	75.0 (2.953)	65.0 (2.559)	4.0 (.157)	8.25 (.325)
MCD075-0256-001	100.0 (3.937)	90.0 (3.543)	4.0 (.157)	8.25 (.325)
MCD100-0256-001	125.0 (4.921)	115.0 (4.528)	4.0 (.157)	8.25 (.325)

### MCDxx-0512



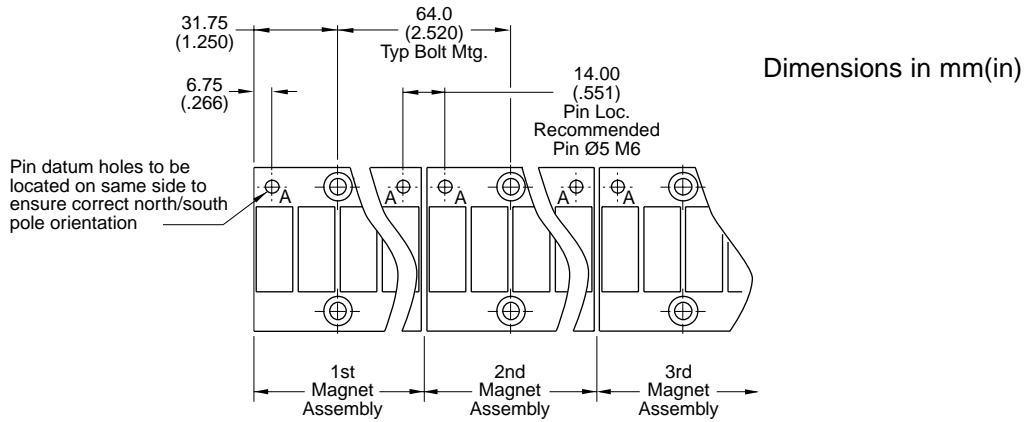
Dimensions in mm(in)

Type	"W"	"W2"	"J"	"H"
MCD030-0512-001	55.0 (2.165)	45.0 (1.772)	4.0 (.157)	8.25 (.325)
MCD050-0512-001	75.0 (2.953)	65.0 (2.559)	4.0 (.157)	8.25 (.325)
MCD075-0512-001	100.0 (3.937)	90.0 (3.543)	4.0 (.157)	8.25 (.325)
MCD100-0512-001	125.0 (4.921)	115.0 (4.528)	4.0 (.157)	8.25 (.325)

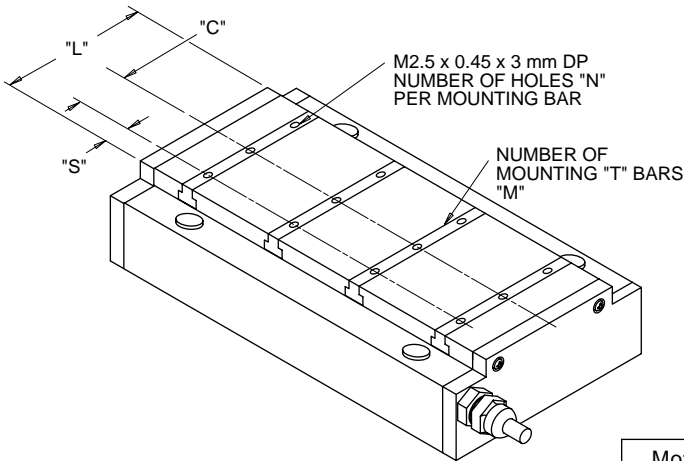
DIMENSIONS & INSTALLATION

**Typical Installation of Multiple Ironcore Magnet Assemblies**

Magnet Way widths correspond to the mating coil assembly width. Magnet Way assemblies are modular and come in standard lengths: 64, 128, 256, 512 mm. Multiple magnet assemblies can be installed to obtain the desired length. Shown below is the method to mount multiple assemblies.



**Typical Mounting Bar Lengths & Mounting Holes Tabulation**



Dimensions in mm(in)

Motor Coil Type	Number of Holes "N"	Spacing Between Holes "C"	Mounting Bar Length "L"	"S"
ICDXX-030	3	12.0 (.472)	30 (1.18)	3.0 (.118)
ICDXX-050	4	12.0 (.472)	50 (1.97)	7.0 (.276)
ICDXX-075	5	16.0 (.630)	75 (2.95)	5.5 (.217)
ICDXX-100	5	20.0 (.787)	100 (3.94)	10.0 (.394)

Motor Coil Type	Number of Bars "M"
ICD05-XXX	4
ICD10-XXX	7

## PERFORMANCE SPECIFICATIONS

### 11 Series Ironcore - Non-cooled

Rated Performance	Symbol	Units	IC11-015		IC11-030		IC11-050		IC11-075		IC11-100		IC11-150		IC11-200		IC11-250	
			A1	A5	A1	A5	A1	A5	A1	A5	A1	A5	A1	A5	A1	A5	A1	A5
Peak force	F <sub>p</sub>	N	190		375		625		940		1250		1875		2500		3125	
		lbf	43		84		141		211		281		422		562		703	
Continuous force @Tmax see note 1.	F <sub>c</sub>	N	73		151		276		435		599		905		1255		1496	
		lbf	16		34		62		98		135		203		282		336	
Motor constant @ 25°C	K <sub>m</sub>	N/√W	13.1		22.5		32.0		41.4		49.1		62.0		73.0		79.5	
Max. Cont. power dissipation	P <sub>c</sub>	W	44		64		106		157		210		300		418		500	
<b>Electrical Specifications</b>																		
		<b>Winding Code</b>	<b>A1</b>	<b>A5</b>	<b>A1</b>	<b>A5</b>	<b>A1</b>	<b>A5</b>	<b>A1</b>	<b>A5</b>	<b>A1</b>	<b>A5</b>	<b>A1</b>	<b>A5</b>	<b>A1</b>	<b>A5</b>	<b>A1</b>	<b>A5</b>
Peak current	I <sub>p</sub>	Arms	11.3	19.1	11.3	19.1	11.3	19.1	11.3	19.1	11.3	19.1	11.3	19.1	11.3	19.1	11.3	19.1
Continuous Current @Tmax	I <sub>c</sub>	Arms	3.9	6.7	4.0	6.9	4.4	7.6	4.6	8.0	4.8	8.2	4.8	8.3	5.0	8.6	4.9	8.6
Electrical resistance @25°C±10%	R <sub>m</sub>	Ohms L-L	1.4	0.47	1.9	0.63	2.6	0.87	3.5	1.2	4.4	1.5	6.2	2.1	8.0	2.7	9.7	3.2
Electrical inductance ±20%	L	mH L-L	9.1	3.0	16.7	5.6	26.7	8.9	39.4	13.1	52.0	17.3	77.3	25.8	103	34.2	128	42.6
Back EMF constant @25°C±10%	K <sub>e</sub>	Vpeak/m/s L-L	15.4	8.9	30.9	17.8	51.4	29.7	77.1	44.5	103	59.3	154	89.0	206	119	247	143
		Vpeak/in/sec L-L	0.39	0.23	0.78	0.45	1.30	0.75	1.96	1.13	2.61	1.51	3.92	2.26	5.22	3.02	6.27	3.62
Force constant @25°C±10%	K <sub>f</sub>	N/Arms	18.9	10.9	37.8	21.8	62.9	36.3	94.4	54.5	126	72.7	189	109	252	145	303	175
		lbf / Arms	4.2	2.5	8.5	4.9	14.1	8.2	21.2	12.3	28.3	16.3	42.4	24.5	56.6	32.7	68.0	39.3
<b>Mechanical Specifications</b>																		
Coil Assembly Mass ±15%	M <sub>c</sub>	kg	1.7		2.5		3.6		5.0		6.5		9.4		12.3		15.2	
		lbs	3.7		5.5		7.9		11.0		14.3		20.7		27.1		33.5	
<b>Magnetic Way Type</b>			<b>MC015</b>		<b>MC030</b>		<b>MC050</b>		<b>MC075</b>		<b>MC100</b>		<b>MC150</b>		<b>MC200</b>		<b>MC250</b>	
<b>Magnetic Way Mass ±15%</b>	M <sub>w</sub>	kg/m	2.5		5.4		7.5		10.1		12.7		20.7		26.8		33.2	
		lbs/in	0.14		0.30		0.42		0.56		0.71		1.16		1.50		1.86	
<b>Figures of Merit &amp; Additional Data</b>																		
Electrical time constant	T <sub>e</sub>	ms	6.5		8.8		10.3		11.3		11.8		12.5		12.8		13.2	
Max.Theoretical Acceleration	A <sub>max</sub>	g's	11.4		15.3		17.7		19.2		19.6		20.3		20.7		21.0	
Magnetic attraction	F <sub>a</sub>	kN	0.72		1.4		2.4		3.7		4.9		7.3		9.9		12.3	
		lbf	162		324		546		821		1102		1639		2214		2761	
Thermal Resistance																		
- coils to external structure	R <sub>th</sub>	°C/Watt	2.40		1.64		0.99		0.67		0.50		0.35		0.25		0.21	
Max. Allowable Coil Temp.	T <sub>max</sub>	°C	130		130		130		130		130		130		130		130	

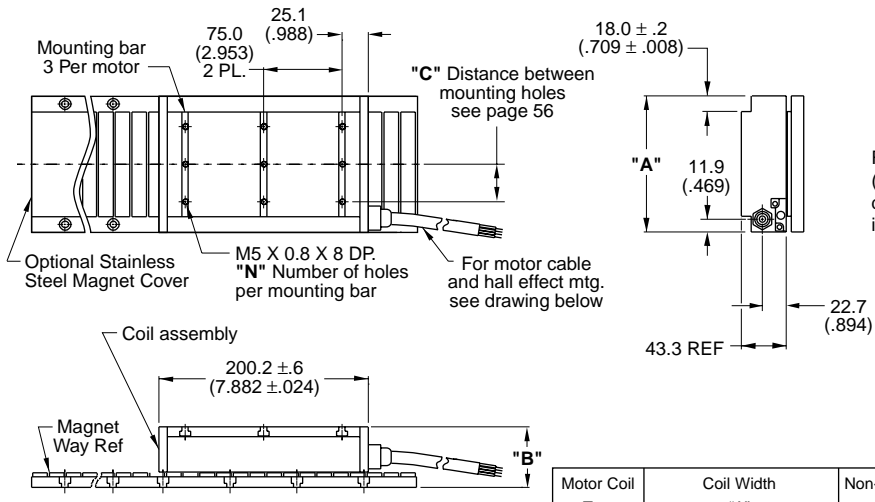
**Notes:**

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to: Fc = Km x Square Root (Pw); where Pw = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

DIMENSIONS

Non-Cooled

IC11-xxx



Resultant airgap = 0.9mm (.036) nominal (0.5mm (.020") minimum) when components are set up to dimension "B" in table below. (Please refer to installation manual for more detail)

- Notes:  
 1. Dimensions in mm (inches)  
 2. Tolerances unless otherwise specified:  
 no decimal place ± 0.8 (.03)  
 X decimal place ± 0.1 (.004)  
 XX decimal place ± 0.05 (.002)

Motor Coil Type	Coil Width "A"	Non-Cooled	Dim "B" without cover	Dim "B" w/ Magnet cover	# Holes "N"
IC11-015	50.0 (1.969) ± 1.0 (.04)	ICXX-015	54.3±0.1 (2.138±.004)	54.6±0.1 (2.150±.004)	1
IC11-030	65.0 (2.559) ± 1.0 (.04)	ICXX-030	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	2
IC11-050	85.0 (3.346) ± 1.0 (.04)	ICXX-050	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	2
IC11-075	110.0 (4.331) ± 1.0 (.04)	ICXX-075	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	3
IC11-100	135.0 (5.315) ± 1.0 (.04)	ICXX-100	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	3
IC11-150	185.0 (7.283) ± 1.5 (.06)	ICXX-150	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	5
IC11-200	235.0 (9.252) ± 1.5 (.06)	ICXX-200	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	6
IC11-250	285.0 (11.220) ± 1.5 (.06)	ICXX-250	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	7

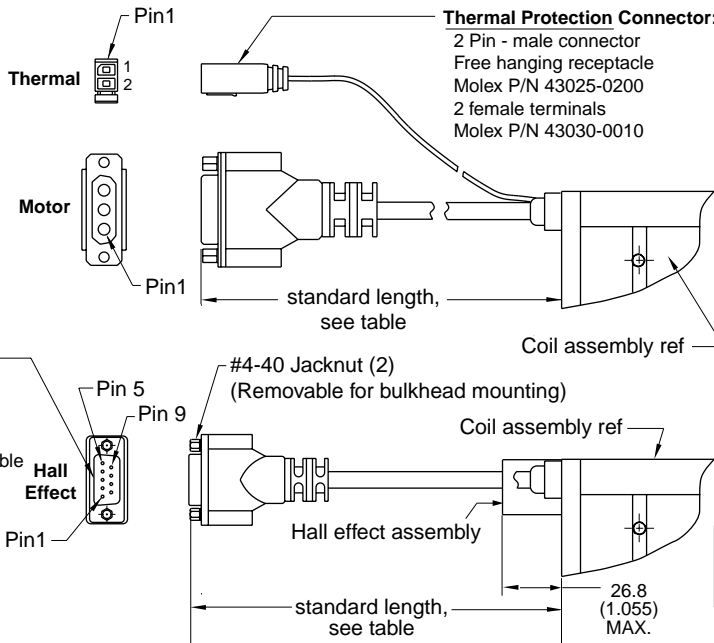
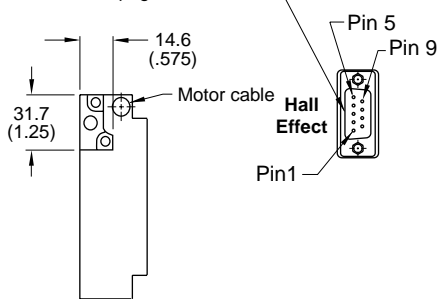
TERMINATION AND HALL EFFECT OPTIONS

Note:  
 Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57

**Hall Effect Connector Option:**  
 Positronic P/N: MD9M2000Z  
 9 Pin, male

**Mating Connector Reference:**  
 Positronic P/N: MD9F2000X

See wire table, page 59



**Thermal Protection Connector:**  
 2 Pin - male connector  
 Free hanging receptacle  
 Molex P/N 43025-0200  
 2 female terminals  
 Molex P/N 43030-0010

**Mating Connector Reference:**  
 Molex "Micro-Fit 3.0"  
 Plug: 43020-0201  
 Male Terminals: 43031-0010  
  
 See Wire Table, page 59

**Motor Connector:**  
 Positronic P/N: CBD3W3M0000Z  
 3 Pin, Male shell, size 2  
**Male Contacts:**  
 Positronic P/N: MS40--D  
 3 removable male contacts, size 8

**Mating Connector Reference:**  
 Positronic P/N: CBD3W3F0000X  
 3 Female Sockets, solder type, size 8, Positronic P/N: FS40--D  
  
 See Wire Table, page 59

**HALL EFFECT MASS**  
 w/P\* connector: .07 kg (.15 lb) max  
 w/C\* cable: .03 kg (.07 lb) max

Connector Option	
Connector	Length
P1	400 (16)
P2	200 (8)
P3	100 (4)

Flying Lead Option	
Leads	Length
C1	400 (16)
C2	200 (8)
C3	100 (4)

## PERFORMANCE SPECIFICATIONS

### 22 Series Ironcore - Non-cooled

Rated Performance	Symbol	Units	IC22-015			IC22-030			IC22-050			IC22-075		
Peak force	F <sub>p</sub>	N	375			750			1250			1875		
		lbf	84			169			281			422		
Continuous force @Tmax see note 1.	F <sub>c</sub>	N	143			298			548			864		
		lbf	32			67			123			194		
Motor constant @ 25°C	K <sub>m</sub>	N/√W	18.2			31.4			44.8			58.0		
Max. Cont. power dissipation	P <sub>c</sub>	W	88			128			212			313		
<b>Electrical Specifications</b>														
		<b>Winding Code</b>	<b>A1</b>	<b>A2</b>	<b>A6</b>	<b>A1</b>	<b>A2</b>	<b>A6</b>	<b>A1</b>	<b>A2</b>	<b>A6</b>	<b>A1</b>	<b>A2</b>	<b>A6</b>
Peak current	I <sub>p</sub>	Arms	11.0	22.0	38.1	11.0	22.0	38.1	11.0	22.0	38.1	11.0	22.0	38.1
Continuous Current @Tmax	I <sub>c</sub>	Arms	3.8	7.6	13.1	3.9	7.9	13.7	4.4	8.7	15.1	4.6	9.2	15.9
Electrical resistance @25°C±10%	R <sub>m</sub>	Ohms L-L	2.9	0.73	0.24	3.9	1.0	0.33	5.3	1.3	0.44	7.1	1.8	0.59
Electrical inductance ±20%	L	mH L-L	18.3	4.6	1.5	33.4	8.4	2.8	53.4	13.4	4.5	78.9	19.7	6.6
Back EMF constant @25°C±10%	K <sub>e</sub>	Vpeak/m/s L-L	30.9	15.4	8.9	61.7	30.9	17.8	103	51.4	29.7	154	77.1	44.5
		Vpeak/in/sec L-L	0.78	0.39	0.23	1.57	0.78	0.45	2.61	1.31	0.75	3.92	1.96	1.13
Force constant @25°C±10%	K <sub>f</sub>	N/Arms	37.8	18.9	10.9	75.6	37.8	21.8	126	63.0	36.3	189	94.4	54.5
		lbf/Arms	8.5	4.2	2.5	17.0	8.5	4.9	28.3	14.2	8.2	42.4	21.2	12.3
<b>Mechanical Specifications</b>														
Coil Assembly Mass ±15%	M <sub>c</sub>	kg	3.2			4.8			6.9			9.6		
		lbs	7.1			10.6			15.2			21.2		
<b>Magnetic Way Type</b>			<b>MC015</b>			<b>MC030</b>			<b>MC050</b>			<b>MC075</b>		
<b>Magnetic Way Mass ±15%</b>	M <sub>w</sub>	kg/m	2.5			5.4			7.5			10.1		
		lbs/in	0.14			0.30			0.42			0.56		
<b>Figures of Merit &amp; Additional Data</b>														
Electrical time constant	T <sub>e</sub>	ms	6.3			8.6			10.1			11.1		
Max.Theoretical Acceleration	A <sub>max</sub>	g's	11.9			15.9			18.5			19.9		
Magnetic attraction	F <sub>a</sub>	kN	1.5			2.9			4.9			7.3		
		lbf	328			654			1090			1637		
Thermal Resistance														
- coils to external structure	R <sub>th</sub>	°C/Watt	1.20			0.82			0.50			0.34		
Max. Allowable Coil Temp.	T <sub>max</sub>	°C	130			130			130			130		

#### Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to: Fc = Km x Square Root (Pw); where Pw = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

## PERFORMANCE SPECIFICATIONS

## 22 Series Ironcore - Non-cooled

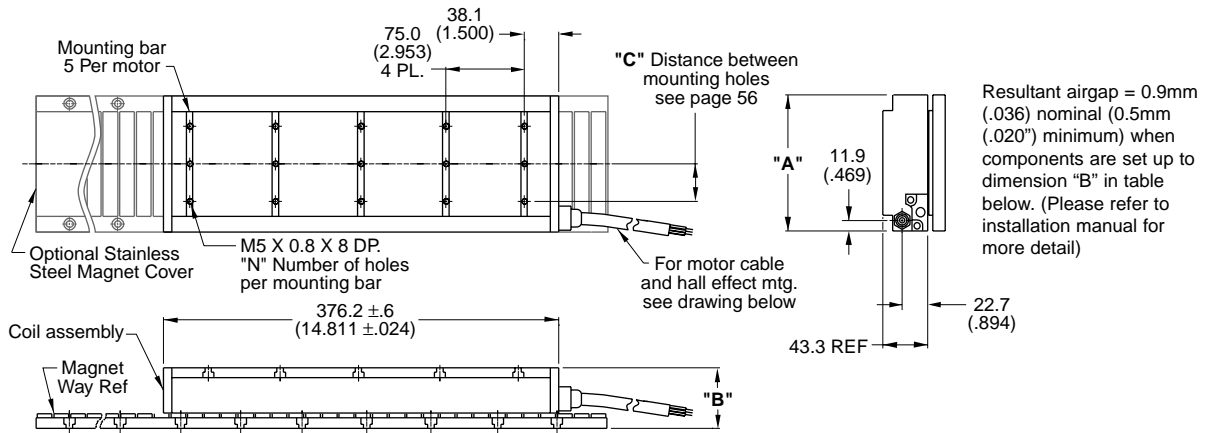
Rated Performance	Symbol	Units	IC22-100			IC22-150			IC22-200			IC22-250		
Peak force	F <sub>p</sub>	N	2500			3750			5000			6250		
		lbf	562			843			1124			1405		
Continuous force @Tmax see note 1.	F <sub>c</sub>	N	1198			1810			2513			3000		
		lbf	269			407			565			674		
Motor constant @ 25°C	K <sub>m</sub>	N/√W	69.5			87.8			103.4			112.8		
Max. Cont. power dissipation	P <sub>c</sub>	W	420			600			833			1000		
<b>Electrical Specifications</b>														
		<b>Winding Code</b>	<b>A1</b>	<b>A2</b>	<b>A6</b>	<b>A1</b>	<b>A2</b>	<b>A6</b>	<b>A1</b>	<b>A2</b>	<b>A6</b>	<b>A1</b>	<b>A2</b>	<b>A6</b>
Peak current	I <sub>p</sub>	Arms	11.0	22.0	38.1	11.0	22.0	38.1	11.0	22.0	38.1	11.0	22.0	38.1
Continuous Current @Tmax	I <sub>c</sub>	Arms	4.8	9.5	16.5	4.8	9.6	16.6	5.0	10.0	17.3	5.0	9.9	17.2
Electrical resistance @25°C±10%	R <sub>m</sub>	Ohms L-L	8.8	2.2	0.73	12.4	3.1	1.0	15.9	4.0	1.3	19.3	4.8	1.6
Electrical inductance ±20%	L	mH L-L	104	26.0	8.7	155	38.7	12.9	205	51.3	17.1	256	63.9	21.3
Back EMF constant @25°C±10%	K <sub>e</sub>	Vpeak/m/s L-L	206	103	59.3	308	154	89.0	411	206	119	494	247	143
		Vpeak/in/sec L-L	5.22	2.61	1.51	7.83	3.92	2.26	10.4	5.22	3.02	12.5	6.27	3.62
Force constant @25°C±10%	K <sub>f</sub>	N/Arms	252	126	72.7	378	189	109	504	252	145	605	303	175
		lbf/Arms	56.6	28.3	16.3	84.9	42.5	24.5	113	56.6	32.7	136	68.0	39.3
<b>Mechanical Specifications</b>														
Coil Assembly Mass ±15%	M <sub>c</sub>	kg	12.5			18.1			23.7			29.3		
		lbs	27.6			39.9			52.2			64.6		
<b>Magnetic Way Type</b>			<b>MC100</b>			<b>MC150</b>			<b>MC200</b>			<b>MC250</b>		
<b>Magnetic Way Mass ±15%</b>	M <sub>w</sub>	kg/m	12.7			20.7			26.8			33.2		
		lbs/in	0.71			1.16			1.50			1.86		
<b>Figures of Merit &amp; Additional Data</b>														
Electrical time constant	T <sub>e</sub>	ms	11.8			12.5			12.9			13.2		
Max.Theoretical Acceleration	A <sub>max</sub>	g's	20.4			21.1			21.5			21.8		
Magnetic attraction	F <sub>a</sub>	kN	9.8			14.6			19.7			24.6		
		lbf	2205			3271			4433			5524		
<b>Thermal Resistance</b>														
- coils to external structure	R <sub>th</sub>	°C/Watt	0.25			0.18			0.13			0.11		
Max. Allowable Coil Temp.	T <sub>max</sub>	°C	130			130			130			130		

## Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to:  
F<sub>c</sub> = K<sub>m</sub> x Square Root (P<sub>w</sub>); where P<sub>w</sub> = the acceptable heat load, in watts, and must be a value below Pc.  
The RMS current needed to produce this force is simply F<sub>c</sub> divided by the force constant K<sub>f</sub>.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

## DIMENSIONS

### Non-Cooled IC22-xxx



**Notes:**

1. Dimensions in mm (inches)
2. Tolerances unless otherwise specified:  
no decimal place  $\pm 0.8$  (.03)  
X decimal place  $\pm 0.1$  (.004)  
XX decimal place  $\pm 0.05$  (.002)

