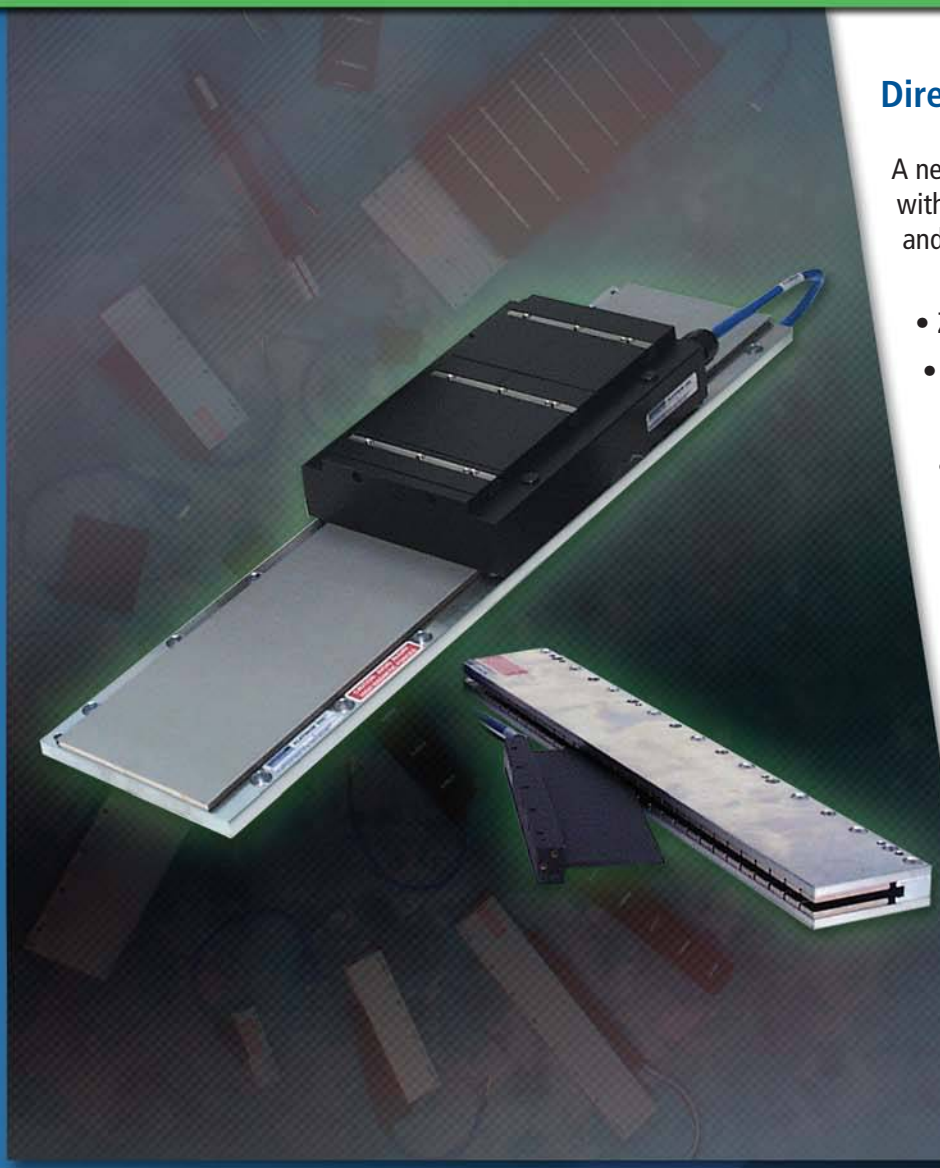
PLATINUM® DDL

November 2004

www.DanaherMotion.com



Direct Drive Linear Motors

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

- 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

KOLLMORGEN

Solutions by DANAHER MOTION

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

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.

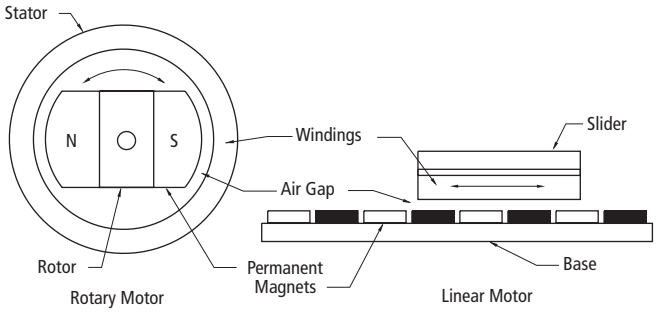
Kollmorgen PLATINUM DDL motors have been reviewed, tested, and found to be in conformity to the following standards: EN 60034, EN 60204-1, IEC 34-1. Product has been reviewed per EN 60950, EN 60529, IEC 721-3, NEMA MG7, UL1004, UL547, and UL674.

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:

What is a Linear Servomotor?