Motor Coil Type	Coil Width "A"	Non-Cooled	Dim "B" without cover	Dim "B" w/ Magnet cover	# Holes
IC22-015	50.0 (1.969) $\pm 1.0$ (.04)	ICXX-015	54.3 $\pm 0.1$ (2.138 $\pm 0.004$ )	54.6 $\pm 0.1$ (2.150 $\pm 0.004$ )	1
IC22-030	65.0 (2.559) $\pm 1.0$ (.04)	ICXX-030	58.3 $\pm 0.1$ (2.295 $\pm 0.004$ )	58.6 $\pm 0.1$ (2.307 $\pm 0.004$ )	2
IC22-050	85.0 (3.346) $\pm 1.0$ (.04)	ICXX-050	58.3 $\pm 0.1$ (2.295 $\pm 0.004$ )	58.6 $\pm 0.1$ (2.307 $\pm 0.004$ )	2
IC22-075	110.0 (4.331) $\pm 1.0$ (.04)	ICXX-075	58.3 $\pm 0.1$ (2.295 $\pm 0.004$ )	58.6 $\pm 0.1$ (2.307 $\pm 0.004$ )	3
IC22-100	135.0 (5.315) $\pm 1.0$ (.04)	ICXX-100	58.3 $\pm 0.1$ (2.295 $\pm 0.004$ )	58.6 $\pm 0.1$ (2.307 $\pm 0.004$ )	3
IC22-150	185.0 (7.283) $\pm 1.5$ (.06)	ICXX-150	60.3 $\pm 0.1$ (2.374 $\pm 0.004$ )	60.6 $\pm 0.1$ (2.386 $\pm 0.004$ )	5
IC22-200	235.0 (9.252) $\pm 1.5$ (.06)	ICXX-200	60.3 $\pm 0.1$ (2.374 $\pm 0.004$ )	60.6 $\pm 0.1$ (2.386 $\pm 0.004$ )	6
IC22-250	285.0 (11.220) $\pm 1.5$ (.06)	ICXX-250	60.3 $\pm 0.1$ (2.374 $\pm 0.004$ )	60.6 $\pm 0.1$ (2.386 $\pm 0.004$ )	7

## TERMINATION AND HALL EFFECT OPTIONS

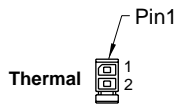
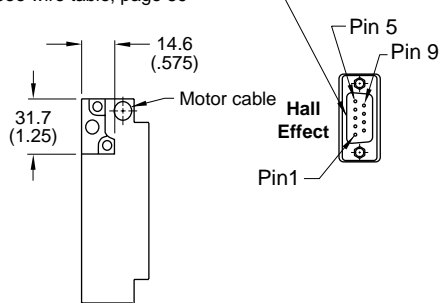
Note:  
Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57

**Hall Effect Connector Option:**

Positronic P/N: MD9M2000Z  
9 Pin, male

**Mating Connector Reference:**  
Positronic P/N: MD9F2000X

See wire table, page 59



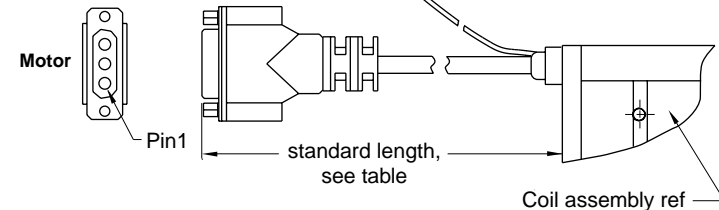
**Thermal Protection Connector:**

2 Pin - male connector  
Free hanging receptacle  
Molex P/N 43025-0200  
2 female terminals  
Molex P/N 43030-0010

**Mating Connector Reference:**

Molex "Micro-Fit 3.0"  
Plug: 43020-0201  
Male Terminals: 43031-0010

See Wire Table, page 59



**Motor Connector:**

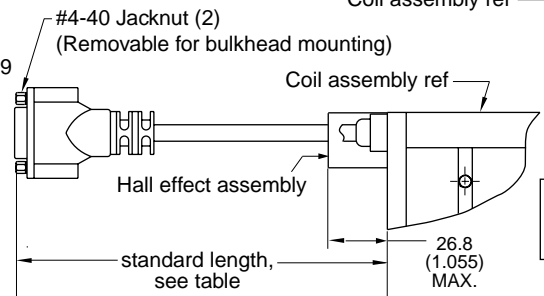
Positronic P/N: CBD3W3M0000Z  
3 Pin, Male shell, size 2

**Male Contacts:**  
Positronic P/N: MS40--D  
3 removable male contacts, size 8

**Mating Connector Reference:**

Positronic P/N: CBD3W3F0000X  
3 Female Sockets, solder type, size 8, Positronic P/N: FS40--D

See Wire Table, page 59



**HALL EFFECT MASS**

w/P\* connector: .07 kg (.15 lb) max  
w/C\* cable: .03 kg (.07 lb) max

Connector Option	
Connector	Length
P1	400 (16)
P2	200 (8)
P3	100 (4)

Flying Lead Option	
Leads	Length
C1	400 (16)
C2	200 (8)
C3	100 (4)

## PERFORMANCE SPECIFICATIONS

## 33 Series Ironcore - Non-cooled

Rated Performance	Symbol	Units	IC33-015				IC33-030				IC33-050				IC33-075			
Peak force	F <sub>p</sub>	N	565				1125				1875				2815			
		lbf	127				253				422				633			
Continuous force @Tmax see note 1.	F <sub>c</sub>	N	216				450				824				1301			
		lbf	49				101				185				292			
Motor constant @ 25°C	K <sub>m</sub>	N/√W	22.3				38.5				55.0				71.2			
Max. Cont. power dissipation	P <sub>c</sub>	W	131				192				317				471			
<b>Electrical Specifications</b>																		
		<b>Winding Code</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A7</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A7</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A7</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A7</b>
Peak current	I <sub>p</sub>	Arms	11.1	33.3	19.1	57.7	11.1	33.1	19.1	57.3	11.1	33.1	19.1	57.3	11.1	33.1	19.1	57.3
Continuous Current @Tmax	I <sub>c</sub>	Arms	3.8	11.4	6.6	19.8	4.0	11.9	6.9	20.6	4.4	13.1	7.6	22.7	4.6	13.8	8.0	23.9
Electrical resistance @25°C±10%	R <sub>m</sub>	Ohms L-L	4.3	0.48	1.4	0.16	5.8	0.64	1.9	0.21	7.9	0.88	2.6	0.29	10.6	1.2	3.5	0.39
Electrical inductance ±20%	L	mH L-L	27.4	3.0	9.1	1.0	50.1	5.6	16.7	1.9	80.2	8.9	26.7	3.0	118	13.1	39.4	4.4
Back EMF constant @25°C±10%	K <sub>e</sub>	Vpeak/m/s L-L	46.3	15.4	26.7	8.9	92.6	30.9	53.5	17.8	154	51.4	89.0	29.7	231	77.1	134	44.5
		Vpeak/in/sec L-L	1.18	0.39	0.68	0.23	2.35	0.78	1.36	0.45	3.92	1.31	2.26	0.75	5.88	1.96	3.39	1.13
Force constant @25°C±10%	K <sub>f</sub>	N/Arms	56.7	18.9	32.7	10.9	113	37.8	65.5	21.8	189	62.9	109	36.3	283	94.4	164	54.5
		lbf / Arms	12.7	4.2	7.4	2.5	25.5	8.5	14.7	4.9	42.4	14.1	24.5	8.2	63.7	21.2	36.8	12.3
<b>Mechanical Specifications</b>																		
Coil Assembly Mass ±15%	M <sub>c</sub>	kg	5.0				7.3				10.4				14.4			
		lbs	11.0				16.1				22.9				31.7			
<b>Magnetic Way Type</b>			<b>MC015</b>				<b>MC030</b>				<b>MC050</b>				<b>MC075</b>			
<b>Magnetic Way Mass ±15%</b>	M <sub>w</sub>	kg/m	2.5				5.4				7.5				10.1			
		lbs/in	0.14				0.30				0.42				0.56			
<b>Figures of Merit &amp; Additional Data</b>																		
Electrical time constant	T <sub>e</sub>	ms	6.4				8.6				10.2				11.2			
Max.Theoretical Acceleration	A <sub>max</sub>	g's	11.5				15.7				18.4				19.9			
Magnetic attraction	F <sub>a</sub>	kN	2.2				4.4				7.4				11.0			
		lbf	497				991				1652				2480			
Thermal Resistance																		
- coils to external structure	R <sub>th</sub>	°C/Watt	0.80				0.55				0.33				0.22			
Max. Allowable Coil Temp.	T <sub>max</sub>	°C	130				130				130				130			

## Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to: Fc = Km x Square Root (Pw); where Pw = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

## PERFORMANCE SPECIFICATIONS

### 33 Series Ironcore - Non-cooled

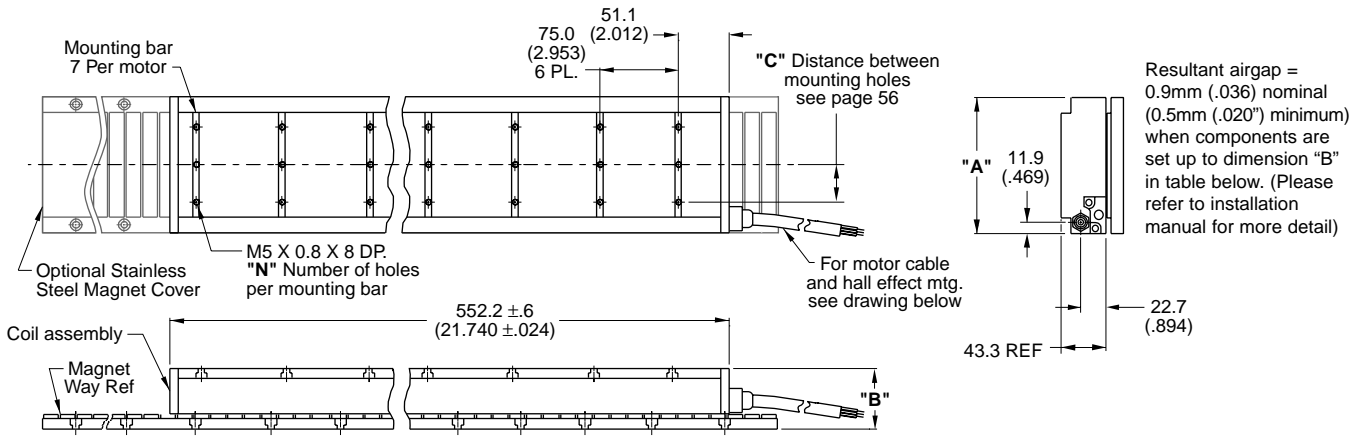
Rated Performance	Symbol	Units	IC33-100				IC33-150				IC33-200				IC33-250				
Peak force	F <sub>p</sub>	N	3750				5625				7500				9375				
		lbf	843				1265				1686				2108				
Continuous force @Tmax see note 1.	F <sub>c</sub>	N	1796				2718				3765				4496				
		lbf	404				611				846				1011				
Motor constant @ 25°C	K <sub>m</sub>	N/√W	85.1				107.8				127				138				
Max. Cont. power dissipation	P <sub>c</sub>	W	629				897				1250				1500				
<b>Electrical Specifications</b>																			
			<b>Winding Code</b>																
			<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A7</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A7</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A7</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A7</b>	
Peak current	I <sub>p</sub>	Arms	11.1	33.1	19.1	57.3	11.1	33.1	19.1	57.3	11.1	33.1	19.1	57.3	11.1	33.1	19.1	57.3	
Continuous Current @Tmax	I <sub>c</sub>	Arms	4.8	14.3	8.2	24.7	4.8	14.4	8.3	24.9	5.0	14.9	8.6	25.9	5.0	14.9	8.6	25.7	
Electrical resistance @25°C±10%	R <sub>m</sub>	Ohms L-L	13.2	1.5	4.4	0.49	18.5	2.1	6.2	0.69	23.9	2.7	8.0	0.89	29.0	3.2	9.7	1.1	
Electrical inductance ±20%	L	mH L-L	156	17.3	52.0	5.8	232	25.8	77.3	8.6	308	34.2	103	11.4	384	42.6	128	14.2	
Back EMF constant @25°C±10%	K <sub>e</sub>	Vpeak/m/s L-L	308	103	178	59.3	463	154	267	89.0	617	206	356	119	741	247	428	143	
		Vpeak/in/sec L-L	7.83	2.61	4.52	1.51	11.7	3.92	6.78	2.26	15.7	5.22	9.05	3.02	18.8	6.27	10.9	3.62	
Force constant @25°C±10%	K <sub>f</sub>	N/Arms	378	126	218	72.7	567	189	327	109	756	252	436	145	907	302	524	175	
		lbf / Arms	84.9	28.3	49.0	16.3	127	42.5	73.5	24.5	170	56.6	98.1	32.7	204	68.0	118	39.3	
<b>Mechanical Specifications</b>																			
Coil Assembly Mass ±15%	M <sub>c</sub>	kg	18.9				27.3				35.7				44.1				
		lbs	41.7				60.2				78.7				97.2				
<b>Magnetic Way Type</b>			<b>MC100</b>				<b>MC150</b>				<b>MC200</b>				<b>MC250</b>				
Magnetic Way Mass ±15%	M <sub>w</sub>	kg/m	12.7				20.7				26.8				33.2				
		lbs/in	0.71				1.16				1.50				1.86				
<b>Figures of Merit &amp; Additional Data</b>																			
Electrical time constant	T <sub>e</sub>	ms	11.8				12.5				12.9				13.2				
Max.Theoretical Acceleration	A <sub>max</sub>	g's	20.2				21.0				21.4				21.7				
Magnetic attraction	F <sub>a</sub>	kN	14.7				22.1				29.4				36.8				
		lbf	3305				4957				6609				8262				
Thermal Resistance																			
- coils to external structure	R <sub>th</sub>	°C/Watt	0.17				0.12				0.084				0.070				
Max. Allowable Coil Temp.	T <sub>max</sub>	°C	130				130				130				130				

**Notes:**

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to: Fc = Km x Square Root (Pw); where Pw = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

DIMENSIONS

Non-Cooled  
IC33-xxx



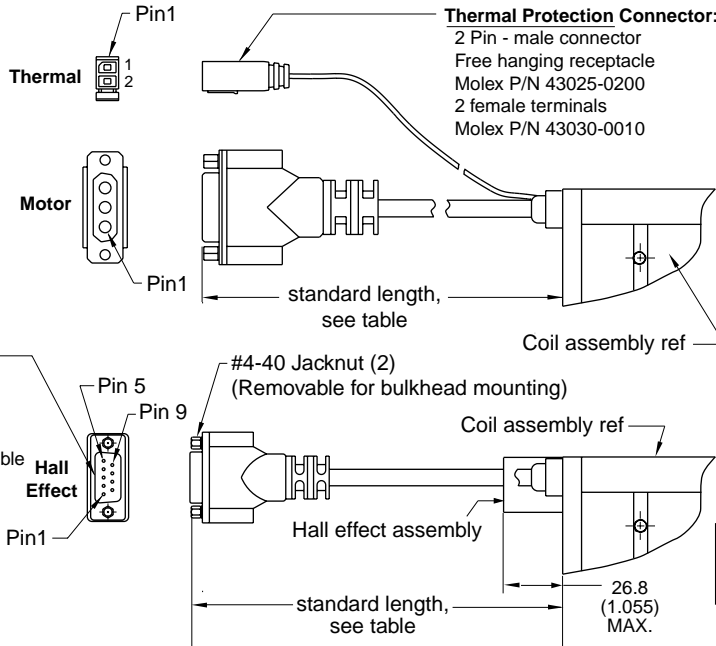
Resultant airgap = 0.9mm (.036) nominal (0.5mm (.020) minimum) when components are set up to dimension "B" in table below. (Please refer to installation manual for more detail)

Motor Coil Type	Coil Width "A"	Non-Cooled	Dim "B" without cover	Dim "B" w/ Magnet cover	# Holes "N"
IC33-015	50.0 (1.969) ± 1.0 (.04)	ICXX-015	54.3±0.1 (2.138±.004)	54.6±0.1 (2.150±.004)	1
IC33-030	65.0 (2.559) ± 1.0 (.04)	ICXX-030	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	2
IC33-050	85.0 (3.346) ± 1.0 (.04)	ICXX-050	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	2
IC33-075	110.0 (4.331) ± 1.0 (.04)	ICXX-075	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	3
IC33-100	135.0 (5.315) ± 1.0 (.04)	ICXX-100	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	3
IC33-150	185.0 (7.283) ± 1.5 (.06)	ICXX-150	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	5
IC33-200	235.0 (9.252) ± 1.5 (.06)	ICXX-200	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	6
IC33-250	285.0 (11.220) ± 1.5 (.06)	ICXX-250	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	7

- Notes:
1. Dimensions in mm (inches)
  2. Tolerances unless otherwise specified:
    - no decimal place ± 0.8 (.03)
    - X decimal place ± 0.1 (.004)
    - XX decimal place ± 0.05 (.002)

TERMINATION AND HALL EFFECT OPTIONS

Note:  
Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57



**Mating Connector Reference:**  
Molex "Micro-Fit 3.0"  
Plug: 43020-0201  
Male Terminals: 43031-0010  
See Wire Table, page 59

**Motor Connector:**  
Positronic P/N: CBD3W3M0000Z  
3 Pin, Male shell, size 2  
**Male Contacts:**  
Positronic P/N: MS40--D  
3 removable male contacts, size 8

**Mating Connector Reference:**  
Positronic P/N: CBD3W3F0000X  
3 Female Sockets, solder type, size 8, Positronic P/N: FS40--D  
See Wire Table, page 59

**HALL EFFECT MASS**  
w/P\* connector: .07 kg (.15 lb) max  
w/C\* cable: .03 kg (.07 lb) max

Connector Option	
Connector	Length
P1	400 (16)
P2	200 (8)
P3	100 (4)

Flying Lead Option	
Leads	Length
C1	400 (16)
C2	200 (8)
C3	100 (4)

## PERFORMANCE SPECIFICATIONS

### 44 Series Ironcore - Non-cooled

Rated Performance	Symbol	Units	IC44-015				IC44-030				IC44-050				IC44-075			
Peak force	$F_p$	N	750				1500				2500				3750			
		lbf	169				337				562				843			
Continuous force @Tmax see note 1.	$F_c$	N	286				597				1096				1732			
		lbf	64				134				246				389			
Motor constant @ 25°C	$K_m$	$N/\sqrt{W}$	25.7				44.3				63.3				82.4			
Max. Cont. power dissipation	$P_c$	W	175				256				423				625			
<b>Electrical Specifications</b>																		
			<b>Winding Code</b>															
			<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A7</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A7</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A7</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A7</b>
Peak current	$I_p$	Arms	11.1	22.1	44.1	76.4	11.1	22.1	44.1	76.4	11.1	22.1	44.1	76.4	11.1	22.1	44.1	76.4
Continuous Current @Tmax	$I_c$	Arms	3.8	7.6	15.1	26.2	3.9	7.9	15.8	27.3	4.4	8.7	17.4	30.2	4.6	9.2	18.3	31.8
Electrical resistance @25°C±10%	$R_m$	Ohms L-L	5.8	1.5	0.36	0.12	7.8	2.0	0.49	0.16	10.6	2.7	0.66	0.22	14.1	3.5	0.88	0.29
Electrical inductance ±20%	L	mH L-L	36.5	9.1	2.3	0.8	66.8	16.7	4.2	1.4	107	26.7	6.7	2.2	158	39.4	9.9	3.3
Back EMF constant @25°C±10%	$K_e$	Vpeak/m/s L-L	61.7	30.9	15.4	8.9	123	61.7	30.9	17.8	206	103	51.4	29.7	308	154	77.1	44.5
		Vpeak/in/sec L-L	1.57	0.78	0.39	0.23	3.14	1.57	0.78	0.45	5.22	2.61	1.31	0.75	7.83	3.92	1.96	1.13
Force constant @25°C±10%	$K_f$	N/Arms	75.6	37.8	18.9	10.9	151	75.6	37.8	21.8	252	126	63.0	36.3	378	189	94.4	54.5
		lbf / Arms	17.0	8.5	4.2	2.5	34.0	17.0	8.5	4.9	56.6	28.3	14.2	8.2	84.9	42.5	21.2	12.3
<b>Mechanical Specifications</b>																		
Coil Assembly Mass ±15%	$M_c$	kg	6.4				9.6				13.9				19.2			
		lbs	14.1				21.2				30.6				42.3			
<b>Magnetic Way Type</b>			<b>MC015</b>				<b>MC030</b>				<b>MC050</b>				<b>MC075</b>			
Magnetic Way Mass ±15%	$M_w$	kg/m	2.5				5.4				7.5				10.1			
		lbs/in	0.14				0.30				0.42				0.56			
<b>Figures of Merit &amp; Additional Data</b>																		
Electrical time constant	$T_e$	ms	6.3				8.6				10.1				11.2			
Max.Theoretical Acceleration	$A_{max}$	g's	11.9				15.9				18.3				19.9			
Magnetic attraction	$F_a$	kN	2.9				5.9				9.8				14.7			
		lbf	661				1322				2203				3305			
Thermal Resistance																		
- coils to external structure	$R_{th}$	°C/Watt	0.60				0.41				0.25				0.17			
Max. Allowable Coil Temp.	$T_{max}$	°C	130				130				130				130			

#### Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to:  
 $F_c = K_m \times \text{Square Root}(P_w)$ ; where Pw = the acceptable heat load, in watts, and must be a value below Pc.  
 The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

## PERFORMANCE SPECIFICATIONS

## 44 Series Ironcore - Non-cooled

Rated Performance	Symbol	Units	IC44-100				IC44-150				IC44-200				IC44-250				
Peak force	$F_p$	N	5000				7500				10000				12500				
		lbf	1124				1686				2248				2810				
Continuous force @Tmax see note 1.	$F_c$	N	2397				3617				5025				6029				
		lbf	539				813				1130				1355				
Motor constant @ 25°C	$K_m$	N/√W	98.3				124				146				160				
Max. Cont. power dissipation	$P_c$	W	840				1193				1667				2019				
<b>Electrical Specifications</b>																			
			<b>Winding Code</b>																
			<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A7</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A7</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A7</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A7</b>	
Peak current	$I_p$	Arms	11.1	22.1	44.1	76.4	11.1	22.1	44.1	76.4	11.1	22.1	44.1	76.4	11.1	22.1	44.1	76.4	
Continuous Current @Tmax	$I_c$	Arms	4.8	9.5	19.0	33.0	4.8	9.6	19.2	33.2	5.0	10.0	20.0	34.6	5.0	10.0	19.9	34.5	
Electrical resistance @25°C±10%	$R_m$	Ohms L-L	17.6	4.4	1.1	0.37	24.7	6.2	1.5	0.51	31.8	8.0	2.0	0.66	38.6	9.7	2.4	0.80	
Electrical inductance ±20%	L	mH L-L	208	52.1	13.0	4.3	309	77.4	19.3	6.4	410	103	25.7	8.6	512	128	32.0	10.7	
Back EMF constant @25°C±10%	$K_e$	Vpeak/m/s L-L	411	206	103	59.3	617	308	154	89.0	823	411	206	119	988	494	247	143	
		Vpeak/in/sec L-L	10.4	5.22	2.61	1.51	15.7	7.83	3.92	2.26	20.9	10.4	5.22	3.02	25.1	12.5	6.27	3.62	
Force constant @25°C±10%	$K_f$	N/Arms	504	252	126	72.7	755	378	189	109	1008	504	252	145	1210	605	302	175	
		lbf/Arms	113	56.6	28.3	16.3	170	84.9	42.5	24.5	227	113	56.6	32.7	272	136	68.0	39.3	
<b>Mechanical Specifications</b>																			
Coil Assembly Mass ±15%	$M_c$	kg	25.0				36.2				47.4				58.5				
		lbs	55.1				79.8				104				129				
<b>Magnetic Way Type</b>			<b>MC100</b>				<b>MC150</b>				<b>MC200</b>				<b>MC250</b>				
<b>Magnetic Way Mass ±15%</b>	$M_w$	kg/m	12.7				20.7				26.8				33.2				
		lbs/in	0.71				1.16				1.50				1.86				
<b>Figures of Merit &amp; Additional Data</b>																			
Electrical time constant	$T_e$	ms	11.8				12.5				12.9				13.3				
Max.Theoretical Acceleration	$A_{max}$	g's	20.4				21.1				21.5				21.8				
Magnetic attraction	$F_a$	kN	19.6				29.4				39.4				49.2				
		lbf	4406				6609				8858				11061				
Thermal Resistance																			
- coils to external structure	$R_{th}$	°C/Watt	0.13				0.088				0.063				0.052				
Max. Allowable Coil Temp.	$T_{max}$	°C	130				130				130				130				