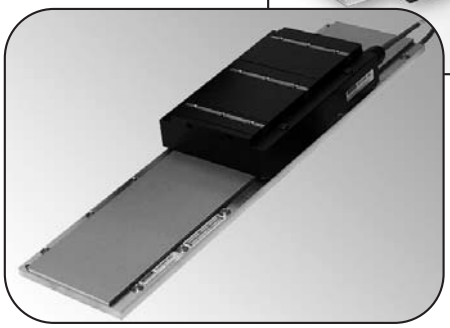
The Kollmorgen PLATINUM® DDL Series motors are frameless permanent magnet, three phase brushless servomotors. Fundamentally, a linear motor is a rotary motor that is rolled out flat.



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.



Ironless Motor

Ironcore Motor

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.

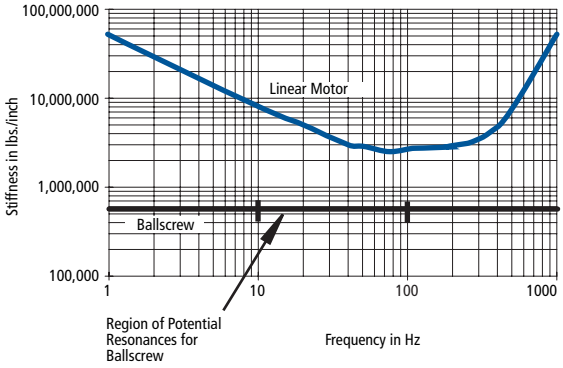
For exceptionally smooth motion requirements, sinusoidal drive electronics such as the Kollmorgen ServoStar® series, using digital Hall effects, provide sinusoidal drive currents to the motor for the best constant force and velocity performance. As an alternative, it is typical for linear motor applications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

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.

Ironcore model 22-100 Stiffness vs. Ballscrew



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 ± 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

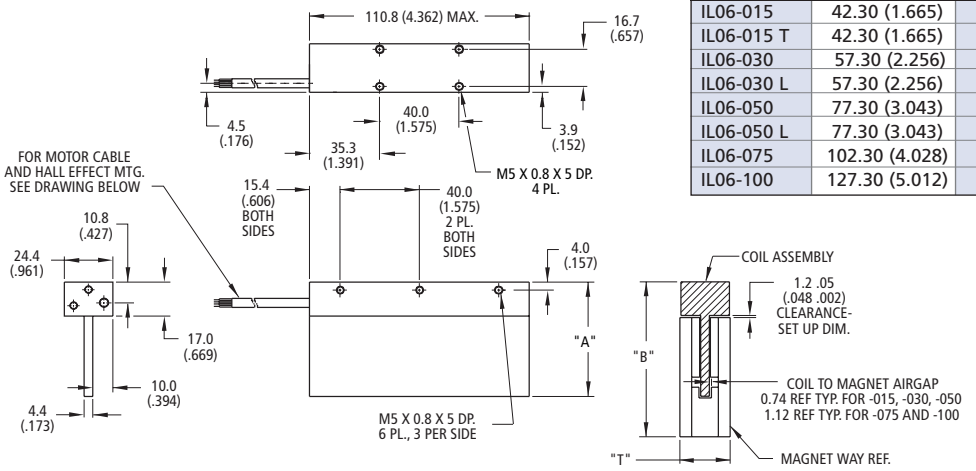
06 Series Ironless - Non-cooled

Rated Performance	Symbol	Units	IL06-015		IL06-030		IL06-050		IL06-075		IL06-100	
Peak force	Fp	N	60		120		200		300		400	
		lbf	13.6		27		45		68		90	
Continuous force @ Tmax	Fc	N	21		38		61		87		113	
see note ①		lbf	4.6		9		14		19		25	
Motor constant @ 25°C	Km	$N/\sqrt{W}$	3.3		5.6		8.0		10.2		12.1	
Max. Cont. power dissipation	Pc	W	53		65		83		101		121	
Electrical Specifications												
		Winding Code	**A1**	**A4**	**A1**	**A4**	**A1**	**A4**	**A1**	**A4**	**A1**	**A4**
Peak current	Ip	Arms	7.2	14.4	7.1	14.2	7.0	14.0	7.0	14.0	7.0	14.0
Continuous Current @ Tmax	Ic	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%	Rm	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%	Ke	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%	Kf	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
Mechanical Specifications												
Coil Assembly Mass ±15%	Mc	kg	0.23		0.27		0.32		0.38		0.45	
		lbs	0.5		0.6		0.7		0.8		1.0	
Magnetic Way Type			**MW**		**MW**		**MW**		**MW075**		**MW100**	
			015	015T	030	030L	050	050L				
Magnetic Way Mass ±15%	Mw	kg/m	5.1	4.2	9.4	7.3	12.2	10.2	18.9		27.3	
		lb/in	0.28	0.23	0.51	0.40	0.68	0.56	1.05		1.51	
Figures of Merit & Additional Data												
Electrical time constant	Te	ms	0.12		0.21		0.35		0.43		0.48	
Max.Theoretical Acceleration	Amax	g's	26.8		45.2		63.6		80.6		90.7	
Magnetic attraction	Fa	kN	0		0		0		0		0	
		lbf	0		0		0		0		0	
Thermal Resistance - coils to external structure	Rth	°C/Watt	1.97		1.61		1.26		1.04		0.87	
Max. Allowable Coil Temp.	Tmax	°C	130		130		130		130		130	