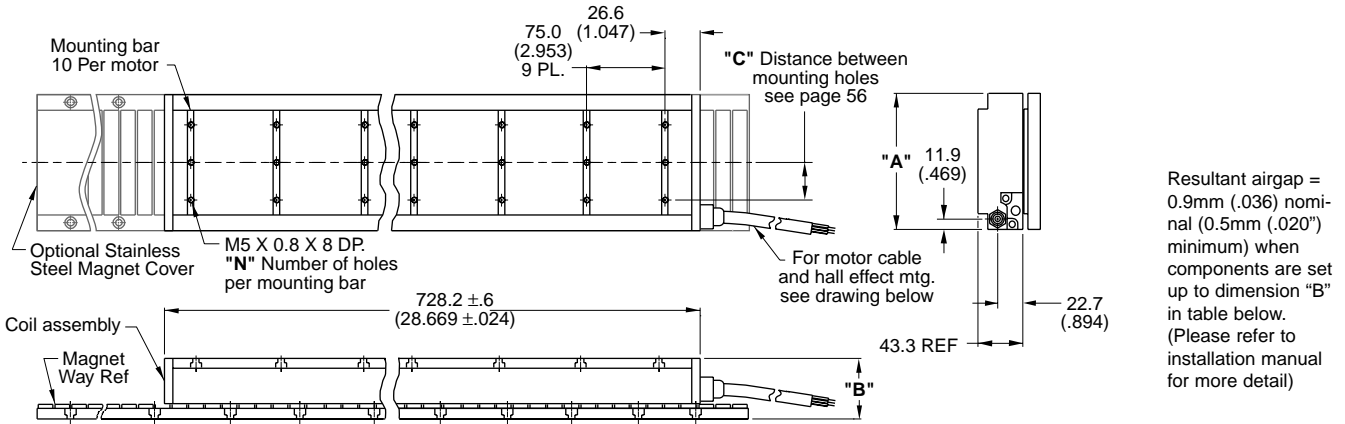
## Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to:  
 $F_c = K_m \times \text{Square Root}(P_w)$ ; where Pw = the acceptable heat load, in watts, and must be a value below Pc.  
The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

## DIMENSIONS

### Non-Cooled

### IC44-xxx



**Notes:**

1. Dimensions in mm (inches)
2. Tolerances unless otherwise specified:  
no decimal place ± 0.8 (.03)  
X decimal place ± 0.1 (.004)  
XX decimal place ± 0.05 (.002)

Motor Coil Type	Coil Width "A"	Non-Cooled	Dim "B" without cover	Dim "B" w/ Magnet cover	# Holes "N"
IC44-015	50.0 (1.969) ± 1.0 (.04)	ICXX-015	54.3±0.1 (2.138±.004)	54.6±0.1 (2.150±.004)	1
IC44-030	65.0 (2.559) ± 1.0 (.04)	ICXX-030	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	2
IC44-050	85.0 (3.346) ± 1.0 (.04)	ICXX-050	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	2
IC44-075	110.0 (4.331) ± 1.0 (.04)	ICXX-075	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	3
IC44-100	135.0 (5.315) ± 1.0 (.04)	ICXX-100	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	3
IC44-150	185.0 (7.283) ± 1.5 (.06)	ICXX-150	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	5
IC44-200	235.0 (9.252) ± 1.5 (.06)	ICXX-200	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	6
IC44-250	285.0 (11.220) ± 1.5 (.06)	ICXX-250	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	7

## TERMINATION AND HALL EFFECT OPTIONS

Note:  
Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57

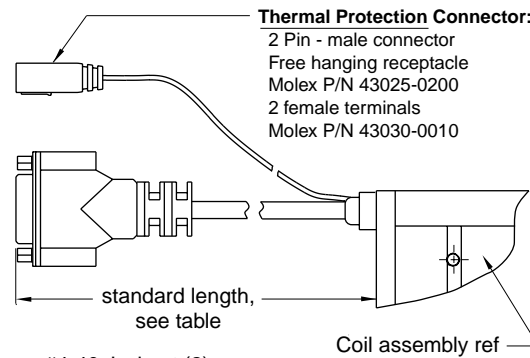
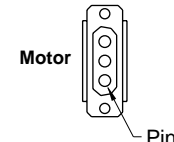
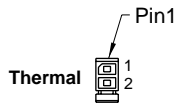
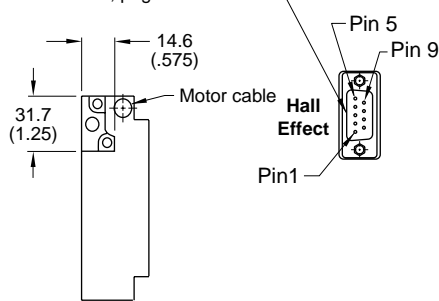
**Hall Effect Connector Option:**

Positronic P/N: MD9M2000Z  
9 Pin, male

**Mating Connector Reference:**

Positronic P/N: MD9F2000X

See wire table, page 59



**Thermal Protection Connector:**

2 Pin - male connector  
Free hanging receptacle  
Molex P/N 43025-0200  
2 female terminals  
Molex P/N 43030-0010

**Mating Connector Reference:**

Molex "Micro-Fit 3.0"  
Plug: 43020-0201  
Male Terminals: 43031-0010

See Wire Table, page 59

**Motor Connector:**

Positronic P/N: CBD3W3M0000Z  
3 Pin, Male shell, size 2

**Male Contacts:**

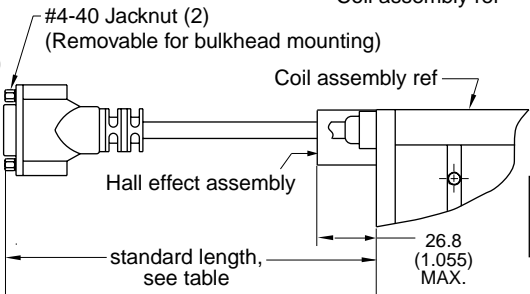
Positronic P/N: MS40--D  
3 removable male contacts, size 8

**Mating Connector Reference:**

Positronic P/N: CBD3W3F0000X  
3 Female Sockets, solder type, size 8, Positronic P/N: FS40--D

See Wire Table, page 59

**HALL EFFECT MASS**  
w/P\* connector: .07 kg (.15 lb) max  
w/C\* cable: .03 kg (.07 lb) max



Connector Option	
Connector	Length
P1	400 (16)
P2	200 (8)
P3	100 (4)

Flying Lead Option	
Leads	Length
C1	400 (16)
C2	200 (8)
C3	100 (4)

## PERFORMANCE SPECIFICATIONS

## 55 Series Ironcore - Non-cooled

Rated Performance	Symbol	Units	IC55-015				IC55-030				IC55-050			
			A1	A3	A5	A7	A1	A3	A5	A7	A1	A3	A5	A7
Peak force	$F_p$	N	940				1875				3125			
		lbf	211				422				703			
Continuous force @Tmax see note 1.	$F_c$	N	359				748				1374			
		lbf	81				168				309			
Motor constant @ 25°C	$K_m$	N/√W	28.9				49.7				71.0			
Max. Cont. power dissipation	$P_c$	W	219				320				530			
<b>Electrical Specifications</b>														
		<b>Winding Code</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A7</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A7</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A7</b>
Peak current	$I_p$	Arms	11.1	55.5	19.2	96.1	11.1	55.5	19.2	96.1	11.1	55.5	19.2	96.1
Continuous Current @Tmax	$I_c$	Arms	3.8	19.0	6.6	32.9	4.0	19.8	6.9	34.3	4.4	21.8	7.6	37.8
Electrical resistance @25°C±10%	$R_m$	Ohms L-L	7.2	0.29	2.4	0.10	9.7	0.39	3.2	0.13	13.2	0.53	4.4	0.18
Electrical inductance ±20%	L	mH L-L	45.6	1.8	15.2	0.6	83.5	3.3	27.8	1.1	134	5.3	44.5	1.8
Back EMF constant @25°C±10%	$K_e$	Vpeak/m/s L-L	77.2	15.4	44.5	8.9	154	30.9	89.1	17.8	257	51.4	148	29.7
		Vpeak/in/sec L-L	1.96	0.39	1.13	0.23	3.92	0.78	2.26	0.45	6.53	1.31	3.77	0.75
Force constant @25°C±10%	$K_f$	N/Arms	94.5	18.9	54.6	10.9	189	37.8	109	21.8	315	62.9	182	36.3
		lbf/Arms	21.2	4.2	12.3	2.5	42.5	8.5	24.5	4.9	70.7	14.1	40.8	8.2
<b>Mechanical Specifications</b>														
Coil Assembly Mass ±15%	$M_c$	kg	8.0				12.0				17.3			
		lbs	17.6				26.5				38.1			
<b>Magnetic Way Type</b>			<b>MC015</b>				<b>MC030</b>				<b>MC050</b>			
<b>Magnetic Way Mass ±15%</b>	$M_w$	kg/m	2.5				5.4				7.5			
		lbs/in	0.14				0.30				0.42			
<b>Figures of Merit &amp; Additional Data</b>														
Electrical time constant	$T_e$	ms	6.3				8.6				10.1			
Max.Theoretical Acceleration	$A_{max}$	g's	12.0				15.9				18.4			
Magnetic attraction	$F_a$	kN	3.7				7.4				12.3			
		lbf	827				1652				2754			
Thermal Resistance <sup>0.48</sup> - coils to external structure	$R_{th}$	°C/Watt	0.48				0.33				0.20			
Max. Allowable Coil Temp.	$T_{max}$	°C	130				130				130			

## Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to:  $F_c = K_m \times \text{Square Root}(P_w)$ ; where  $P_w$  = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply  $F_c$  divided by the force constant  $K_f$ .
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

## PERFORMANCE SPECIFICATIONS

### 55 Series Ironcore - Non-cooled

Rated Performance	Symbol	Units	IC55-075				IC55-100				IC55-150				
			A1	A3	A5	A7	A1	A3	A5	A7	A1	A3	A5	A7	
Peak force	F <sub>p</sub>	N	4690				6250				9375				
		lbf	1054				1405				2108				
Continuous force @Tmax see note 1.	F <sub>c</sub>	N	2164				2989				4532				
		lbf	486				672				1019				
Motor constant @ 25°C	K <sub>m</sub>	N/√W	91.9				109.7				139				
Max. Cont. power dissipation	P <sub>c</sub>	W	784				1050				1500				
<b>Electrical Specifications</b>															
			<b>Winding Code</b>												
Peak current	I <sub>p</sub>	Arms	11.1	55.5	19.2	96.1	11.1	55.5	19.2	96.1	11.1	55.5	19.2	96.1	
Continuous Current @Tmax	I <sub>c</sub>	Arms	4.6	22.9	7.9	39.7	4.7	23.7	8.2	41.1	4.8	24.0	8.3	41.6	
Electrical resistance @25°C±10%	R <sub>m</sub>	Ohms L-L	17.7	0.71	5.9	0.24	22.1	0.88	7.4	0.29	30.9	1.2	10.3	0.41	
Electrical inductance ±20%	L	mH L-L	197	7.9	65.7	2.6	260	10.4	86.7	3.5	387	15.5	129	5.2	
Back EMF constant @25°C±10%	K <sub>e</sub>	Vpeak/m/s L-L	385	77.1	223	44.5	514	103	297	59.3	771	154	445	89.0	
		Vpeak/in/sec L-L	9.79	1.96	5.65	1.13	13.1	2.61	7.54	1.51	19.6	3.92	11.3	2.26	
Force constant @25°C±10%	K <sub>f</sub>	N/Arms	472	94.4	273	54.5	630	126	363	72.7	944	189	545	109	
		lbf / Arms	106	21.2	61.3	12.3	142	28.3	81.7	16.3	212	42.5	123	24.5	
<b>Mechanical Specifications</b>															
Coil Assembly Mass ±15%	M <sub>c</sub>	kg	23.9				31.2				45.1				
		lbs	52.7				68.8				99.4				
<b>Magnetic Way Type</b>			<b>MC075</b>				<b>MC100</b>				<b>MC150</b>				
<b>Magnetic Way Mass ±15%</b>	M <sub>w</sub>	kg/m	10.1				12.7				20.7				
		lbs/in	0.56				0.71				1.16				
<b>Figures of Merit &amp; Additional Data</b>															
Electrical time constant	T <sub>e</sub>	ms	11.1				11.8				12.5				
Max.Theoretical Acceleration	A <sub>max</sub>	g's	20.0				20.4				21.2				
Magnetic attraction	F <sub>a</sub>	kN	18.4				24.5				36.8				
		lbf	4132				5508				8262				
Thermal Resistance															
- coils to external structure	R <sub>th</sub>	°C/Watt	0.13				0.10				0.070				
Max. Allowable Coil Temp.	T <sub>max</sub>	°C	130				130				130				

#### Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to: Fc = Km x Square Root (Pw); where Pw = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

## PERFORMANCE SPECIFICATIONS

## 55 Series Ironcore - Non-cooled

Rated Performance	Symbol	Units	IC55-200				IC55-250			
Peak force	$F_p$	N	12500				15625			
		lbf	2810				3513			
Continuous force @Tmax see note 1.	$F_c$	N	6303				7496			
		lbf	1417				1685			
Motor constant @ 25°C	$K_m$	N/√W	163				178			
Max. Cont. power dissipation	$P_c$	W	2100				2500			
<b>Electrical Specifications</b>										
		<b>Winding Code</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A7</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A7</b>
Peak current	$I_p$	Arms	11.1	55.5	19.2	96.1	11.1	55.5	19.2	96.1
Continuous Current @Tmax	$I_c$	Arms	5.0	25.0	8.7	43.3	5.0	24.8	8.6	42.9
Electrical resistance @25°C±10%	$R_m$	Ohms L-L	39.8	1.6	13.3	0.53	48.3	1.9	16.1	0.64
Electrical inductance ±20%	L	mH L-L	513	20.5	171	6.8	639	25.6	213	8.5
Back EMF constant @25°C±10%	$K_e$	Vpeak/m/s L-L	1028	206	594	119	1235	247	713	143
		Vpeak/in/sec L-L	26.1	5.22	15.1	3.02	31.4	6.27	18.1	3.62
Force constant @25°C±10%	$K_f$	N/Arms	1260	252	727	145	1512	302	873	175
		lbf / Arms	283	56.6	163	32.7	340	68.0	196	39.3
<b>Mechanical Specifications</b>										
Coil Assembly Mass ±15%	$M_c$	kg	59				73			
		lbs	130				161			
<b>Magnetic Way Type</b>			<b>MC200</b>				<b>MC250</b>			
<b>Magnetic Way Mass ±15%</b>	$M_w$	kg/m	26.8				33.2			
		lbs/in	1.50				1.86			
<b>Figures of Merit &amp; Additional Data</b>										
Electrical time constant	$T_e$	ms	12.9				13.2			
Max.Theoretical Acceleration	$A_{max}$	g's	21.6				21.8			
Magnetic attraction	$F_a$	kN	49.3				61.5			
		lbf	11072				13826			
Thermal Resistance										
- coils to external structure	$R_{th}$	°C/Watt	0.050				0.042			
Max. Allowable Coil Temp.	$T_{max}$	°C	130				130			

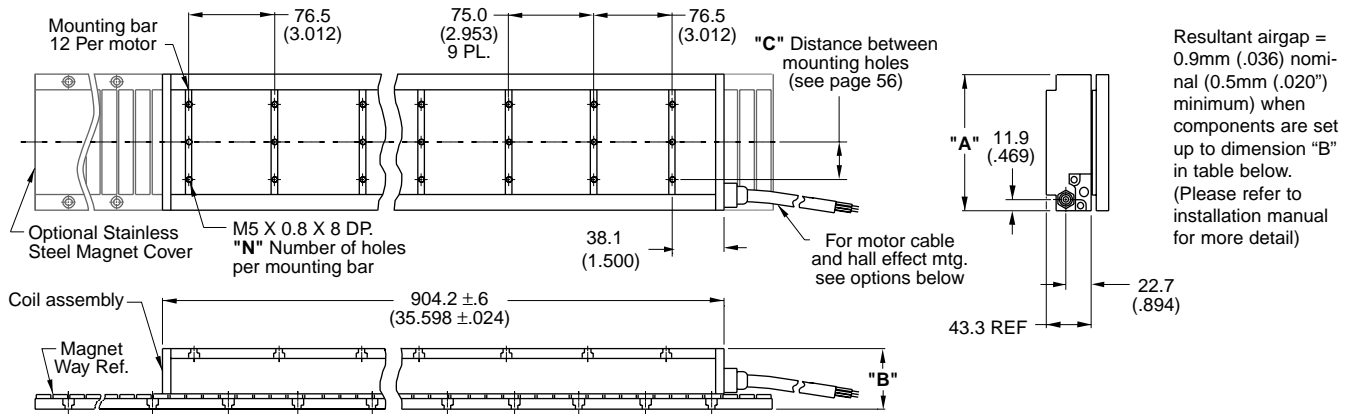
## Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to:  
 $F_c = K_m \times \text{Square Root}(P_w)$ ; where  $P_w$  = the acceptable heat load, in watts, and must be a value below Pc.  
The RMS current needed to produce this force is simply  $F_c$  divided by the force constant  $K_f$ .
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

## DIMENSIONS

### Non-Cooled

### IC55-xxx



**Notes:**

1. Dimensions in mm (inches)
2. Tolerances unless otherwise specified:  
no decimal place  $\pm 0.8$  (.03)  
X decimal place  $\pm 0.1$  (.004)  
XX decimal place  $\pm 0.05$  (.002)

Motor Coil Type	Coil Width "A"	Non-Cooled	Dim "B" without cover	Dim "B" w/ Magnet cover	# Holes "N"
IC55-015	50.0 (1.969) $\pm 1.0$ (.04)	ICXX-015	54.3 $\pm 0.1$ (2.138 $\pm 0.004$ )	54.6 $\pm 0.1$ (2.150 $\pm 0.004$ )	1
IC55-030	65.0 (2.559) $\pm 1.0$ (.04)	ICXX-030	58.3 $\pm 0.1$ (2.295 $\pm 0.004$ )	58.6 $\pm 0.1$ (2.307 $\pm 0.004$ )	2
IC55-050	85.0 (3.346) $\pm 1.0$ (.04)	ICXX-050	58.3 $\pm 0.1$ (2.295 $\pm 0.004$ )	58.6 $\pm 0.1$ (2.307 $\pm 0.004$ )	2
IC55-075	110.0 (4.331) $\pm 1.0$ (.04)	ICXX-075	58.3 $\pm 0.1$ (2.295 $\pm 0.004$ )	58.6 $\pm 0.1$ (2.307 $\pm 0.004$ )	3
IC55-100	135.0 (5.315) $\pm 1.0$ (.04)	ICXX-100	58.3 $\pm 0.1$ (2.295 $\pm 0.004$ )	58.6 $\pm 0.1$ (2.307 $\pm 0.004$ )	3
IC55-150	185.0 (7.283) $\pm 1.5$ (.06)	ICXX-150	60.3 $\pm 0.1$ (2.374 $\pm 0.004$ )	60.6 $\pm 0.1$ (2.386 $\pm 0.004$ )	5
IC55-200	235.0 (9.252) $\pm 1.5$ (.06)	ICXX-200	60.3 $\pm 0.1$ (2.374 $\pm 0.004$ )	60.6 $\pm 0.1$ (2.386 $\pm 0.004$ )	6
IC55-250	285.0 (11.220) $\pm 1.5$ (.06)	ICXX-250	60.3 $\pm 0.1$ (2.374 $\pm 0.004$ )	60.6 $\pm 0.1$ (2.386 $\pm 0.004$ )	7

## TERMINATION AND HALL EFFECT OPTIONS

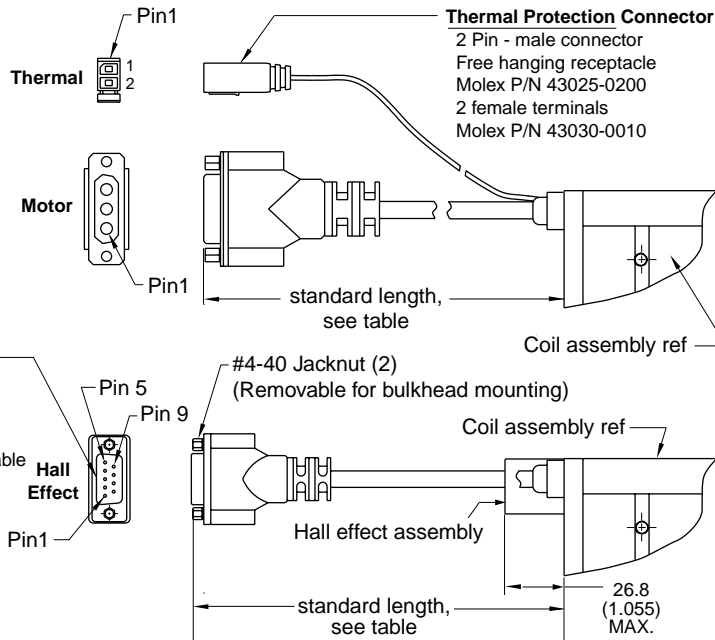
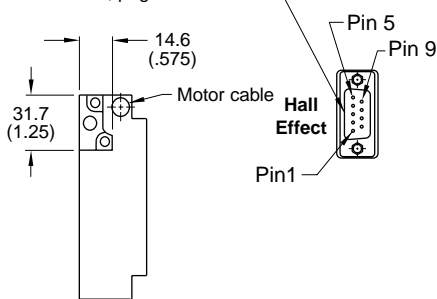
**Note:**  
Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57

**Hall Effect Connector Option:**

Positronic P/N: MD9M2000Z  
9 Pin, male

**Mating Connector Reference:**  
Positronic P/N: MD9F2000X

See wire table, page 59



**Thermal Protection Connector:**

2 Pin - male connector  
Free hanging receptacle  
Molex P/N 43025-0200  
2 female terminals  
Molex P/N 43030-0010

**Mating Connector Reference:**

Molex "Micro-Fit 3.0"  
Plug: 43020-0201  
Male Terminals: 43031-0010

See Wire Table, page 59

**Motor Connector:**

Positronic P/N: CBD3W3M0000Z  
3 Pin, Male shell, size 2

**Male Contacts:**

Positronic P/N: MS40--D  
3 removable male contacts, size 8

**Mating Connector Reference:**

Positronic P/N: CBD3W3F0000X  
3 Female Sockets, solder type, size 8, Positronic P/N: FS40--D

See Wire Table, page 59

**HALL EFFECT MASS**

w/P\* connector: .07 kg (.15 lb) max  
w/C\* cable: .03 kg (.07 lb) max

Connector Option	
Connector	Length
P1	400 (16)
P2	200 (8)
P3	100 (4)

Flying Lead Option	
Leads	Length
C1	400 (16)
C2	200 (8)
C3	100 (4)

## PERFORMANCE SPECIFICATIONS

## 11 Series Ironcore - Water cooled

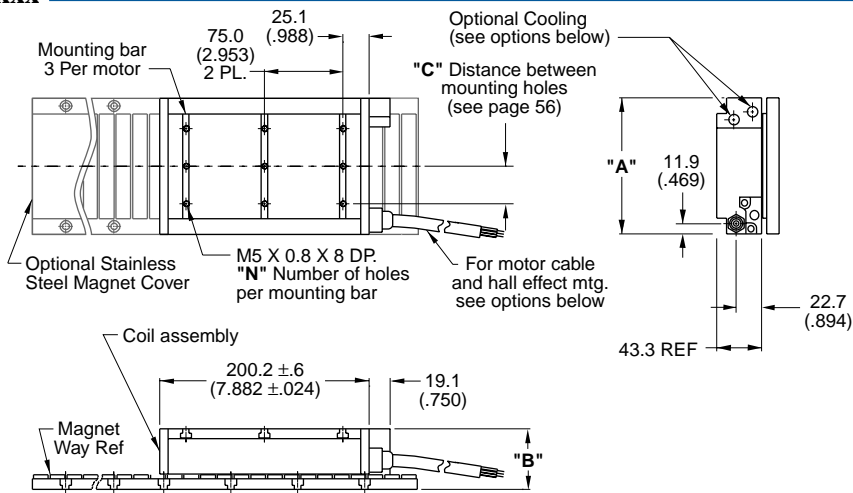
Rated Performance	Symbol	Units	IC11-030		IC11-050		IC11-075		IC11-100		IC11-150		IC11-200		IC11-250	
Peak force	$F_p$	N	375		625		940		1250		1875		2500		3125	
		lbf	84		141		211		281		422		562		703	
Continuous force @Tmax see note 1.	$F_c$	N	296		502		754		1006		1490		1991		2410	
		lbf	66		113		169		226		335		448		542	
Motor constant @ 25°C	$K_m$	N/√W	19.3		28.6		37.3		45.0		55.7		65.7		71.8	
Max. Cont. power dissipation	$P_c$	W	319		434		577		724		1010		1296		1591	
<b>Electrical Specifications</b>																
			<b>Winding Code</b>		<b>A1</b>	<b>A5</b>	<b>A1</b>	<b>A5</b>	<b>A1</b>	<b>A5</b>	<b>A1</b>	<b>A5</b>	<b>A1</b>	<b>A5</b>	<b>A1</b>	<b>A5</b>
Peak current	$I_p$	Arms	13.8	23.9	13.8	23.9	13.8	23.9	13.8	23.9	13.8	23.9	13.8	23.9	13.8	23.9
Continuous Current @Tmax	$I_c$	Arms	9.7	16.9	9.9	17.2	9.9	17.1	9.9	17.2	9.8	17.0	9.8	17.0	9.9	17.2
Electrical resistance @25°C±10%	$R_m$	Ohms L-L	1.6	0.53	2.1	0.70	2.8	0.93	3.5	1.2	5.0	1.7	6.4	2.1	7.7	2.6
Electrical inductance ±20%	L	mH L-L	10.3	3.4	16.5	5.5	24.4	8.1	32.1	10.7	47.7	15.9	63.3	21.1	78.9	26.3
Back EMF constant @25°C±10%	$K_e$	Vpeak/m/s L-L	24.8	14.3	41.4	23.9	62.2	35.9	82.9	47.8	124	71.7	166	95.7	199	115
		Vpeak/in/sec L-L	0.63	0.36	1.05	0.61	1.58	0.91	2.11	1.22	3.16	1.82	4.21	2.43	5.05	2.91
Force constant @25°C±10%	$K_f$	N/Arms	30.4	17.6	50.7	29.3	76.2	44.0	102	58.6	152	87.9	203	117	243	141
		lbf / Arms	6.8	3.9	11.4	6.6	17.1	9.9	22.8	13.2	34.2	19.8	45.7	26.4	54.7	31.6
<b>Mechanical Specifications</b>																
Coil Assembly Mass ±15%	$M_c$	kg	2.5		3.6		5.0		6.5		9.4		12.3		15.2	
		lbs	5.5		7.9		11.0		14.3		20.7		27.1		33.5	
<b>Magnetic Way Type</b>			<b>MC030</b>		<b>MC050</b>		<b>MC075</b>		<b>MC100</b>		<b>MC150</b>		<b>MC200</b>		<b>MC250</b>	
<b>Magnetic Way Mass ±15%</b>	$M_w$	kg/m	5.4		7.5		10.1		12.7		20.7		26.8		33.2	
		lbs/in	0.30		0.42		0.56		0.71		1.16		1.50		1.86	
<b>Figures of Merit &amp; Additional Data</b>																
Electrical time constant	$T_e$	ms	6.4		7.9		8.7		9.2		9.5		9.9		10.2	
Max.Theoretical Acceleration	$A_{max}$	g's	15.3		17.7		19.2		19.6		20.3		20.7		21.0	
Magnetic attraction	$F_a$	kN	1.4		2.4		3.7		4.9		7.3		9.9		12.3	
		lbf	324		546		821		1102		1639		2214		2761	
Thermal Resistance																
- coils to external structure	$R_{th}$	°C/Watt	0.33		0.24		0.18		0.15		0.10		0.081		0.066	
Max. Allowable Coil Temp.	$T_{max}$	°C	130		130		130		130		130		130		130	

## Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to:  $F_c = K_m \times \text{Square Root}(P_w)$ ; where Pw = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.
- The stated performance with the cooling option assures water cooling at a minimum flow rate of 2.8 liters/min. (0.75 GPM) depending on motor size and power losses.

## DIMENSIONS

### Cooled IC11-xxx



Resultant airgap = 0.9mm (.036) nominal (0.5mm (.020") minimum) when components are set up to dimension "B" in table below. (Please refer to installation manual for more detail)

- Notes:  
 1. Dimensions in mm (inches)  
 2. Tolerances unless otherwise specified:  
 no decimal place  $\pm 0.8$  (.03)  
 X decimal place  $\pm 0.1$  (.004)  
 XX decimal place  $\pm 0.05$  (.002)

Motor Coil Type	Coil Width "A"	Cooled	Dim "B" without cover	Dim "B" w/ Magnet cover	# Holes "N"
IC11-030	65.0 (2.559) $\pm 1.0$ (.04)	ICXX-030	58.3 $\pm 0.1$ (2.295 $\pm 0.04$ )	58.6 $\pm 0.1$ (2.307 $\pm 0.04$ )	2
IC11-050	85.0 (3.346) $\pm 1.0$ (.04)	ICXX-050	58.3 $\pm 0.1$ (2.295 $\pm 0.04$ )	58.6 $\pm 0.1$ (2.307 $\pm 0.04$ )	2
IC11-075	110.0 (4.331) $\pm 1.0$ (.04)	ICXX-075	58.3 $\pm 0.1$ (2.295 $\pm 0.04$ )	58.6 $\pm 0.1$ (2.307 $\pm 0.04$ )	3
IC11-100	135.0 (5.315) $\pm 1.0$ (.04)	ICXX-100	58.3 $\pm 0.1$ (2.295 $\pm 0.04$ )	58.6 $\pm 0.1$ (2.307 $\pm 0.04$ )	3
IC11-150	185.0 (7.283) $\pm 1.5$ (.06)	ICXX-150	60.3 $\pm 0.1$ (2.374 $\pm 0.04$ )	60.6 $\pm 0.1$ (2.386 $\pm 0.04$ )	5
IC11-200	235.0 (9.252) $\pm 1.5$ (.06)	ICXX-200	60.3 $\pm 0.1$ (2.374 $\pm 0.04$ )	60.6 $\pm 0.1$ (2.386 $\pm 0.04$ )	6
IC11-250	285.0 (11.220) $\pm 1.5$ (.06)	ICXX-250	60.3 $\pm 0.1$ (2.374 $\pm 0.04$ )	60.6 $\pm 0.1$ (2.386 $\pm 0.04$ )	7

## TERMINATION AND HALL EFFECT OPTIONS

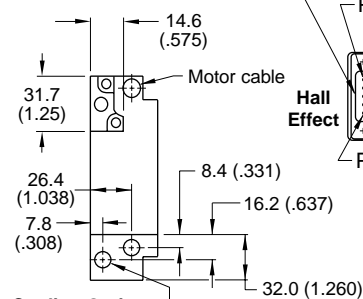
Note:  
 Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57

### Hall Effect Connector Option:

Positronic P/N: MD9M2000Z  
 9 Pin, male

Mating Connector Reference:  
 Positronic P/N: MD9F2000X

See wire table, page 59



### Cooling Option:

1/8-27 NPT (female) 2 PL.

### Thermal Protection Connector:

2 Pin - male connector  
 Free hanging receptacle  
 Molex P/N 43025-0200  
 2 female terminals  
 Molex P/N 43030-0010

### Mating Connector Reference:

Molex "Micro-Fit 3.0"  
 Plug: 43020-0201  
 Male Terminals: 43031-0010

See Wire Table, page 59

### Motor Connector:

Positronic P/N: CBD3W3M0000Z  
 3 Pin, Male shell, size 2

### Male Contacts:

Positronic P/N: MS40--D  
 3 removable male contacts, size 8

### Mating Connector Reference:

Positronic P/N: CBD3W3F0000X  
 3 Female Sockets, solder type, size 8, Positronic P/N: FS40--D

See Wire Table, page 59

**HALL EFFECT MASS**  
 w/P\* connector: .07 kg (.15 lb) max  
 w/C\* cable: .03 kg (.07 lb) max

Connector Option	
Connector	Length
P1	400 (16)
P2	200 (8)
P3	100 (4)

Flying Lead Option	
Leads	Length
C1	400 (16)
C2	200 (8)
C3	100 (4)

## PERFORMANCE SPECIFICATIONS

## 22 Series Ironcore - Water cooled

Rated Performance	Symbol	Units	IC22-030			IC22-050			IC22-075			IC22-100		
Peak force	$F_p$	N	750			1250			1875			2500		
		lbf	169			281			422			562		
Continuous force @Tmax see note 1.	$F_c$	N	603			1005			1493			1995		
		lbf	136			226			336			448		
Motor constant @ 25°C	$K_m$	$N/\sqrt{W}$	28.3			40.5			52.2			62.5		
Max. Cont. power dissipation	$P_c$	W	640			868			1154			1438		
<b>Electrical Specifications</b>														
		<b>Winding Code</b>	<b>A1</b>	<b>A2</b>	<b>A6</b>	<b>A1</b>	<b>A2</b>	<b>A6</b>	<b>A1</b>	<b>A2</b>	<b>A6</b>	<b>A1</b>	<b>A2</b>	<b>A6</b>
Peak current	$I_p$	Arms	13.8	27.6	47.8	13.8	27.6	47.8	13.8	27.6	47.8	13.8	27.6	47.8
Continuous Current @Tmax	$I_c$	Arms	9.9	19.8	34.3	9.9	19.8	34.3	9.8	19.6	34.0	9.8	19.6	34.0
Electrical resistance @25°C±10%	$R_m$	Ohms L-L	3.1	0.78	0.26	4.2	1.1	0.35	5.7	1.4	0.48	7.1	1.8	0.59
Electrical inductance ±20%	L	mH L-L	20.6	5.2	1.7	33.0	8.3	2.8	48.6	12.2	4.1	64.1	16.0	5.3
Back EMF constant @25°C±10%	$K_e$	Vpeak/m/s L-L	49.7	24.9	14.4	82.9	41.4	23.9	124	62.2	35.9	166	83.1	48.0
		Vpeak/in/sec L-L	1.26	0.63	0.36	2.11	1.05	0.61	3.16	1.58	0.91	4.22	2.11	1.22
Force constant @25°C±10%	$K_f$	N/Arms	60.9	30.5	17.6	102	50.8	29.3	152	76.2	44.0	203	102	58.7
		lbf/Arms	13.7	6.8	4.0	22.8	11.4	6.6	34.2	17.1	9.9	45.7	22.9	13.2
<b>Mechanical Specifications</b>														
Coil Assembly Mass ±15%	$M_c$	kg	4.8			6.9			9.6			12.5		
		lbs	10.6			15.2			21.2			27.6		
<b>Magnetic Way Type</b>			<b>MC030</b>			<b>MC050</b>			<b>MC075</b>			<b>MC100</b>		
<b>Magnetic Way Mass ±15%</b>	$M_w$	kg/m	5.4			7.5			10.1			12.7		
		lbs/in	0.30			0.42			0.56			0.71		
<b>Figures of Merit &amp; Additional Data</b>														
Electrical time constant	$T_e$	ms	6.6			7.9			8.5			9.0		
Max.Theoretical Acceleration	$A_{max}$	g's	15.9			18.5			19.9			20.4		
Magnetic attraction	$F_a$	kN	2.9			4.9			7.3			9.8		
		lbf	654			1090			1637			2205		
Thermal Resistance														
- coils to external structure	$R_{th}$	°C/Watt	0.16			0.12			0.091			0.073		
Max. Allowable Coil Temp.	$T_{max}$	°C	130			130			130			130		

## Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to:  $F_c = K_m \times \text{Square Root}(P_w)$ ; where  $P_w$  = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply  $F_c$  divided by the force constant  $K_f$ .
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.
- The stated performance with the cooling option assures water cooling at a minimum flow rate of 2.8 liters/min. (0.75 GPM) depending on motor size and power losses.

## PERFORMANCE SPECIFICATIONS

## 22 Series Ironcore - Water cooled

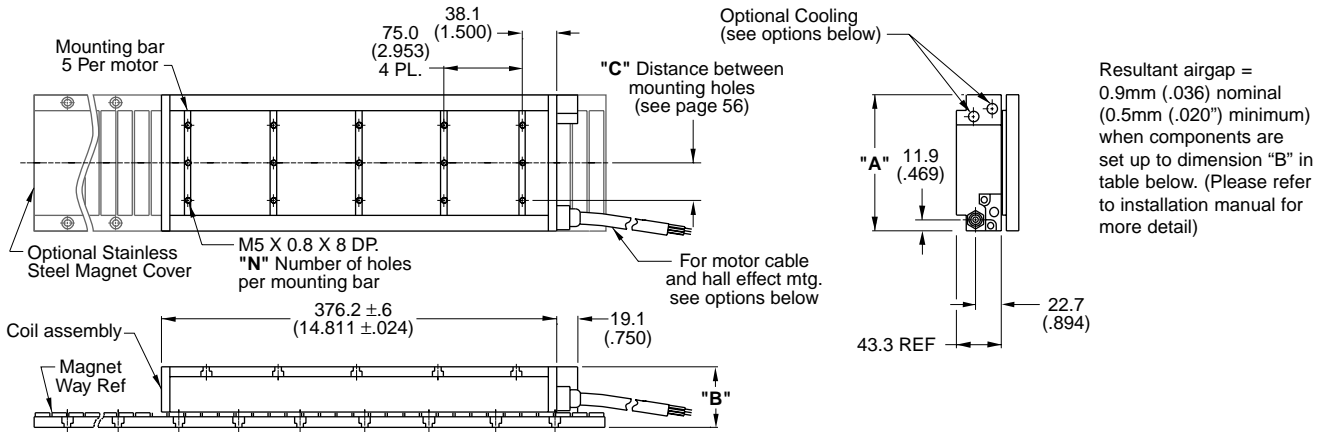
Rated Performance	Symbol	Units	IC22-150			IC22-200			IC22-250		
Peak force	F <sub>p</sub>	N	3750			5000			6250		
		lbf	843			1124			1405		
Continuous force @Tmax see note 1.	F <sub>c</sub>	N	2996			4023			4806		
		lbf	674			904			1080		
Motor constant @ 25°C	K <sub>m</sub>	N/√W	79.3			93.3			101		
Max. Cont. power dissipation	P <sub>c</sub>	W	2019			2625			3182		
<b>Electrical Specifications</b>											
		<b>Winding Code</b>	<b>A1</b>	<b>A2</b>	<b>A6</b>	<b>A1</b>	<b>A2</b>	<b>A6</b>	<b>A1</b>	<b>A2</b>	<b>A6</b>
Peak current	I <sub>p</sub>	Arms	13.8	27.6	47.8	13.8	27.6	47.8	13.8	27.6	47.8
Continuous Current @Tmax	I <sub>c</sub>	Arms	9.8	19.7	34.1	9.9	19.8	34.3	9.9	19.7	34.2
Electrical resistance @25°C±10%	R <sub>m</sub>	Ohms L-L	9.9	2.5	0.83	12.7	3.2	1.1	15.5	3.9	1.3
Electrical inductance ±20%	L	mH L-L	95.4	23.9	8.0	127	31.6	10.5	158	39.4	13.1
Back EMF constant @25°C±10%	K <sub>e</sub>	Vpeak/m/s L-L	249	124	71.8	332	166	95.7	398	199	115
		Vpeak/in/sec L-L	6.32	3.16	1.82	8.42	4.21	2.43	10.1	5.05	2.91
Force constant @25°C±10%	K <sub>f</sub>	N/Arms	305	152	87.9	406	203	117	487	243	141
		lbf / Arms	68.5	34.2	19.8	91.3	45.7	26.4	109	54.7	31.6
<b>Mechanical Specifications</b>											
Coil Assembly Mass ±15%	M <sub>c</sub>	kg	18.1			23.7			29.3		
		lbs	39.9			52.2			64.6		
<b>Magnetic Way Type</b>			<b>MC150</b>			<b>MC200</b>			<b>MC250</b>		
<b>Magnetic Way Mass ±15%</b>	M <sub>w</sub>	kg/m	20.7			26.8			33.2		
		lbs/in	1.16			1.50			1.86		
<b>Figures of Merit &amp; Additional Data</b>											
Electrical time constant	T <sub>e</sub>	ms	9.6			10.0			10.2		
Max.Theoretical Acceleration	A <sub>max</sub>	g's	21.1			21.5			21.8		
Magnetic attraction	F <sub>a</sub>	kN	14.6			19.7			24.6		
		lbf	3271			4433			5524		
Thermal Resistance											
- coils to external structure	R <sub>th</sub>	°C/Watt	0.052			0.040			0.033		
Max. Allowable Coil Temp.	T <sub>max</sub>	°C	130			130			130		

## Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to: Fc = Km x Square Root (Pw); where Pw = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.
- The stated performance with the cooling option assures water cooling at a minimum flow rate of 2.8 liters/min. (0.75 GPM) depending on motor size and power losses.

DIMENSIONS

Cooled  
IC22-xxx

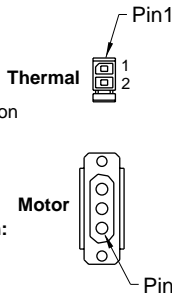


- Notes:
1. Dimensions in mm (inches)
  2. Tolerances unless otherwise specified:  
no decimal place ± 0.8 (.03)  
X decimal place ± 0.1 (.004)  
XX decimal place ± 0.05 (.002)

Motor Coil Type	Coil Width "A"	Cooled	Dim "B" without cover	Dim "B" w/ Magnet cover	# Holes "N"
IC22-030	65.0 (2.559) ± 1.0 (.04)	ICXX-030	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	2
IC22-050	85.0 (3.346) ± 1.0 (.04)	ICXX-050	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	2
IC22-075	110.0 (4.331) ± 1.0 (.04)	ICXX-075	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	3
IC22-100	135.0 (5.315) ± 1.0 (.04)	ICXX-100	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	3
IC22-150	185.0 (7.283) ± 1.5 (.06)	ICXX-150	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	5
IC22-200	235.0 (9.252) ± 1.5 (.06)	ICXX-200	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	6
IC22-250	285.0 (11.220) ± 1.5 (.06)	ICXX-250	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	7

TERMINATION AND HALL EFFECT OPTIONS

Note:  
Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57



**Thermal Protection Connector:**

- 2 Pin - male connector
- Free hanging receptacle
- Molex P/N 43025-0200
- 2 female terminals
- Molex P/N 43030-0010

**Mating Connector Reference:**

- Molex "Micro-Fit 3.0"
- Plug: 43020-0201
- Male Terminals: 43031-0010

See Wire Table, page 59

**Motor Connector:**

- Positronic P/N: CBD3W3M0000Z
- 3 Pin, Male shell, size 2

**Male Contacts:**

- Positronic P/N: MS40--D
- 3 removable male contacts, size 8

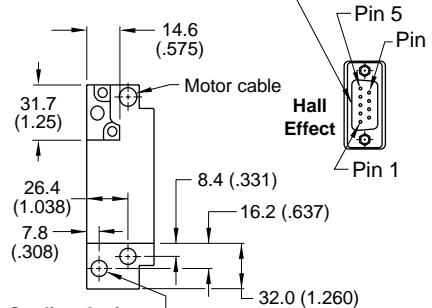
**Hall Effect Connector Option:**

- Positronic P/N: MD9M2000Z
- 9 Pin, male

**Mating Connector Reference:**

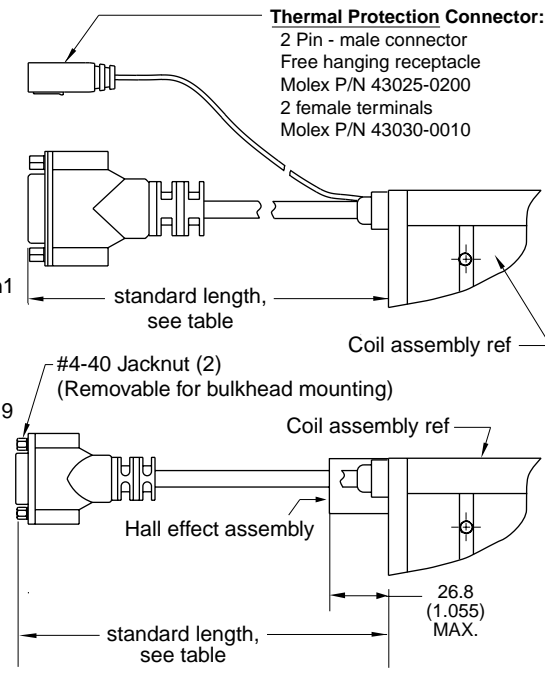
- Positronic P/N: MD9F2000X

See wire table, page 59



**Cooling Option:**

- 1/8-27 NPT (female) 2 PL.



**Mating Connector Reference:**

- Positronic P/N: CBD3W3F0000X
- 3 Female Sockets, solder type, size 8, Positronic P/N: FS40--D

See Wire Table, page 59

**HALL EFFECT MASS**  
w/P\* connector: .07 kg (.15 lb) max  
w/C\* cable: .03 kg (.07 lb) max

Connector Option	
Connector	Length
P1	400 (16)
P2	200 (8)
P3	100 (4)

Flying Lead Option	
Leads	Length
C1	400 (16)
C2	200 (8)
C3	100 (4)

## PERFORMANCE SPECIFICATIONS

## 33 Series Ironcore - Water cooled

Rated Performance	Symbol	Units	IC33-030			IC33-050			IC33-075		
Peak force	F <sub>p</sub>	N	1125			1875			2815		
		lbf	253			422			633		
Continuous force @Tmax see note 1.	F <sub>c</sub>	N	896			1492			2240		
		lbf	202			335			504		
Motor constant @ 25°C	K <sub>m</sub>	N/√W	34.5			49.2			64.2		
Max. Cont. power dissipation	P <sub>c</sub>	W	955			1296			1721		
<b>Electrical Specifications</b>											
		<b>Winding Code</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>
Peak current	I <sub>p</sub>	Arms	13.8	41.4	23.9	13.8	41.4	23.9	13.8	41.4	23.9
Continuous Current @Tmax	I <sub>c</sub>	Arms	9.8	29.5	17.0	9.8	29.4	17.0	9.8	29.4	17.0
Electrical resistance @25°C±10%	R <sub>m</sub>	Ohms L-L	4.7	0.52	1.6	6.4	0.71	2.1	8.5	0.94	2.8
Electrical inductance ±20%	L	mH L-L	31.0	3.4	10.3	49.5	5.5	16.5	73.1	8.1	24.4
Back EMF constant @25°C±10%	K <sub>e</sub>	Vpeak/m/s L-L	74.5	24.8	43.0	124	41.4	71.7	187	62.2	108
		Vpeak/in/sec L-L	1.89	0.63	1.09	3.16	1.05	1.82	4.74	1.58	2.74
Force constant @25°C±10%	K <sub>f</sub>	N/Arms	91.3	30.4	52.7	152	50.7	87.9	229	76.2	132
		lbf / Arms	20.5	6.8	11.9	34.2	11.4	19.8	51.4	17.1	29.7
<b>Mechanical Specifications</b>											
Coil Assembly Mass ±15%	M <sub>c</sub>	kg	7.3			10.4			14.4		
		lbs	16.1			22.9			31.7		
<b>Magnetic Way Type</b>			<b>MC030</b>			<b>MC050</b>			<b>MC075</b>		
<b>Magnetic Way Mass ±15%</b>	M <sub>w</sub>	kg/m	5.4			7.5			10.1		
		lbs/in	0.30			0.42			0.56		
<b>Figures of Merit &amp; Additional Data</b>											
Electrical time constant	T <sub>e</sub>	ms	6.6			7.7			8.6		
Max.Theoretical Acceleration	A <sub>max</sub>	g's	15.7			18.4			19.9		
Magnetic attraction	F <sub>a</sub>	kN	4.4			7.4			11.0		
		lbf	991			1652			2480		
Thermal Resistance											
- coils to external structure	R <sub>th</sub>	°C/Watt	0.11			0.081			0.061		
Max. Allowable Coil Temp.	T <sub>max</sub>	°C	130			130			130		

## Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to:  $F_c = K_m \times \text{Square Root}(P_w)$ ; where  $P_w$  = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply  $F_c$  divided by the force constant  $K_f$ .
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.
- The stated performance with the cooling option assures water cooling at a minimum flow rate of 2.8 liters/min. (0.75 GPM) depending on motor size and power losses.

## PERFORMANCE SPECIFICATIONS

## 33 Series Ironcore - Water cooled

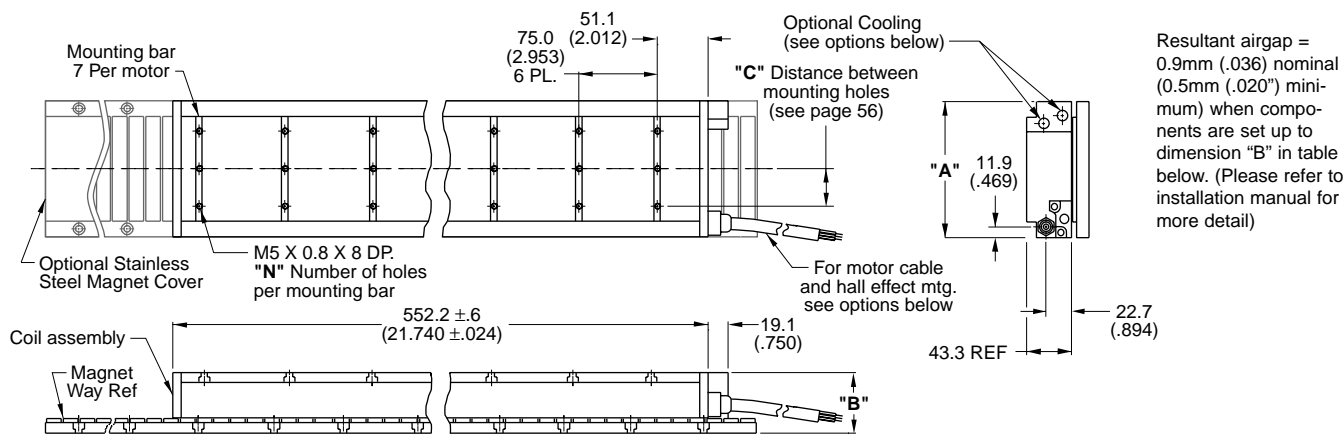
Rated Performance	Symbol	Units	IC33-100			IC33-150			IC33-200			IC33-250		
Peak force	$F_p$	N	3750			5625			7500			9375		
		lbf	843			1265			1686			2108		
Continuous force @Tmax see note 1.	$F_c$	N	3014			4464			5990			7216		
		lbf	677			1004			1347			1622		
Motor constant @ 25°C	$K_m$	N/ $\sqrt{W}$	76.5			96.9			114			124		
Max. Cont. power dissipation	$P_c$	W	2188			3000			3889			4773		
<b>Electrical Specifications</b>														
		<b>Winding Code</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>
Peak current	$I_p$	Arms	13.8	41.4	23.9	13.8	41.4	23.9	13.8	41.4	23.9	13.8	41.4	23.9
Continuous Current @Tmax	$I_c$	Arms	9.9	29.7	17.1	9.8	29.3	16.9	9.8	29.5	17.0	9.9	29.6	17.1
Electrical resistance @25°C±10%	$R_m$	Ohms L-L	10.6	1.2	3.5	14.9	1.7	5.0	19.1	2.1	6.4	23.2	2.6	7.7
Electrical inductance ±20%	L	mH L-L	96.2	10.7	32.1	143	15.9	47.7	190	21.1	63.3	237	26.3	78.8
Back EMF constant @25°C±10%	$K_e$	Vpeak/m/s L-L	249	82.9	144	373	124	215	497	166	287	596	199	344
		Vpeak/in/sec L-L	6.32	2.11	3.65	9.47	3.16	5.47	12.6	4.21	7.30	15.1	5.05	8.74
Force constant @25°C±10%	$K_f$	N/Arms	304	102	176	457	152	264	609	203	352	730	243	422
		lbf/Arms	68.5	22.8	39.5	103	34.2	59.3	137	45.7	79.1	164	54.7	94.8
<b>Mechanical Specifications</b>														
Coil Assembly Mass ±15%	$M_c$	kg	18.9			27.3			35.7			44.1		
		lbs	41.7			60.2			78.7			97.2		
<b>Magnetic Way Type</b>			<b>MC100</b>			<b>MC150</b>			<b>MC200</b>			<b>MC250</b>		
<b>Magnetic Way Mass ±15%</b>	$M_w$	kg/m	12.7			20.7			26.8			33.2		
		lbs/in	0.71			1.16			1.50			1.86		
<b>Figures of Merit &amp; Additional Data</b>														
Electrical time constant	$T_e$	ms	9.1			9.6			9.9			10.2		
Max.Theoretical Acceleration	$A_{max}$	g's	20.2			21.0			21.4			21.7		
Magnetic attraction	$F_a$	kN	14.7			22.1			29.4			36.8		
		lbf	3305			4957			6609			8262		
Thermal Resistance														
- coils to external structure	$R_{th}$	°C/Watt	0.048			0.035			0.027			0.022		
Max. Allowable Coil Temp.	$T_{max}$	°C	130			130			130			130		

## Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to:  
 $F_c = K_m \times \text{Square Root}(P_w)$ ; where  $P_w$  = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply  $F_c$  divided by the force constant  $K_f$ .
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.
- The stated performance with the cooling option assures water cooling at a minimum flow rate of 2.8 liters/min. (0.75 GPM) depending on motor size and power losses.

## DIMENSIONS

### Cooled IC33-xxx



**Notes:**

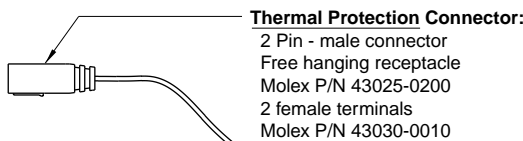
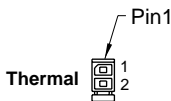
1. Dimensions in mm (inches)
2. Tolerances unless otherwise specified:  
no decimal place  $\pm 0.8$  (.03)  
X decimal place  $\pm 0.1$  (.004)  
XX decimal place  $\pm 0.05$  (.002)

Motor Coil Type	Coil Width "A"	Cooled	Dim "B" without cover	Dim "B" w/ Magnet cover	# Holes "N"
IC33-030	65.0 (2.559) $\pm 1.0$ (.04)	ICXX-030	58.3 $\pm 0.1$ (2.295 $\pm 0.004$ )	58.6 $\pm 0.1$ (2.307 $\pm 0.004$ )	2
IC33-050	85.0 (3.346) $\pm 1.0$ (.04)	ICXX-050	58.3 $\pm 0.1$ (2.295 $\pm 0.004$ )	58.6 $\pm 0.1$ (2.307 $\pm 0.004$ )	2
IC33-075	110.0 (4.331) $\pm 1.0$ (.04)	ICXX-075	58.3 $\pm 0.1$ (2.295 $\pm 0.004$ )	58.6 $\pm 0.1$ (2.307 $\pm 0.004$ )	3
IC33-100	135.0 (5.315) $\pm 1.0$ (.04)	ICXX-100	58.3 $\pm 0.1$ (2.295 $\pm 0.004$ )	58.6 $\pm 0.1$ (2.307 $\pm 0.004$ )	3
IC33-150	185.0 (7.283) $\pm 1.5$ (.06)	ICXX-150	60.3 $\pm 0.1$ (2.374 $\pm 0.004$ )	60.6 $\pm 0.1$ (2.386 $\pm 0.004$ )	5
IC33-200	235.0 (9.252) $\pm 1.5$ (.06)	ICXX-200	60.3 $\pm 0.1$ (2.374 $\pm 0.004$ )	60.6 $\pm 0.1$ (2.386 $\pm 0.004$ )	6
IC33-250	285.0 (11.220) $\pm 1.5$ (.06)	ICXX-250	60.3 $\pm 0.1$ (2.374 $\pm 0.004$ )	60.6 $\pm 0.1$ (2.386 $\pm 0.004$ )	7

## TERMINATION AND HALL EFFECT OPTIONS

**Note:**

Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57



**Mating Connector Reference:**

Molex "Micro-Fit 3.0"  
Plug: 43020-0201  
Male Terminals: 43031-0010

See Wire Table, page 59

**Motor Connector:**

Positronic P/N: CBD3W3M0000Z  
3 Pin, Male shell, size 2

**Male Contacts:**

Positronic P/N: MS40--D  
3 removable male contacts, size 8

**Mating Connector Reference:**

Positronic P/N: CBD3W3F0000X  
3 Female Sockets, solder type, size 8, Positronic P/N: FS40--D

See Wire Table, page 59

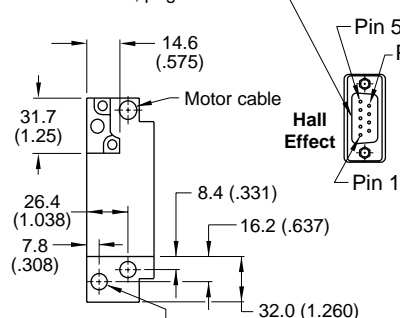
**Hall Effect Connector Option:**

Positronic P/N: MD9M2000Z  
9 Pin, male

**Mating Connector Reference:**

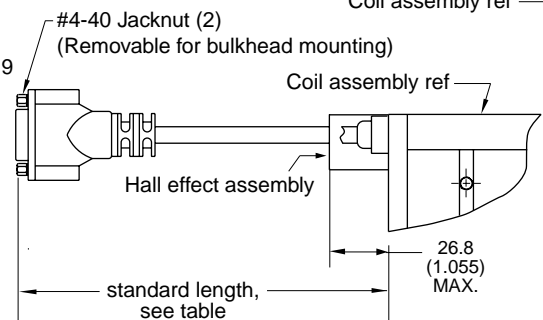
Positronic P/N: MD9F2000X

See wire table, page 59



**Cooling Option:**

1/8-27 NPT (female) 2 PL.



**HALL EFFECT MASS**  
w/P\* connector: .07 kg (.15 lb) max  
w/C\* cable: .03 kg (.07 lb) max

Connector Option	
Connector	Length
P1	400 (16)
P2	200 (8)
P3	100 (4)

Flying Lead Option	
Leads	Length
C1	400 (16)
C2	200 (8)
C3	100 (4)

## PERFORMANCE SPECIFICATIONS

## 44 Series Ironcore - Water cooled

Rated Performance	Symbol	Units	IC44-030			IC44-050			IC44-075			IC44-100		
Peak force	$F_p$	N	1500			2500			3750			5000		
		lbf	337			562			843			1124		
Continuous force @Tmax see note 1.	$F_c$	N	1201			1990			2980			4015		
		lbf	270			446			669			902		
Motor constant @ 25°C	$K_m$	N/ $\sqrt{W}$	39.9			56.8			74.0			88.3		
Max. Cont. power dissipation	$P_c$	W	1280			1721			2283			2917		
<b>Electrical Specifications</b>														
		<b>Winding Code</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>
Peak current	$I_p$	Arms	13.8	27.6	55.2	13.8	27.6	55.2	13.8	27.6	55.2	13.8	27.5	55.1
Continuous Current @Tmax	$I_c$	Arms	9.9	19.7	39.5	9.8	19.6	39.1	9.8	19.5	39.1	9.9	19.8	39.5
Electrical resistance @25°C±10%	$R_m$	Ohms L-L	6.2	1.6	0.39	8.5	2.1	0.53	11.3	2.8	0.71	14.1	3.5	0.88
Electrical inductance ±20%	L	mH L-L	41.3	10.3	2.6	66.1	16.5	4.1	97.3	24.3	6.1	128	32.1	8.0
Back EMF constant @25°C±10%	$K_e$	Vpeak/m/s L-L	99.4	49.7	24.8	166	82.9	41.4	249	124	62.2	331	166	82.9
		Vpeak/in/sec L-L	2.52	1.26	0.63	4.21	2.11	1.05	6.32	3.16	1.58	8.42	4.21	2.11
Force constant @25°C±10%	$K_f$	N/Arms	122	60.9	30.4	203	102	50.8	305	152	76.2	406	203	102
		lbf/Arms	27.4	13.7	6.8	45.6	22.8	11.4	68.5	34.2	17.1	91.3	45.6	22.8
<b>Mechanical Specifications</b>														
Coil Assembly Mass ±15%	$M_c$	kg	9.6			13.9			19.2			25.0		
		lbs	21.2			30.6			42.3			55.1		
<b>Magnetic Way Type</b>			<b>MC030</b>			<b>MC050</b>			<b>MC075</b>			<b>MC100</b>		
<b>Magnetic Way Mass ±15%</b>	$M_w$	kg/m	5.4			7.5			10.1			12.7		
		lbs/in	0.30			0.42			0.56			0.71		
<b>Figures of Merit &amp; Additional Data</b>														
Electrical time constant	$T_e$	ms	6.7			7.8			8.6			9.1		
Max.Theoretical Acceleration	$A_{max}$	g's	15.9			18.3			19.9			20.4		
Magnetic attraction	$F_a$	kN	5.9			9.8			14.7			19.6		
		lbf	1322			2203			3305			4406		
Thermal Resistance														
- coils to external structure	$R_{th}$	°C/Watt	0.082			0.061			0.046			0.036		
Max. Allowable Coil Temp.	$T_{max}$	°C	130			130			130			130		

## Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to:  $F_c = K_m \times \text{Square Root}(P_w)$ ; where  $P_w$  = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply  $F_c$  divided by the force constant  $K_f$ .
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.
- The stated performance with the cooling option assures water cooling at a minimum flow rate of 2.8 liters/min. (0.75 GPM) depending on motor size and power losses.

## PERFORMANCE SPECIFICATIONS

### 44 Series Ironcore - Water cooled

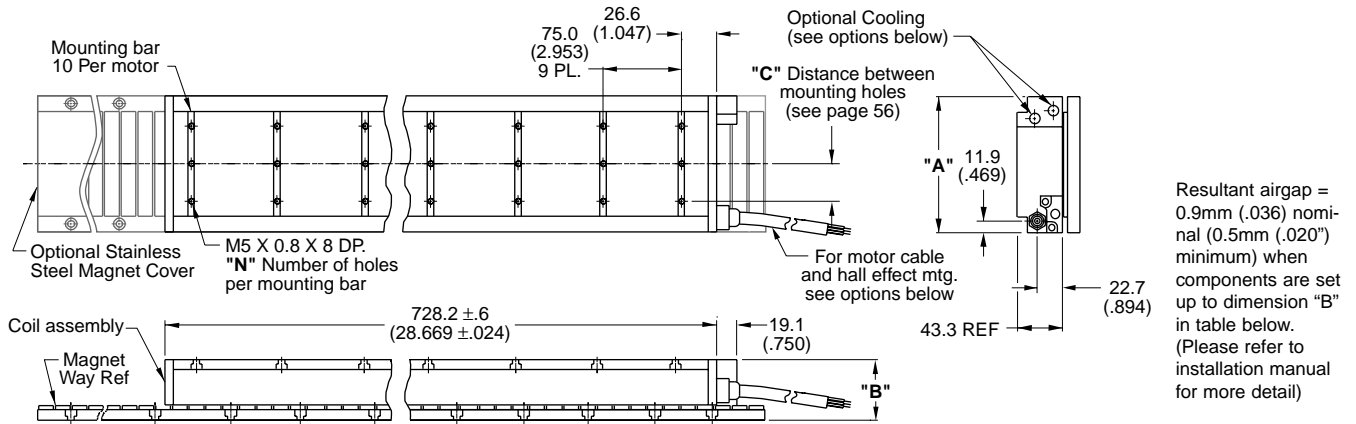
Rated Performance	Symbol	Units	IC44-150			IC44-200			IC44-250	
Peak force	F <sub>p</sub>	N	7500			10000			12500	
		lbf	1686			2248			2810	
Continuous force @Tmax see note 1.	F <sub>c</sub>	N	5990			8035			9620	
		lbf	1343			1806			2165	
Motor constant @ 25°C	K <sub>m</sub>	N/√W	112			132			143	
Max. Cont. power dissipation	P <sub>c</sub>	W	4038			5250			6364	
<b>Electrical Specifications</b>										
		<b>Winding Code</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>A2</b>	<b>A3</b>
Peak current	I <sub>p</sub>	Arms	13.8	27.6	55.3	13.8	27.6	55.2	27.6	55.0
Continuous Current @Tmax	I <sub>c</sub>	Arms	9.8	19.6	39.2	9.9	19.8	39.6	19.8	39.5
Electrical resistance @25°C±10%	R <sub>m</sub>	Ohms L-L	19.8	5.0	1.2	25.5	6.4	1.6	7.7	1.9
Electrical inductance ±20%	L	mH L-L	191	47.7	11.9	253	63.3	15.8	78.9	19.7
Back EMF constant @25°C±10%	K <sub>e</sub>	Vpeak/m/s L-L	497	249	124	663	332	166	397	199
		Vpeak/in/sec L-L	12.6	6.32	3.16	16.8	8.42	4.21	10.1	5.05
Force constant @25°C±10%	K <sub>f</sub>	N/Arms	609	305	152	812	406	203	487	243
		lbf / Arms	137	68.5	34.2	183	91.3	45.7	109	54.7
<b>Mechanical Specifications</b>										
Coil Assembly Mass ±15%	M <sub>c</sub>	kg	36.2			47.4			58.5	
		lbs	79.8			104			129	
<b>Magnetic Way Type</b>			<b>MC150</b>			<b>MC200</b>			<b>MC250</b>	
<b>Magnetic Way Mass ±15%</b>	M <sub>w</sub>	kg/m	20.7			26.8			33.2	
		lbs/in	1.16			1.50			1.86	
<b>Figures of Merit &amp; Additional Data</b>										
Electrical time constant	T <sub>e</sub>	ms	9.6			9.9			10.2	
Max.Theoretical Acceleration	A <sub>max</sub>	g's	21.1			21.5			21.8	
Magnetic attraction	F <sub>a</sub>	kN	29.4			39.4			49.2	
		lbf	6609			8855			11061	
Thermal Resistance										
- coils to external structure	R <sub>th</sub>	°C/Watt	0.026			0.020			0.017	
Max. Allowable Coil Temp.	T <sub>max</sub>	°C	130			130			130	

**Notes:**

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to: Fc = Km x Square Root (Pw); where Pw = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.
- The stated performance with the cooling option assures water cooling at a minimum flow rate of 2.8 liters/min. (0.75 GPM) depending on motor size and power losses.

DIMENSIONS

Cooled  
IC44-xxx

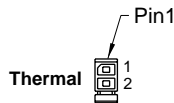


- Notes:
- Dimensions in mm (inches)
  - Tolerances unless otherwise specified:  
no decimal place ± 0.8 (.03)  
X decimal place ± 0.1 (.004)  
XX decimal place ± 0.05 (.002)

Motor Coil Type	Coil Width "A"	Cooled	Dim "B" without cover	Dim "B" w/ Magnet cover	# Holes "N"
IC44-030	65.0 (2.559) ± 1.0 (.04)	ICXX-030	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	2
IC44-050	85.0 (3.346) ± 1.0 (.04)	ICXX-050	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	2
IC44-075	110.0 (4.331) ± 1.0 (.04)	ICXX-075	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	3
IC44-100	135.0 (5.315) ± 1.0 (.04)	ICXX-100	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	3
IC44-150	185.0 (7.283) ± 1.5 (.06)	ICXX-150	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	5
IC44-200	235.0 (9.252) ± 1.5 (.06)	ICXX-200	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	6
IC44-250	285.0 (11.220) ± 1.5 (.06)	ICXX-250	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	7

TERMINATION AND HALL EFFECT OPTIONS

Note:  
Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57



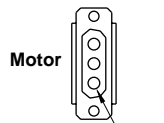
**Thermal Protection Connector:**

- 2 Pin - male connector
- Free hanging receptacle
- Molex P/N 43025-0200
- 2 female terminals
- Molex P/N 43030-0010

**Mating Connector Reference:**

- Molex "Micro-Fit 3.0"
- Plug: 43020-0201
- Male Terminals: 43031-0010

See Wire Table, page 59



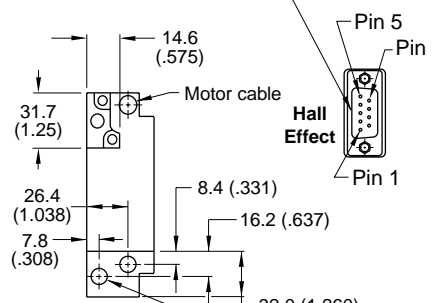
**Hall Effect Connector Option:**

- Positronic P/N: MD9M2000Z
- 9 Pin, male

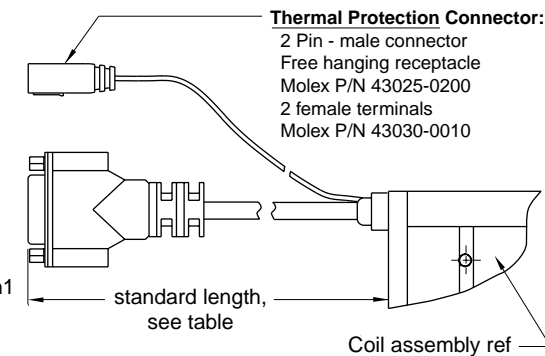
**Mating Connector Reference:**

- Positronic P/N: MD9F2000X

See wire table, page 59



**Cooling Option:**  
1/8-27 NPT (female) 2 PL.



**Motor Connector:**

- Positronic P/N: CBD3W3M0000Z
- 3 Pin, Male shell, size 2

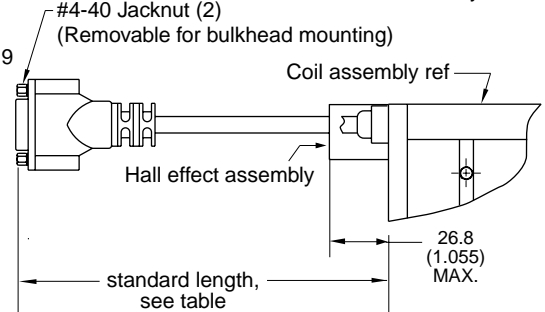
**Male Contacts:**

- Positronic P/N: MS40--D
- 3 removable male contacts, size 8

**Mating Connector Reference:**

- Positronic P/N: CBD3W3F0000X
- 3 Female Sockets, solder type, size 8, Positronic P/N: FS40--D

See Wire Table, page 59



**HALL EFFECT MASS**  
w/P\* connector: .07 kg (.15 lb) max  
w/C\* cable: .03 kg (.07 lb) max

Connector Option	
Connector	Length
P1	400 (16)
P2	200 (8)
P3	100 (4)

Flying Lead Option	
Leads	Length
C1	400 (16)
C2	200 (8)
C3	100 (4)

## PERFORMANCE SPECIFICATIONS

### 55 Series Ironcore - Water cooled

Rated Performance	Symbol	Units	IC55-030			IC55-050			IC55-075			IC55-100		
Peak force	F <sub>p</sub>	N	1875			3125			4690			6250		
		lbf	422			703			1054			1405		
Continuous force @Tmax see note 1.	F <sub>c</sub>	N	1497			2511			3773			5001		
		lbf	336			564			848			1124		
Motor constant @ 25°C	K <sub>m</sub>	N/√W	44.6			63.8			83.1			98.8		
Max. Cont. power dissipation	P <sub>c</sub>	W	1591			2188			2917			3621		
<b>Electrical Specifications</b>														
		<b>Winding Code</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>	<b>A1</b>	<b>A3</b>	<b>A5</b>
Peak current	I <sub>p</sub>	Arms	13.8	69.1	23.9	13.9	69.5	24.1	13.9	69.6	24.1	13.8	69.2	24.0
Continuous Current @Tmax	I <sub>c</sub>	Arms	9.8	49.2	17.0	9.9	49.5	17.1	9.9	49.5	17.2	9.9	49.3	17.1
Electrical resistance @25°C±10%	R <sub>m</sub>	Ohms L-L	7.8	0.31	2.6	10.6	0.42	3.5	14.1	0.56	4.7	17.7	0.71	5.9
Electrical inductance ±20%	L	mH L-L	51.5	2.1	17.2	82.5	3.3	27.5	122	4.9	40.5	161	6.4	53.5
Back EMF constant @25°C±10%	K <sub>e</sub>	Vpeak/m/s L-L	124	24.8	71.7	207	41.4	120	311	62.2	180	414	82.9	239
		Vpeak/in/sec L-L	3.15	0.63	1.82	5.26	1.05	3.04	7.90	1.58	4.56	10.5	2.11	6.08
Force constant @25°C±10%	K <sub>f</sub>	N/Arms	152	30.4	87.8	254	50.7	146	381	76.2	220	508	102	293
		lbf/Arms	34.2	6.8	19.7	57.0	11.4	32.9	85.6	17.1	49.4	114	22.8	65.9
<b>Mechanical Specifications</b>														
Coil Assembly Mass ±15%	M <sub>c</sub>	kg	12.0			17.3			23.9			31.2		
		lbs	26.5			38.1			52.7			68.8		
<b>Magnetic Way Type</b>			<b>MC030</b>			<b>MC050</b>			<b>MC075</b>			<b>MC100</b>		
<b>Magnetic Way Mass ±15%</b>	M <sub>w</sub>	kg/m	5.4			7.5			10.1			12.7		
		lbs/in	0.30			0.42			0.56			0.71		
<b>Figures of Merit &amp; Additional Data</b>														
Electrical time constant	T <sub>e</sub>	ms	6.6			7.8			8.6			9.1		
Max.Theoretical Acceleration	A <sub>max</sub>	g's	15.9			18.4			20.0			20.4		
Magnetic attraction	F <sub>a</sub>	kN	7.4			12.3			18.4			24.5		
		lbf	1652			2754			4132			5508		
Thermal Resistance														
- coils to external structure	R <sub>th</sub>	°C/Watt	0.066			0.048			0.036			0.029		
Max. Allowable Coil Temp.	T <sub>max</sub>	°C	130			130			130			130		

**Notes:**

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to: Fc = Km x Square Root (Pw); where Pw = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.
- The stated performance with the cooling option assures water cooling at a minimum flow rate of 2.8 liters/min. (0.75 GPM) depending on motor size and power losses.

## PERFORMANCE SPECIFICATIONS

## 55 Series Ironcore - Water cooled

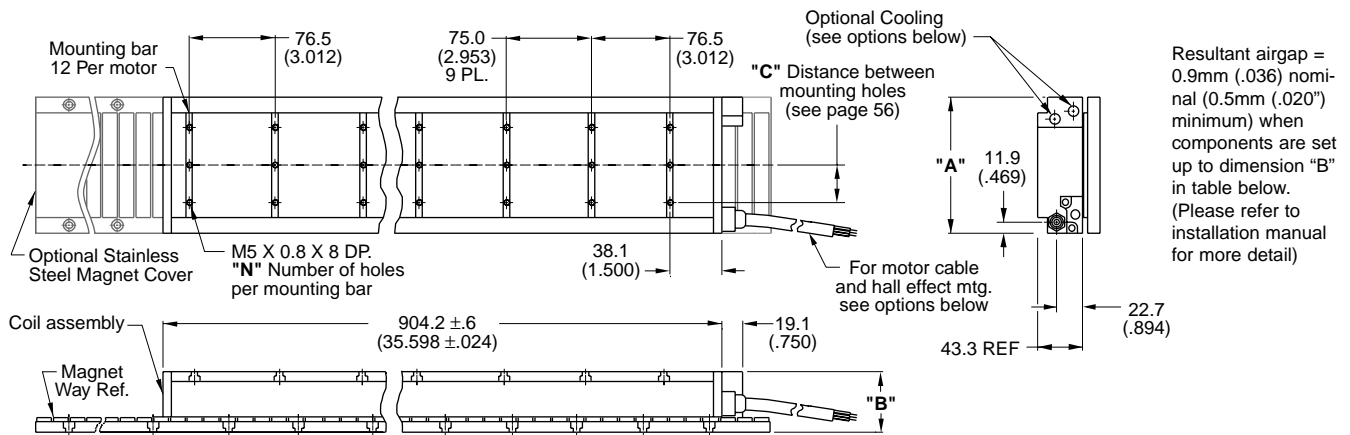
Rated Performance	Symbol	Units	IC55-150		IC55-200		IC55-250	
Peak force	F <sub>p</sub>	N	9375		12500		15625	
		lbf	2108		2810		3513	
Continuous force @Tmax see note 1.	F <sub>c</sub>	N	7446		10033		12023	
		lbf	1674		2256		2703	
Motor constant @ 25°C	K <sub>m</sub>	N/√W	125		147		160	
Max. Cont. power dissipation	P <sub>c</sub>	W	5000		6563		7955	
<b>Electrical Specifications</b>								
		<b>Winding Code</b>	<b>A3</b>	<b>A5</b>	<b>A3</b>	<b>A5</b>	<b>A3</b>	<b>A5</b>
Peak current	I <sub>p</sub>	Arms	68.7	23.8	69.4	24.0	69.4	24.0
Continuous Current @Tmax	I <sub>c</sub>	Arms	48.9	16.9	49.4	17.1	49.4	17.1
Electrical resistance @25°C±10%	R <sub>m</sub>	Ohms L-L	1.0	8.3	1.3	10.6	1.5	12.9
Electrical inductance ±20%	L	mH L-L	9.5	79.5	12.7	106	15.8	131
Back EMF constant @25°C±10%	K <sub>e</sub>	Vpeak/m/s L-L	124	359	166	479	199	574
		Vpeak/in/sec L-L	3.16	9.11	4.21	12.2	5.05	14.6
Force constant @25°C±10%	K <sub>f</sub>	N/Arms	152	439	203	586	243	703
		lbf / Arms	34.2	98.8	45.7	132	54.7	158
<b>Mechanical Specifications</b>								
Coil Assembly Mass ±15%	M <sub>c</sub>	kg	45.1		59		73	
		lbs	99.4		130		161	
<b>Magnetic Way Type</b>			<b>MC150</b>		<b>MC200</b>		<b>MC250</b>	
<b>Magnetic Way Mass ±15%</b>	M <sub>w</sub>	kg/m	20.7		26.8		33.2	
		lbs/in	1.16		1.50		1.86	
<b>Figures of Merit &amp; Additional Data</b>								
Electrical time constant	T <sub>e</sub>	ms	9.6		9.9		10.2	
Max.Theoretical Acceleration	A <sub>max</sub>	g's	21.2		21.6		21.8	
Magnetic attraction	F <sub>a</sub>	kN	36.8		49.3		61.5	
		lbf	8262		11072		13826	
Thermal Resistance								
- coils to external structure	R <sub>th</sub>	°C/Watt	0.021		0.016		0.013	
Max. Allowable Coil Temp.	T <sub>max</sub>	°C	130		130		130	

## Notes:

- The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to a value below Pc by limiting the continuous rated output force of the motor to a value equal to: Fc = Km x Square Root (Pw); where Pw = the acceptable heat load, in watts, and must be a value below Pc. The RMS current needed to produce this force is simply Fc divided by the force constant Kf.
- Alternate windings can be made available. Please consult the Danaher Motion Customer Support Center for design options. (1-815-226-2222)
- Maximum Theoretical Acceleration is based on the motors peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, the peak current available from the amplifier etc. must be considered to determine the achievable acceleration in each application.
- Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.
- The stated performance with the cooling option assures water cooling at a minimum flow rate of 2.8 liters/min. (0.75 GPM) depending on motor size and power losses.

## DIMENSIONS

### Cooled IC55-xxx



**Notes:**

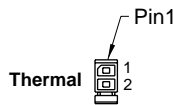
1. Dimensions in mm (inches)
2. Tolerances unless otherwise specified:  
no decimal place ± 0.8 (.03)  
X decimal place ± 0.1 (.004)  
XX decimal place ± 0.05 (.002)

Motor Coil Type	Coil Width "A"	Cooled	Dim "B" without cover	Dim "B" w/ Magnet cover	# Holes "N"
IC55-030	65.0 (2.559) ± 1.0 (.04)	ICXX-030	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	2
IC55-050	85.0 (3.346) ± 1.0 (.04)	ICXX-050	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	2
IC55-075	110.0 (4.331) ± 1.0 (.04)	ICXX-075	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	3
IC55-100	135.0 (5.315) ± 1.0 (.04)	ICXX-100	58.3±0.1 (2.295±.004)	58.6±0.1 (2.307±.004)	3
IC55-150	185.0 (7.283) ± 1.5 (.06)	ICXX-150	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	5
IC55-200	235.0 (9.252) ± 1.5 (.06)	ICXX-200	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	6
IC55-250	285.0 (11.220) ± 1.5 (.06)	ICXX-250	60.3±0.1 (2.374±.004)	60.6±0.1 (2.386±.004)	7

## TERMINATION AND HALL EFFECT OPTIONS

**Note:**

Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57



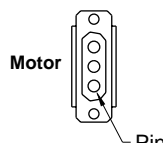
**Thermal Protection Connector:**

- 2 Pin - male connector
- Free hanging receptacle
- Molex P/N 43025-0200
- 2 female terminals
- Molex P/N 43030-0010

**Mating Connector Reference:**

- Molex "Micro-Fit 3.0"
- Plug: 43020-0201
- Male Terminals: 43031-0010

See Wire Table, page 59



**Motor Connector:**

- Positronic P/N: CBD3W3M0000Z
- 3 Pin, Male shell, size 2

**Male Contacts:**

- Positronic P/N: MS40--D
- 3 removable male contacts, size 8

**Mating Connector Reference:**

- Positronic P/N: CBD3W3F0000X
- 3 Female Sockets, solder type, size 8, Positronic P/N: FS40--D

See Wire Table, page 59

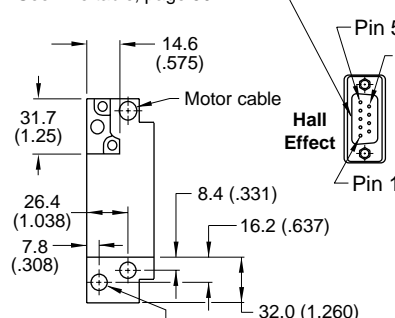
**Hall Effect Connector Option:**

- Positronic P/N: MD9M2000Z
- 9 Pin, male

**Mating Connector Reference:**

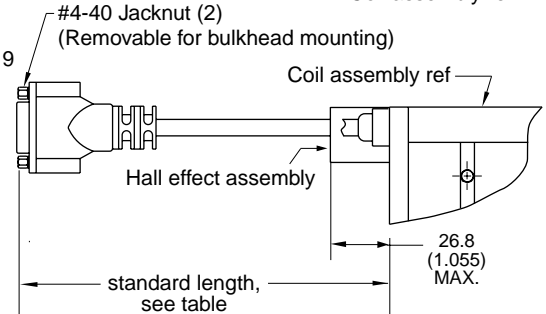
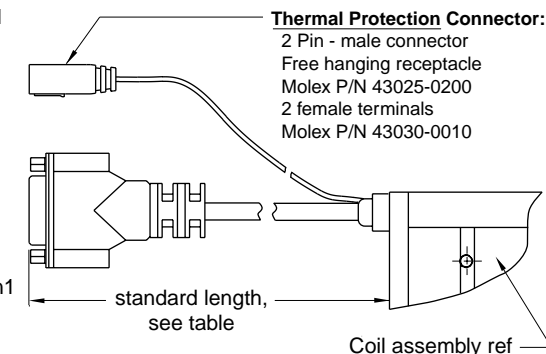
- Positronic P/N: MD9F2000X

See wire table, page 59



**Cooling Option:**

- 1/8-27 NPT (female) 2 PL.



**HALL EFFECT MASS**  
w/P\* connector: .07 kg (.15 lb) max  
w/C\* cable: .03 kg (.07 lb) max

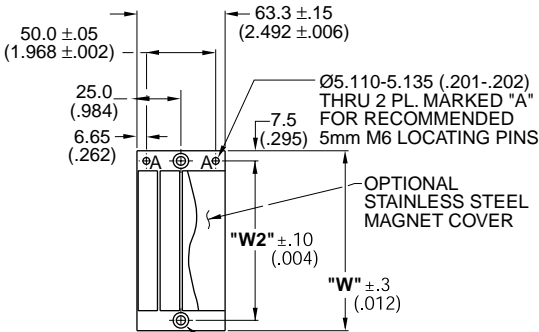
Connector Option	
Connector	Length
P1	400 (16)
P2	200 (8)
P3	100 (4)

Flying Lead Option	
Leads	Length
C1	400 (16)
C2	200 (8)
C3	100 (4)

DIMENSIONS

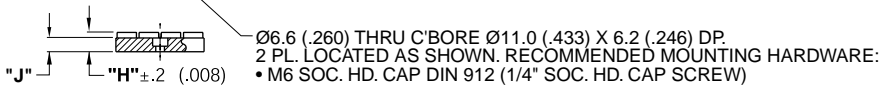
Magnet assemblies are modular and can be installed in multiples of same or alternate lengths. Standard lengths are shown below.

MCxxx-0064

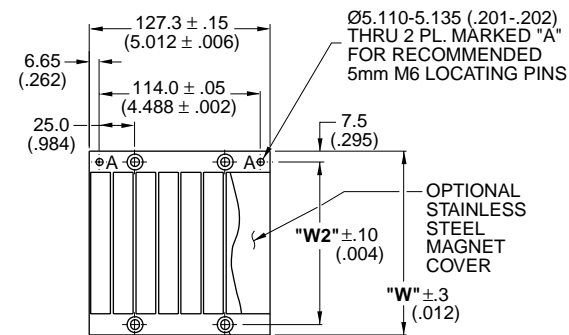


Magnetic Way Type	Assembly Width "W"	Mounting Hole Width "W2"	"J"	"H" With Cover	"H" Without Cover
MC015-0064	45.0 (1.772)	30.0 (1.181)	6.0 (.236)	10.4 (.409)	10.1 (.397)
MC030-0064	60.0 (2.362)	45.0 (1.772)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC050-0064	80.0 (3.150)	65.0 (2.560)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC075-0064	105.0 (4.134)	90.0 (3.544)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC100-0064	130.0 (5.118)	115.0 (4.528)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC150-0064	180.0 (7.087)	165.0 (6.496)	12.0 (.472)	16.4 (.645)	16.1 (.634)
MC200-0064	230.0 (9.055)	215.0 (8.464)	12.0 (.472)	16.4 (.645)	16.1 (.634)
MC250-0064	285.0 (11.220)	270.0 (10.630)	12.0 (.472)	16.4 (.645)	16.1 (.634)

See Dimensions & Installation page for MC250-xx mounting hole details.

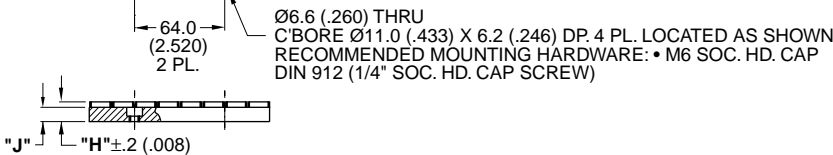


MCxxx-0128

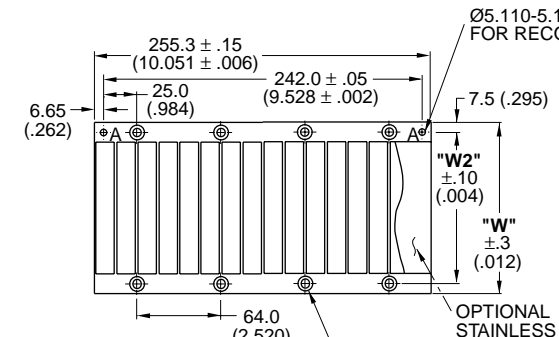


Magnetic Way Type	Assembly Width "W"	Mounting Hole Width "W2"	"J"	"H" With Cover	"H" Without Cover
MC015-0128	45.0 (1.772)	30.0 (1.181)	6.0 (.236)	10.4 (.409)	10.1 (.397)
MC030-0128	60.0 (2.362)	45.0 (1.772)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC050-0128	80.0 (3.150)	65.0 (2.560)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC075-0128	105.0 (4.134)	90.0 (3.544)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC100-0128	130.0 (5.118)	115.0 (4.528)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC150-0128	180.0 (7.087)	165.0 (6.496)	12.0 (.472)	16.4 (.645)	16.1 (.634)
MC200-0128	230.0 (9.055)	215.0 (8.464)	12.0 (.472)	16.4 (.645)	16.1 (.634)
MC250-0128	285.0 (11.220)	270.0 (10.630)	12.0 (.472)	16.4 (.645)	16.1 (.634)

See Dimensions & Installation page for MC250-xx mounting hole details.

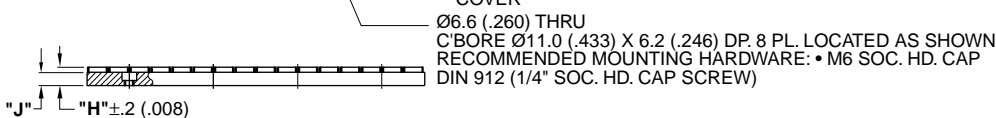


MCxxx-0256



Magnetic Way Type	Assembly Width "W"	Mounting Hole Width "W2"	"J"	"H" With Cover	"H" Without Cover
MC015-0256	45.0 (1.772)	30.0 (1.181)	6.0 (.236)	10.4 (.409)	10.1 (.397)
MC030-0256	60.0 (2.362)	45.0 (1.772)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC050-0256	80.0 (3.150)	65.0 (2.560)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC075-0256	105.0 (4.134)	90.0 (3.544)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC100-0256	130.0 (5.118)	115.0 (4.528)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC150-0256	180.0 (7.087)	165.0 (6.496)	12.0 (.472)	16.4 (.645)	16.1 (.634)
MC200-0256	230.0 (9.055)	215.0 (8.464)	12.0 (.472)	16.4 (.645)	16.1 (.634)
MC250-0256	285.0 (11.220)	270.0 (10.630)	12.0 (.472)	16.4 (.645)	16.1 (.634)

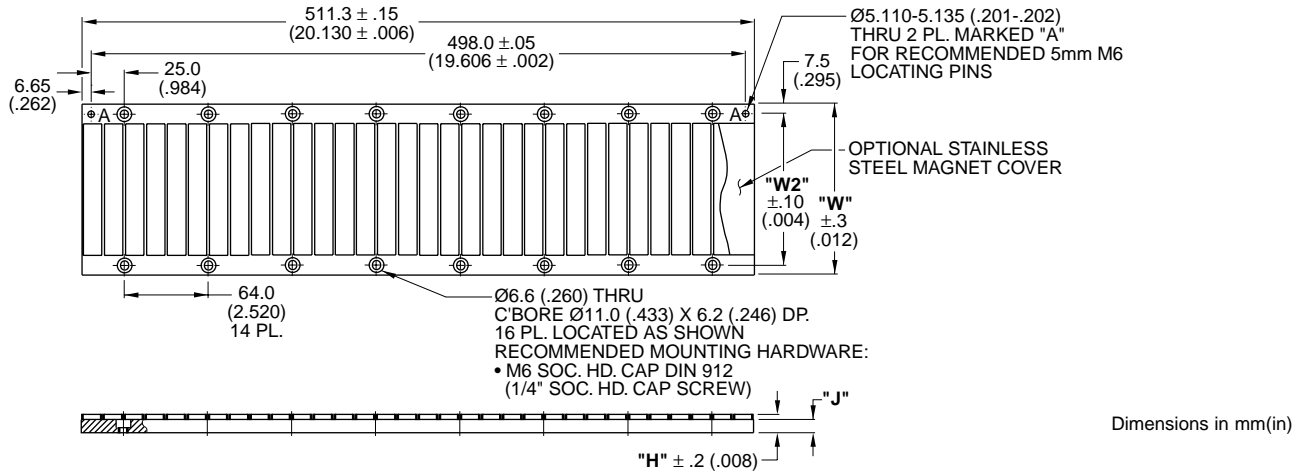
See Dimensions & Installation page for MC250-xx mounting hole details.



Dimensions in mm(in)

## DIMENSIONS

### MCxxx-0512

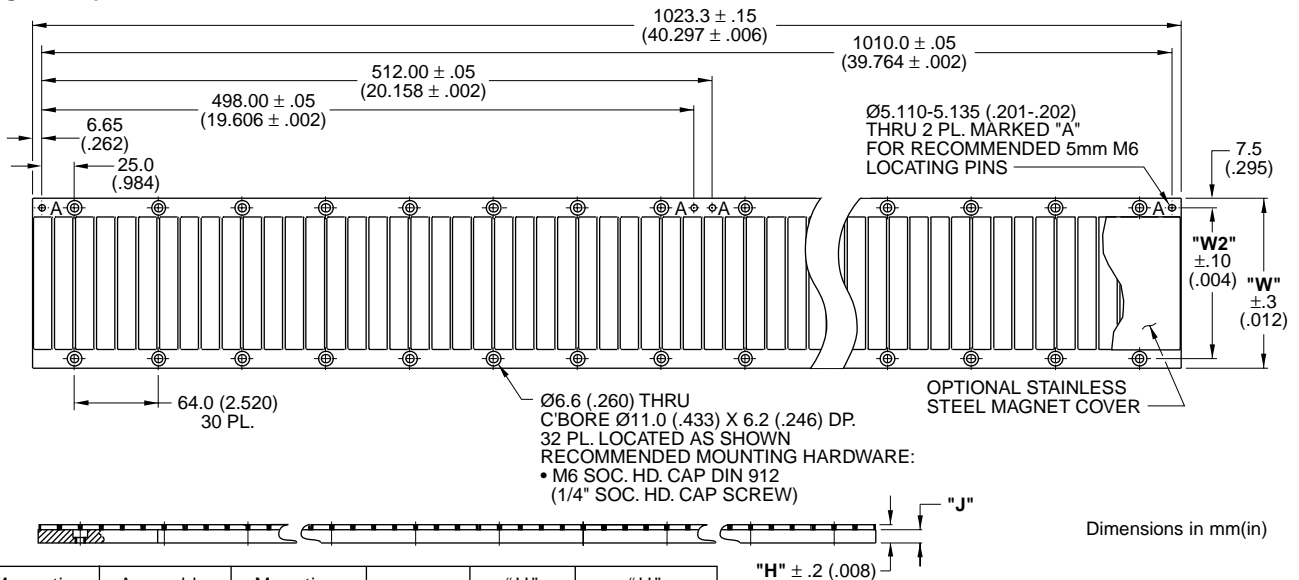


Dimensions in mm(in)

Magnetic Way Type	Assembly Width "W"	Mounting Hole Width "W2"	"J"	"H" With Cover	"H" Without Cover
MC015-0512	45.0 (1.772)	30.0 (1.181)	6.0 (.236)	10.4 (.409)	10.1 (.397)
MC030-0512	60.0 (2.362)	45.0 (1.772)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC050-0512	80.0 (3.150)	65.0 (2.560)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC075-0512	105.0 (4.134)	90.0 (3.544)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC100-0512	130.0 (5.118)	115.0 (4.528)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC150-0512	180.0 (7.087)	165.0 (6.496)	12.0 (.472)	16.4 (.645)	16.1 (.634)
MC200-0512	230.0 (9.055)	215.0 (8.464)	12.0 (.472)	16.4 (.645)	16.1 (.634)
MC250-0512	285.0 (11.220)	270.0 (10.630)	12.0 (.472)	16.4 (.645)	16.1 (.634)

See Dimensions & Installation page for MC250-xx mounting hole details.

### MCxxx-1024



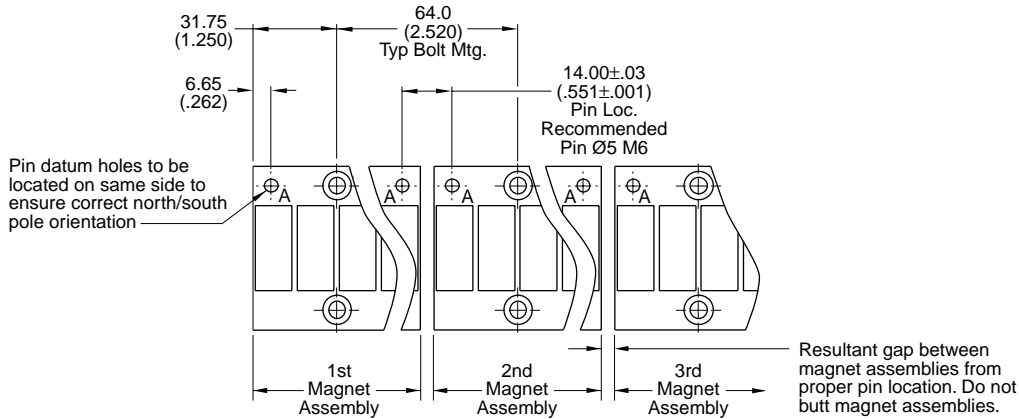
Dimensions in mm(in)

Magnetic Way Type	Assembly Width "W"	Mounting Hole Width "W2"	"J"	"H" With Cover	"H" Without Cover
MC015-1024	45.0 (1.772)	30.0 (1.181)	6.0 (.236)	10.4 (.409)	10.1 (.397)
MC030-1024	60.0 (2.362)	45.0 (1.772)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC050-1024	80.0 (3.150)	65.0 (2.560)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC075-1024	105.0 (4.134)	90.0 (3.544)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC100-1024	130.0 (5.118)	115.0 (4.528)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC150-1024	180.0 (7.087)	165.0 (6.496)	12.0 (.472)	16.4 (.645)	16.1 (.634)
MC200-1024	230.0 (9.055)	215.0 (8.464)	12.0 (.472)	16.4 (.645)	16.1 (.634)
MC250-1024	285.0 (11.220)	270.0 (10.630)	12.0 (.472)	16.4 (.645)	16.1 (.634)

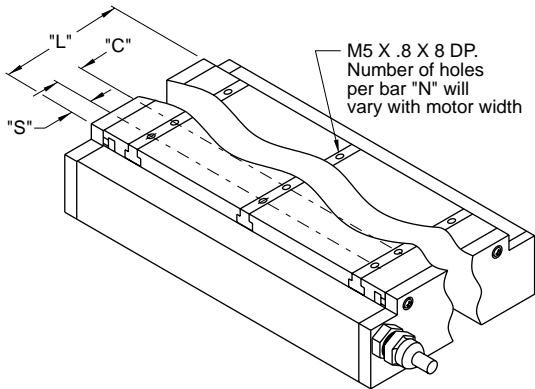
See Dimensions & Installation page for MC250-xx mounting hole details.

TYPICAL INSTALLATION OF MULTIPLE IRONCORE MAGNET ASSEMBLIES

Magnet Way widths correspond to the mating coil assembly width. Magnet Way assemblies are modular and come in standard lengths: 64, 128, 256, 512, 1024 mm. Multiple magnet assemblies can be installed to obtain the desired length. Shown below is the method to mount multiple assemblies.



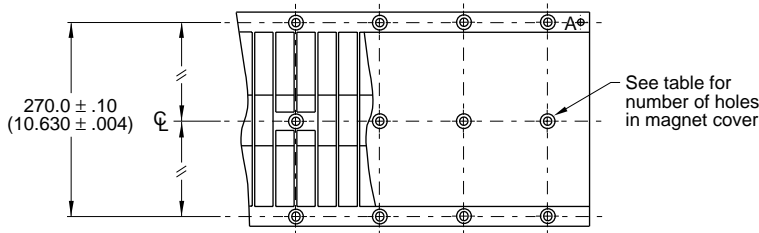
Typical Mounting Bar Lengths & Mounting Holes Tabulation



Motor Coil Type	Number of Holes "N"	Spacing Between Holes "C"	Mounting Bar Length "L"	"S"
ICXX-015	1	ON CENTER	15 (.59)	7.5 (.295)
ICXX-030	2	16.0 (0.630)	30 (1.18)	7.0 (.276)
ICXX-050	2	36.0 (1.417)	50 (1.97)	7.0 (.276)
ICXX-075	3	32.0 (1.260)	75 (2.95)	5.5 (.217)
ICXX-100	3	36.0 (1.417)	100 (3.94)	14.0 (.551)
ICXX-150	5	32.0 (1.260)	150 (5.91)	11.0 (.433)
ICXX-200	6	36.0 (1.417)	200 (7.87)	10.0 (.394)
ICXX-250	7	38.0 (1.496)	250 (9.84)	11.0 (.433)

Dimensions in mm(in)

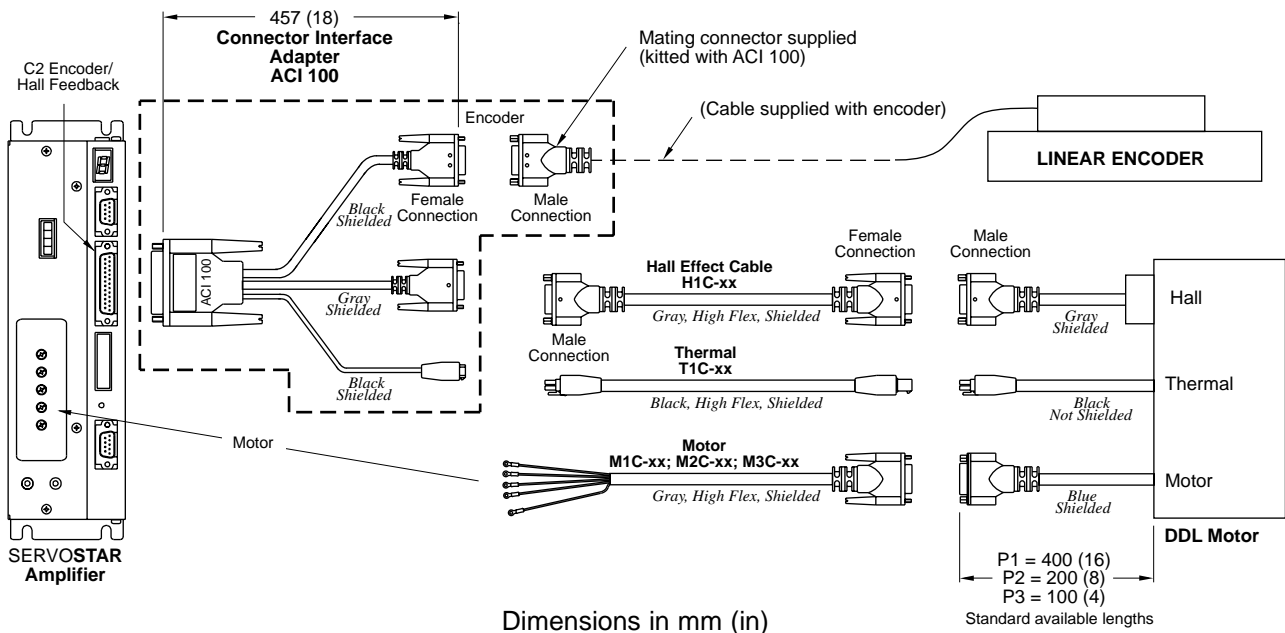
250 Width Magnet Ways with 3 rows of Mounting Holes



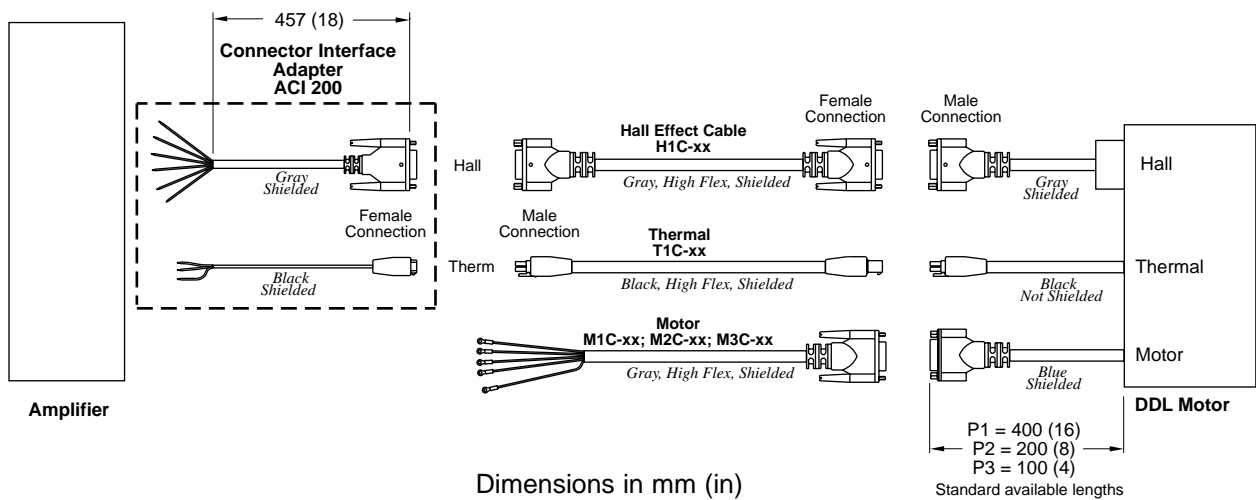
Magnet Way	Number of Holes
MC250-0064	3
MC250-0128	6
MC250-0256	12
MC250-0512	24
MC250-1024	48

## OUTLINE & DIMENSIONS

### High Flex Cables for use with SERVOSTAR®



### High Flex Cables for Generic Applications



**Note:**

Cables are designed for minimum life cycle of millions of cycles under ideal conditions. Actual field application conditions may or may not produce the cable life described here in.

To ensure longest possible cable life under dynamic conditions, cables should be relaxed 24 hours before use by hanging freely at its mid-point. Cable is ready when very little memory is present. Cable should be installed in the 'plane of original flexure.' Cable should be installed with lowest possible mechanical tension. Avoid torsional bending. Minimum recommended dynamic bend radius is 15x largest cable diameter used in cable track; use a large bend radius whenever possible. Clearance between cables and track should be a minimum of 20% of the cable diameter. Use of a clamp or nylon cable tie that creates localized stress within the cable track must be avoided. Minimum distance from the clamping point to the start of the bend radius must be 25x the largest cable diameter used in the track.

Cable track manufacturer should be consulted for application assistance.

Minimum recommended dynamic bend radius 15x cable diameter

Cable Assembly	AWG	Wire Diameter	Min. Dynamic Radius (15x wire Ø)
M1C	18	11.0mm (.430in)	165mm ( 6.5in)
M2C	14	12.6mm (.495in)	185mm (7.3in)
M3C	12	14.2mm (.560in)	215mm (8.5in)
T1C	22	6.0mm (.235in)	90mm (3.5in)
H1C	26	6.0mm (.235in)	90mm (3.5in)

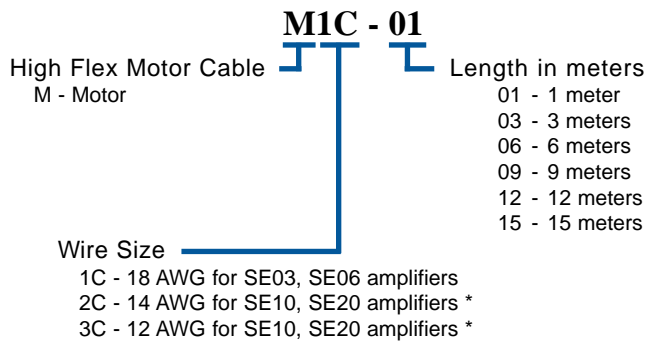
INTRODUCTION

**Features:**

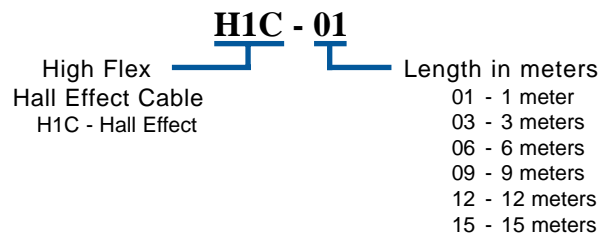
- High Flex cable designed for dynamic, continuous flexing applications
- Cable track compatible
- Molded, high reliability connectors
- Oil resistant PVC jacket
- 105°C / 600V motor cable, 105°C / 300V Hall Effect and Thermal Sensor cable
- CE compliant, fully shielded low impedance cable and connectors
- Fully tested, color coded, shipped with schematics
- Complete cable system for simple and reliable Plug-and-Play installation

Standard lengths of 1, 3, 6, 9, 12 and 15 meters available. For other lengths, consult a Danaher Motion representative.

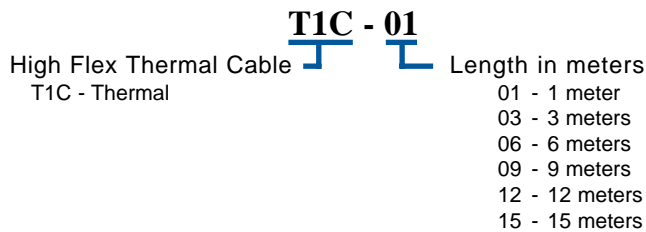
**Model Numbering System**



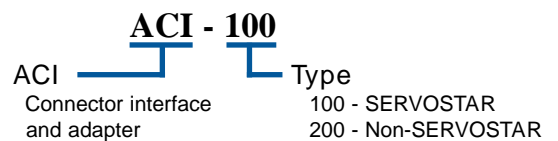
example: M1C - 06  
High flex motor cable, terminated with connectors at motor and amplifier ends, 18 AWG, for SE03 and SE06.



example: H1C - 06  
High flex Hall Effect cable, terminated with connectors at motor and amplifier ends.



example: T1C - 06  
High flex Thermal cable, terminated with connectors at motor and amplifier ends.



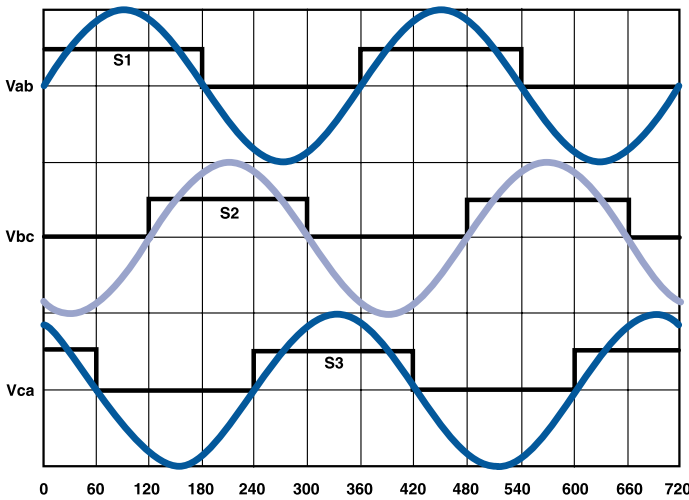
\* For application assistance regarding cable selection for these and other higher current rated amplifiers, contact a Danaher Motion representative.

WIRING & OUTPUT

Motor Wire Table SEE TABLE BELOW FOR AWG DIA			Hall Effect Wire Table 26 AWG 6.0 DIA (.24")			Thermal Protection Wire Table Thermistor 26 AWG 3.8 (.15")		
Pin Number	Color or Wire No.	Function	Pin Number	Color	Function	Pin	Color	Transition Point
1	Red	ØA	1	Gray	+5 Vdc	1	Black / White	120°C (IC/ICD)
2	White	ØB	2	Green	S1	2	Black / White	90°C (IL)
3	Black	ØC	3	Yellow	S2			120°C (IC/ICD)
Connector Shell	Grn/Yel	GND	4	Brown	S3		see note 2	90°C (IL)
Connector Shell	Violet	Shield	5	White	Return			
			Shell	Shield	Shield			

note 1: Ground and shield connection at shell: first make / last break

note 2: TIC-X extender cable is shielded



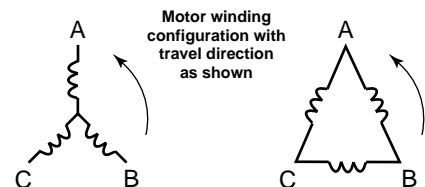
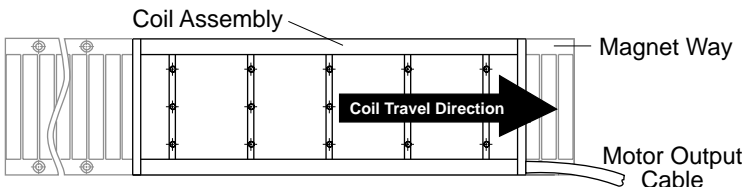
IL WIRE TABLE		
WINDING CODE	AWG	APPROX. CBL. DIA.
ALL (A1,A2,A3,A4)	18	5.6mm (.22 IN)

ICD WIRE TABLE		
WINDING CODE	AWG	APPROX. CBL. DIA.
ALL (A1 - A8)	22	5.1mm (.20 IN)

IC WIRE TABLE NON-COOLED		
WINDING CODE	AWG	APPROX. CBL. DIA.
A1	18	5.6mm (.22 IN)
A2	18	5.8mm (.22 IN)
A3	14	8.9mm (.27 IN)
A5	18	5.8mm (.22 IN)
A6	14	6.9mm (.27 IN)
A7	10	7.9mm (.31 IN)

IC WIRE TABLE COOLED (AC)		
WINDING CODE	AWG	APPROX. CBL. DIA.
A1	18	5.6mm (.22 IN)
A2	14	8.9mm (.27 IN)
A3	10	7.9mm (.31 IN)
A5	14	8.9mm (.27 IN)
A6	12	7.9mm (.31 IN)

- Motor BEMF phases A,B,C relative to Hall effect devices S1,S2,S3 with coil travel direction towards the motor output cable assembly exit as shown below.



Magnet pole pitch:

Both Ironcore (IC) and Ironless (IL) feature the same pole pitch, which is 32 mm (360 electrical degrees).

The diagrams above refer to both ironless and ironcore motors.

**To size a Linear Motor, you will need to:**

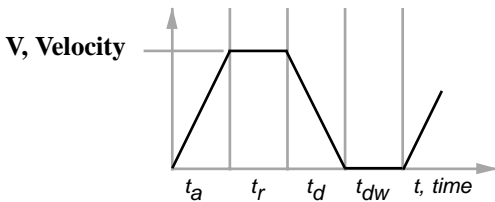
1. Define a Move Profile
2. Define the Load
3. Size the Motor and the Amplifier

From the move profile, we can calculate the maximum speed and the maximum acceleration/deceleration. From the load we can calculate all of the forces at constant speed and using the move profile all the dynamic forces during acceleration and deceleration. Once a motor is selected, the weight of the moving parts of the motor are added to the moving weight to calculate a total Peak Force and a total RMS force. The motor should be able to deliver the peak force and the calculated RMS force should be higher than the continuous force to ensure a known safety margin. The coil temperature rise can also be calculated to ensure that it is lower than the intended maximum temperature rise.

The maximum bus voltage and continuous and peak current can also be calculated and compared to the selected amplifier to be sure the calculated performances can be achieved.

**1. MOVE PROFILE**

**Triangular/Trapezoidal**



	SI	Units	English
$S_m$ - Move displacement	meters		inches
$t_a$ - Acceleration Time	seconds		seconds
$t_r$ - Time run at constant speed	seconds		seconds
$t_d$ - Deceleration Time	seconds		seconds
$t_{dw}$ - Dwell Time	seconds		seconds
$V_m$ - Max Velocity	meter/sec.		inches/sec
$A_m$ - Acceleration	meter/sec <sup>2</sup>		inches/sec <sup>2</sup>
$D_m$ - Deceleration	meter/sec <sup>2</sup>		inches/sec <sup>2</sup>

**Example:**

Move 0.1 meter in 100 msec assuming  $t_a = t_d$  and  $t_r = 0$ ,  
(assume triangular move)

**Max Speed:**  $V_m = 2 \cdot S_m / (t_a + t_d + 2 \cdot t_r)$   
 $V_m = 2 \cdot 0.1 / (100E-3)$   
 $= 2 \text{ meter/sec}$

**Max Acceleration/Deceleration**

**Acceleration**  $A_m = V_m / t_a$   
 $A_m = 2 / 50E-3$   
 $= 40 \text{ meter/sec}^2$   
 $A_m \text{ "g"} = A_m / 9.81$   
 $a \text{ (g)} = 40 / 9.81$   
 $= 4.08 \text{ g}$

**Deceleration**  $D_m = V_m / t_d$   
 $D_m = 2 / 50E-3$   
 $= 40 \text{ meter/sec}^2$   
 $D_m \text{ "g"} = D_m / 9.81$   
 $d \text{ (g)} = 40 / 9.81$   
 $= 4.08 \text{ g}$

**2. LOAD**

	SI	Units	English
$F_{ext}$ - External Force only (Cutting force, etc.)	N		lbf
$F_{acc}$ - Acceleration Force only	N		lbf
$F_r$ - Run Force at constant speed	N		lbf
$F_{dec}$ - Deceleration Force only	N		lbf
$F_{am}$ - Max. Acceleration Force	N		lbf
$F_{dm}$ - Max. Deceleration Force	N		lbf
$F_{dw}$ - Dwell Force	N		lbf
$F_{rms}$ - RMS Force	N		lbf
$\mu$ - Coefficient of Friction (bearing support)	-		-
$M_l$ - Load Mass	kg		lbs
$M_c$ - Coil Mass	kg		lbs
$M_{cb}$ - Counterbalance Mass	kg		lbs
$F_a$ - Magnetic Attraction Force	N		lbf
CB - Counterbalance of load in %	-		-
$\theta$ - Angle of Linear Displacement with horizontal (0°= horizontal, 90° vertical)	degrees		degrees
g - Gravity coefficient	9.81 m/s <sup>2</sup>		386 in/s <sup>2</sup>
n - Number of motors in parallel	-		-

APPLICATION SIZING

**Basic Formulas\*:**

We assume a general case where we have n motors solidly coupled pushing the load and a possible counterbalance weight M<sub>cb</sub> (Mostly for vertical displacement).

**Example of Coefficient of Friction μ:**

Linear bearing w/ balls	0.002 - 0.004
Linear bearing w/ rollers	0.005
Steel on oiled steel	0.06
Steel on dry steel	0.2
Steel on concrete	0.3

Counterbalance Weight:

$$M_{cb} = M_l \cdot CB/100$$

Acceleration Force only:

$$F_{acc} = [(M_l/n) \cdot (1 + CB/100) + M_c] \cdot A_m$$

Run Force at constant speed:

$$F_r = (M_l/n + M_c) \cdot g \cdot \sin(\theta) + \mu \cdot \cos(\theta) - (M_{cb}/n) \cdot g + F_a \cdot \mu + F_{ext}/n$$

Deceleration Force only:

$$F_{dec} = [(M_l/n) \cdot (1 + CB/100) + M_c] \cdot D_m$$

Maximum Acceleration Force:

$$F_{am} = F_{acc} + F_r$$

Maximum Deceleration Force:

$$F_{dm} = F_{dec} - F_r$$

Dwell Force:

$$F_{dw} = (M_l/n + M_c) \cdot g \cdot [\sin(\theta)] - (M_{cb}/n) \cdot g$$

RMS Force:

$$F_{rms} = \sqrt{\frac{F_{am}^2 \cdot t_a + F_r^2 \cdot t_r + F_{dm}^2 \cdot t_d + F_{dw}^2 \cdot t_{dw}}{t_a + t_r + t_d + t_{dw}}}$$

\* All calculations are given in SI units. For English units use weight in lbs instead of mass • g.

**3. SIZE THE MOTOR AND AMPLIFIER**

**Example:**

Moving Weight:	M <sub>l</sub> = 0.5kg
Number of Motors:	n = 1
Horizontal Move:	θ = 0
Counterbalance Force:	M <sub>cb</sub> = 0
External Force:	F <sub>ext</sub> = 0
Friction Coefficient:	μ = 0.01

Assume same move as above with a Dwell Time of 50 ms.

Run Force at Constant Speed: F<sub>r</sub> = 0.5 • 9.81•0.01=0 .05 N

Acceleration Force only: F<sub>a</sub> = 0.5 • 40 = 20 N

Deceleration Force only: F<sub>d</sub> = 0.5 • 40 = 20 N

Maximum Accel Force: F<sub>am</sub> = 20 + 0.05 = 20.05 N

Maximum Decel Force: F<sub>dm</sub> = 20 - 0.05 = 19.95 N

Rms Force:

$$F_{rms} = \sqrt{\frac{(20.05)^2 \cdot (50E-3) + (19.95)^2 \cdot (50E-3)}{100E-3 + 50E-3}}$$

$$F_{rms} = 16.3 \text{ N}$$

**Motor Sizing:**

If we select an ironless motor for smoothest possible move we can use Motor **IL060-30A1**. This motor has a coil mass of 0.21 kg and no attractive force. By adding that weight in equations above, we need an additional Force of 0.21 • 40 • 0.01= 0.084 N. So Peak Force is 20.05 + 0.08 = 28.45 N and RMS force: 23.19 N. This motor will have a safety factor of (38-23.19)•100/38 = 39%.

**Sizing the Amplifier :**

	Units	
	SI	English
I <sub>a</sub> - Max. Acceleration Current	A	A
I <sub>r</sub> - Run Current	A	A
I <sub>d</sub> - Max Deceleration Current	A	A
I <sub>dw</sub> - Dwell Current	A	A
I <sub>rms</sub> - RMS Current	A	A
K <sub>f</sub> - Force Constant	N/A	lbf/A
R <sub>m</sub> - Motor Electrical Resistance	Ohms L-L	Ohms L-L
K <sub>e</sub> - Back EMF Constant	V <sub>peak</sub> /m/s	V <sub>peak</sub> /in/s
V <sub>bus</sub> - Bus Voltage	VDC	VDC
L - Electrical Inductance	H L-L	H L-L

APPLICATION SIZING

Max Acceleration Current:	$I_a = F_{am}/K_f$
Run Current at constant Speed:	$I_r = F_r/K_f$
Max Deceleration Current only:	$I_d = F_{dm}/K_f$
Dwell Current:	$I_{dw} = F_{dw}/K_f$
RMS Current:	$I_{rms} = F_{rms}/K_f$

**Bus Voltage:**

If we assume a sine wave drive with a phase advance  $\phi$  (degrees) and full conduction, the minimum bus voltage (see Fig. 1) is:

$$V_{b1} = 2.4 \text{ (Volts)}$$

$$V_{b2} = K_e \cdot V_m$$

$$V_{b3} = 1.225 \cdot R_{m,hot} \times I_{rms}$$

$$V_{b4} = 7.6953 \cdot L \cdot I_{rms} \cdot V_m / \text{Pitch}$$

$$\alpha_v = \text{ARCTANGENT} (V_{b4}/V_{b3})$$

$$V_{Ir} = \sqrt{V_{b3}^2 + V_{b4}^2}$$

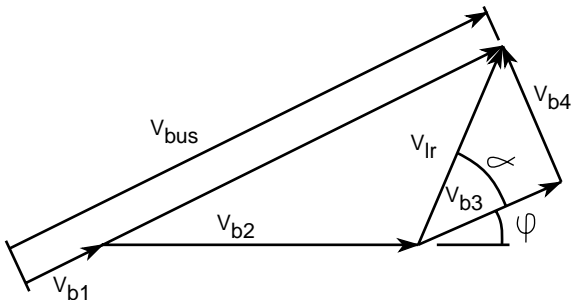
$$V_{bre} = V_{b2} + V_{Ir} \cdot \text{COS}(\alpha_v + \phi)$$

$$V_{bim} = V_{Ir} \cdot \text{SIN}(\alpha_v + \phi)$$

$$V_{bus} = V_{b1} + \sqrt{V_{bre}^2 + V_{bim}^2}$$

Note: If there is no Phase Advance take  $\phi=0^\circ$ . Using an amplifier with Phase Advance such as Kollmorgen SERVOSTAR® gives you up to 30% more speed for same bus voltage.

Figure 1:



**Thermal Considerations:**

	Units	
	SI	English
$\Delta\theta$ - Coil increase of temperature	$^\circ\text{C}$	$^\circ\text{F}$
$R_{th}$ - Thermal Resistance	$^\circ\text{C}/\text{W}$	$^\circ\text{F}/\text{W}$
$K_m$ - Motor Constant	$\text{N}/\sqrt{\text{W}}$	$\text{lbf}/\sqrt{\text{W}}$
$P_{out}$ - Output Power	$\text{W}$	$\text{W}$

Coil Temperature rise

$$\Delta\theta = R_{th} \cdot (F_{rms}/K_m)^2$$

Resistance of Coil hot (copper)

$$R_{m,hot} = \frac{R_{ambient} (234.5 + \theta_{hot})}{(234.5 + \theta_{hot})}$$

Power Losses

$$P_{I_{rms}} = \Delta\theta/R_{th} = \frac{(\theta_{hot} - \theta_{ambient})}{R_{th}}$$

Output Power

$$P_{out(max)} = F_{am} \cdot V_m$$

**Example: In above example with:**

$$R_{th} = 1.61 \text{ } ^\circ\text{C}/\text{W}$$

$$K_m = 4.7 \text{ N}/\sqrt{\text{W}},$$

$$\text{Coil Temperature rise: } \Delta\theta = 1.61 \cdot (23.19/4.7)^2 = 39.2 \text{ } ^\circ\text{C}$$

$$\text{Power Losses } P_I = 39.2/1.61 = 24.34 \text{ Watts}$$

$$\text{Max output Power } P_{out(max)} = 57 \text{ Watts.}$$

**The Use of the Motor Constant  $K_m$ :**

Cognizance of the heat load being generated by the linear motor is an important consideration in the application of any linear motor. Linear motors are direct drive devices, typically mounted very close to the moving load. Therefore, any heat generated by the linear motor needs to be managed to avoid affecting the process or workpiece that the moving load is carrying. The motor constant  $K_m$  is a powerful parameter that can be used to determine this heat load.

$K_m$  equals:

$$K_m = \frac{F}{\sqrt{P_c}} \quad \text{where the RMS force } F \text{ is in Newtons, the RMS heat load } P_c \text{ is in watts and } K_m \text{ is in units of } \text{N}/\sqrt{\text{W}}$$

## APPLICATION SIZING

The motor constant,  $K_M$ , allows us to determine motor performance capabilities such as shown in the following two examples. In the first example, we use  $K_M$  to calculate, for a given force, how many watts of generated heat are dissipated by the motor's coil assembly. In the second, we use  $K_M$  to determine the maximum RMS force developed by the motor when the dissipated power is limited to some value.

1. An application requires a continuous thrust force of 200 Newtons. The IC11-050 ironcore motor is a good candidate, having a continuous force rating of 276 Newtons and a  $K_M$  of  $32.0 \text{ N}/\sqrt{\text{W}}$ . Therefore, since resistance rises 1.405 times at  $130^\circ\text{C}$  from the ambient value at  $25^\circ\text{C}$ , and since resistance is the square root denominator of  $K_M$ , we must write our equation as follows,

$$\text{Force} = \frac{K_M}{\sqrt{\text{Factor}}} \sqrt{\text{Power (dissipated)}}$$

$$200 = \frac{32.0}{\sqrt{1.405}} \sqrt{\text{Watts}}$$

$$\text{Watts} = 54.9$$

This value of watts is the power or heat generated by the motor. It is interesting to note that for the same application, a larger IC11-100 ironcore motor, with a  $K_M$  of  $49.1 \text{ N}/\sqrt{\text{W}}$ , would dissipate only 23.3 watts for the same force, F.

2. The same application requires that no more than 45 watts are to be dissipated by the motor into the surrounding structure and environment. What is the maximum RMS force that the IC11-050 motor may produce while not exceeding this power limit?

$$\text{Maximum RMS Force} = \frac{32.0}{\sqrt{1.405}} \sqrt{45} = 181 \text{ N}$$

Therefore, if the motor delivers no more than 181 N of thrust force on an RMS basis, then this same motor will not dissipate more than 45 watts.

### Continuous Force $F_c$ as a Function of Ambient Temperature

In our data sheets the continuous rated force  $F_c$  is the RMS force that the motor can supply continuously 100% of the time, assuming the ambient temperature is 25 degrees C and with the coils achieving a maximum temperature of 130 degrees C. At higher (or lower) ambient temperatures, the  $F_c$  of the motor must be adjusted by a factor that is determined by the following equation:

$$\text{Factor} = \sqrt{\frac{(130 - \theta_{\text{Amb}})}{105}}$$

where  $\theta_{\text{Amb}}$  = Ambient Temperature

This factor vs. ambient temperature works out as:

5 °C	10	15	20	25	30	35	40	45
1.091	1.069	1.047	1.024	1	0.976	0.951	0.926	0.900

APPLICATION SIZING WORKSHEET

**Customer:** \_\_\_\_\_ **Project Name:** \_\_\_\_\_  
**Contact:** \_\_\_\_\_ **Axis Name:** \_\_\_\_\_  
**Telephone:** \_\_\_\_\_ **Prepared by:** \_\_\_\_\_  
**fax:** \_\_\_\_\_ **E-Mail:** \_\_\_\_\_

**Move**

Axis Orientation  Horizontal  Vertical  
 Typical Move \_\_\_\_\_  mm  in  
 Total Travel Length \_\_\_\_\_  mm  in  
 Typical Move Time \_\_\_\_\_ seconds  
 Maximum Speed \_\_\_\_\_  meters/sec  inches/sec  
 Minimum Speed \_\_\_\_\_  meters/sec  inches/sec  
 Max. Acceleration \_\_\_\_\_  meters/sec<sup>2</sup>  inches/sec<sup>2</sup>  g  
 or Accel/Decel Time \_\_\_\_\_ seconds  
 Dwell Time \_\_\_\_\_ seconds  
 Move Profile  trapezoidal  triangular  S-curve

**Loads**

Friction Coefficient \_\_\_\_\_  
 Max Load Mass \_\_\_\_\_  kg  lb  
 Thrust force \_\_\_\_\_  N  lbf  
 Is this thrust force present during Accel/Decel?  Yes  No

**Precision**

Repeatability \_\_\_\_\_  μm  inch  
 Absolute Accuracy \_\_\_\_\_  μm  inch  
 Resolution \_\_\_\_\_  μm  inch

**Encoder Feedback**

Signal period \_\_\_\_\_ μm  
 Resolution \_\_\_\_\_  lines/mm  lines/in  
 Electronic Interpolation  Yes  No If Yes, Multiplication Factor: \_\_\_\_\_

**Environment**

Ambient Temperature \_\_\_\_\_  °C  °F  
 Max Permissible Temperature Rise \_\_\_\_\_  °C  °F  
 Clean Room Environment  Yes  No If yes Class: \_\_\_\_\_  
 Is Water or Air cooling permissible?  Yes  No  
 Vacuum?  Yes  No Pressure: \_\_\_\_\_

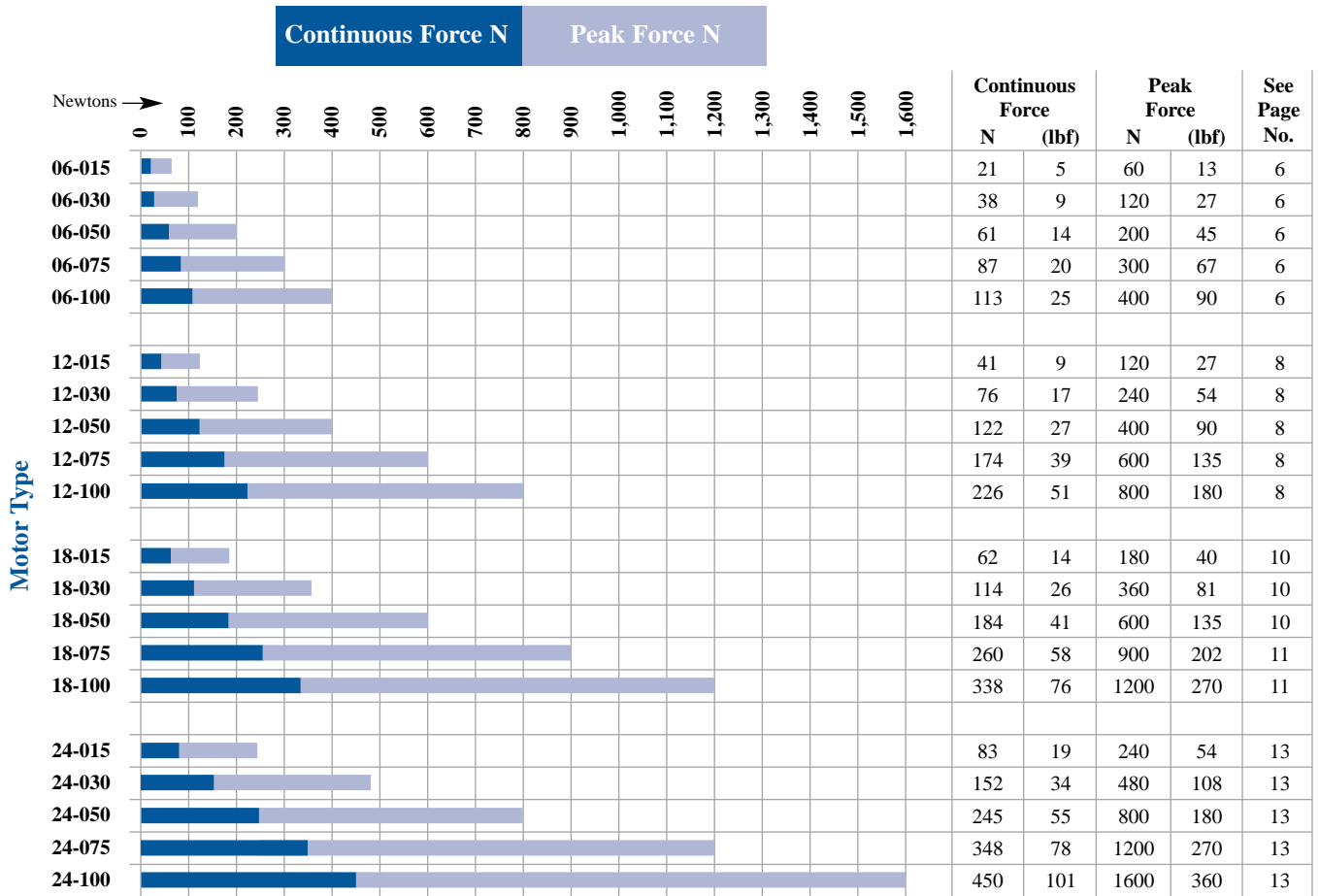
**Amplifier & Power Supply**

Max Voltage \_\_\_\_\_ VDC  
 Max Current \_\_\_\_\_ Amps  
 Power Supply \_\_\_\_\_  Single Phase  Three phase  
 Voltage \_\_\_\_\_ V  50 Hz  60 Hz

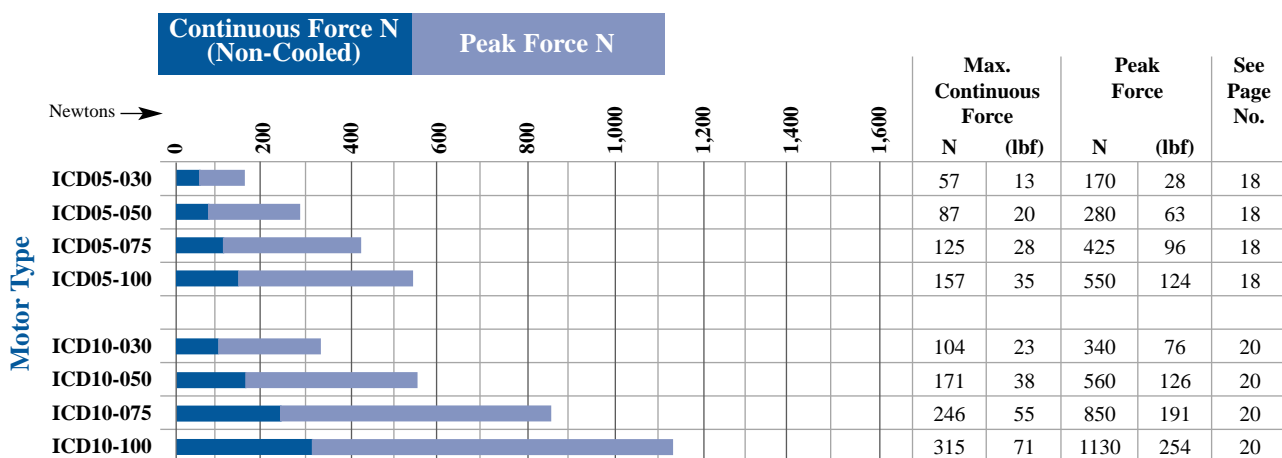
Also see MOTIONEERING®, Danaher Motion's Application Sizing Program.

IRONLESS & ICD SELECTION GUIDE

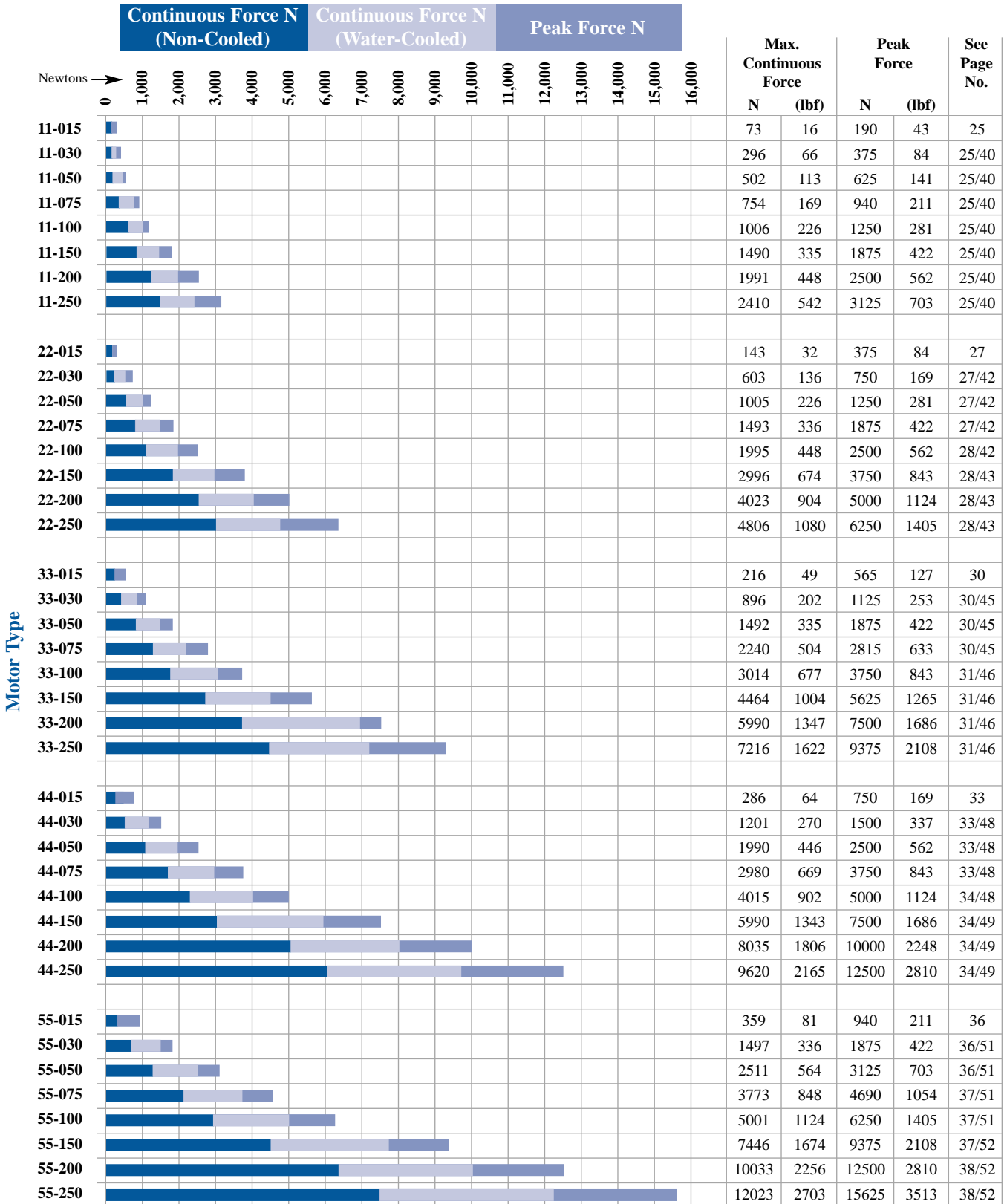
Ironless Linear Motors



ICD Linear Motors

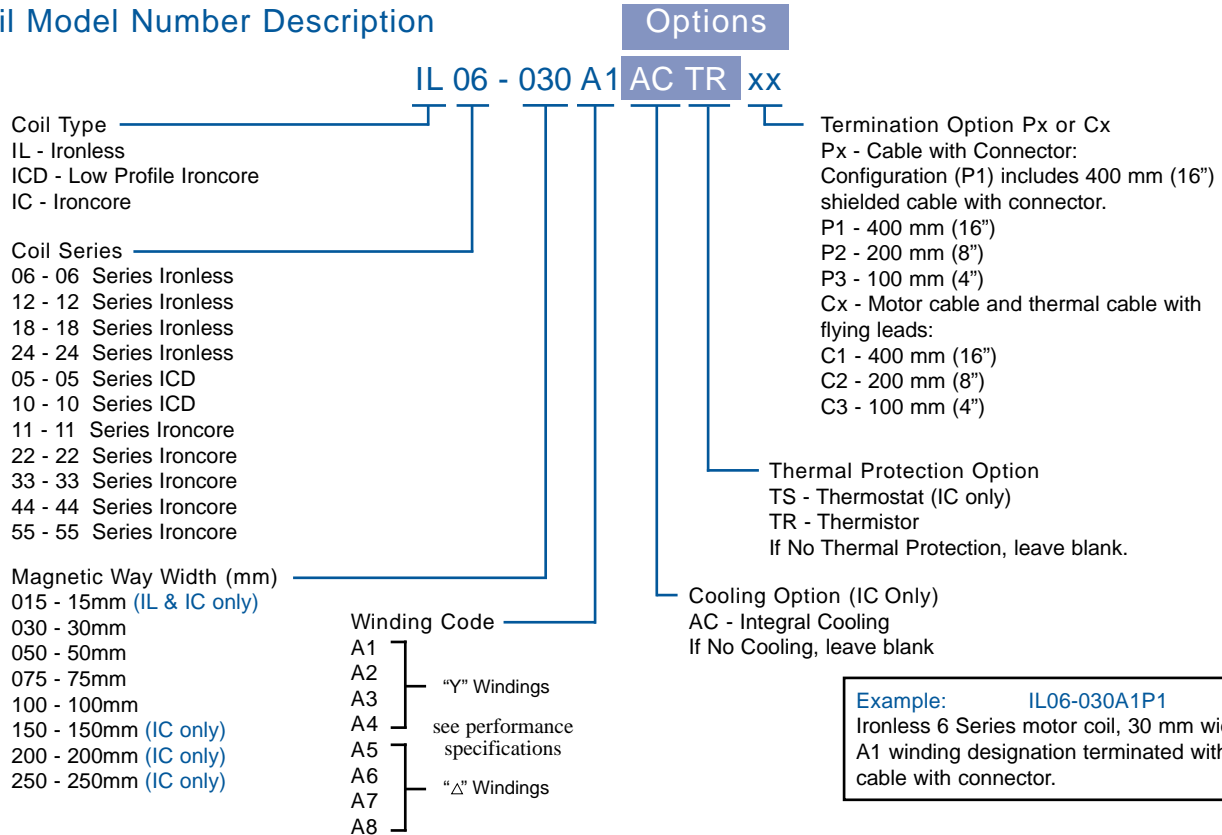


Ironcore Linear Motors



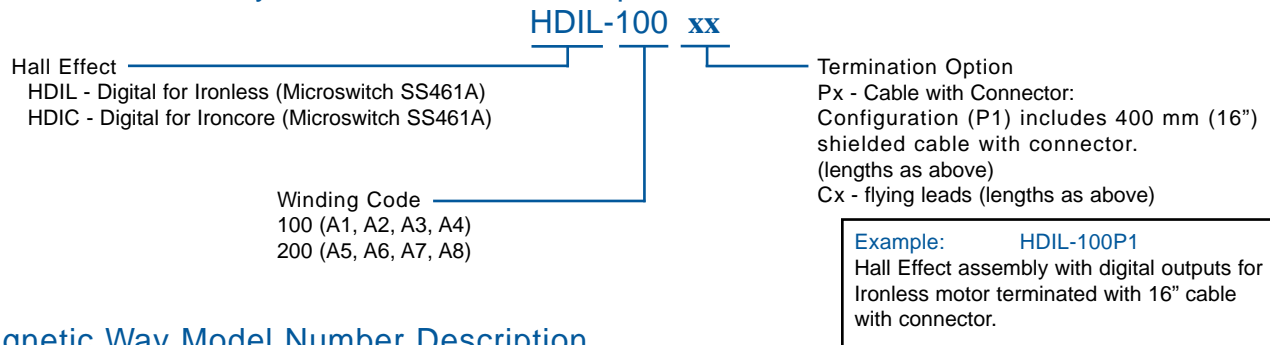
ORDERING INFORMATION

Coil Model Number Description



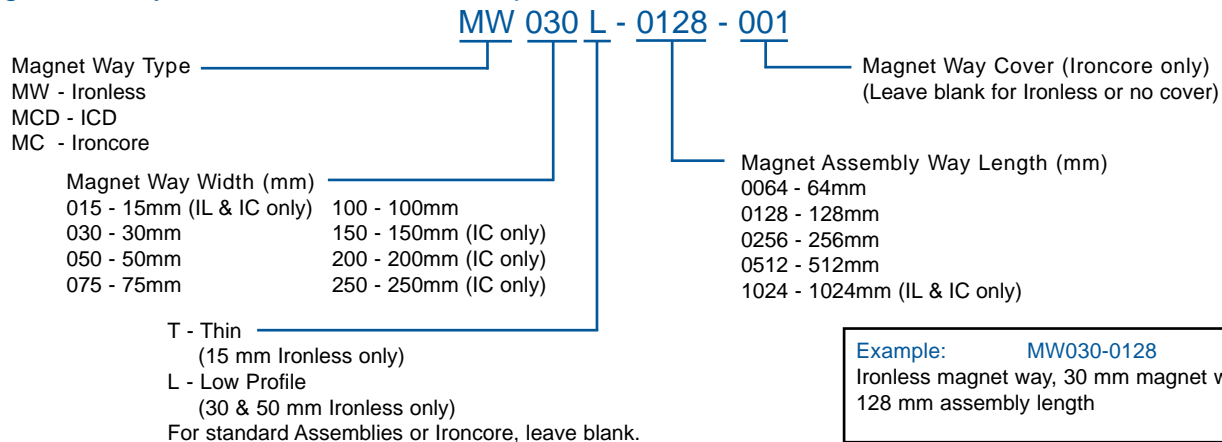
**Example:** IL06-030A1P1  
Ironless 6 Series motor coil, 30 mm width, A1 winding designation terminated with 16” cable with connector.

Hall Effect Assembly Model Number Description



**Example:** HDIL-100P1  
Hall Effect assembly with digital outputs for Ironless motor terminated with 16” cable with connector.

Magnetic Way Model Number Description



**Example:** MW030-0128  
Ironless magnet way, 30 mm magnet width, 128 mm assembly length

[www.DanaherMotion.com](http://www.DanaherMotion.com)



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