Notes:
① 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

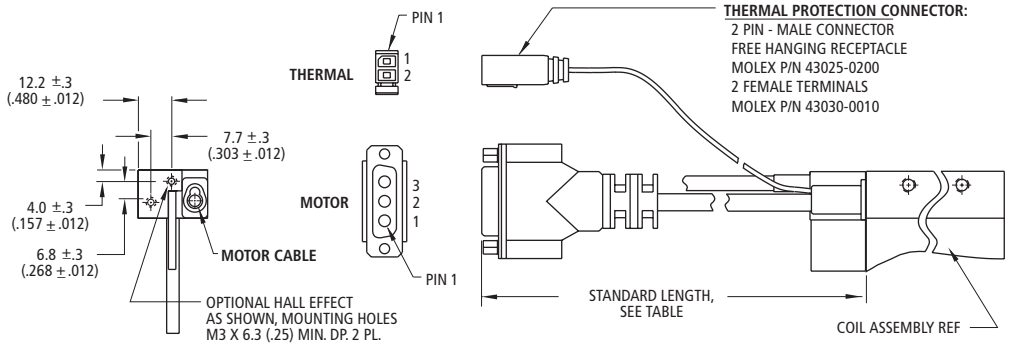
IL06-xxx

Motor Coil	Coil Width "A" +.7 (0.027) -.3 (0.012)	Typ. Assy. Width "B" ±.6 (.024)	Typ. Assy. Height "T" ±.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 ± 0.8 (.03)
X decimal place ± 0.1 (.004)
XX decimal place ± 0.05 (.002)

Termination and Hall Effect Options



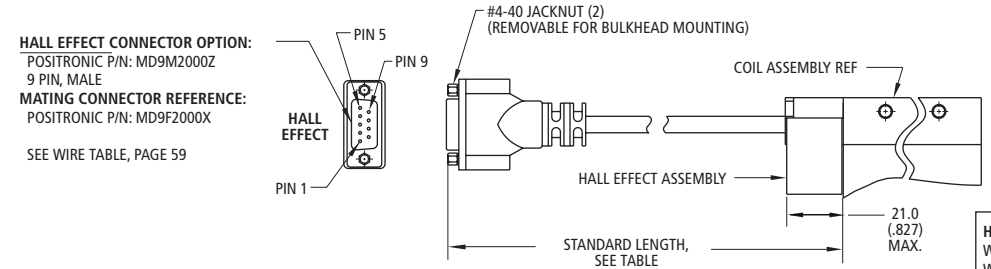
MATING CONNECTOR REFERENCE:
MOLEX "MICRO-FIT 3.0"
PLUG: 43020-0201
MALE TERMINALS: 43031-0010

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: .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

12 Series Ironless - Non-cooled

Rated Performance	Symbol	Units	IL12-015			IL12-030			IL12-050			IL12-075			IL12-100	
Peak force	Fp	N	120			240			400			600			800	
		lbf	27			54			90			135			180	
Continuous force @ Tmax	Fc	N	41			76			122			174			226	
see note ①		lbf	9			17			28			39			51	
Motor constant @ 25°C	Km	$N/\sqrt{W}$	4.8			7.8			11.3			14.5			17.2	
Max. Cont. power dissipation	Pc	W	107			131			167			202			242	
Electrical Specifications																
		Winding Code	**A1**	**A2**	**A4**	**A1**	**A2**	**A4**	**A1**	**A2**	**A4**	**A1**	**A2**	**A4**	**A2**	**A4**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	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
@ 25°C±10%		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%	Kf	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
Mechanical Specifications																
Coil Assembly Mass ±15%	Mc	kg	0.35			0.42			0.52			0.65			0.77	
		lbs	0.8			0.9			1.1			1.4			1.7	
Magnetic Way Type			**MW**			**MW**			**MW**			**MW075**			**MW100**	
			015	**015T**		**030**	**030L**		**050**	**050L**						
Magnetic Way Mass ±15%	Mw	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	
Figures of Merit & Additional Data																
Electrical time constant	Te	ms	0.12			0.21			0.35			0.43			0.48	
Max.Theoretical Acceleration	Amax	g's	35.0			58.2			78.4			94.1			106.0	
Magnetic attraction	Fa	kN	0			0			0			0			0	
		lbf	0			0			0			0			0	
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.984			0.804			0.629			0.519			0.433	
Max. Allowable Coil Temp.	Tmax	°C	130			130			130			130			130	

Notes:
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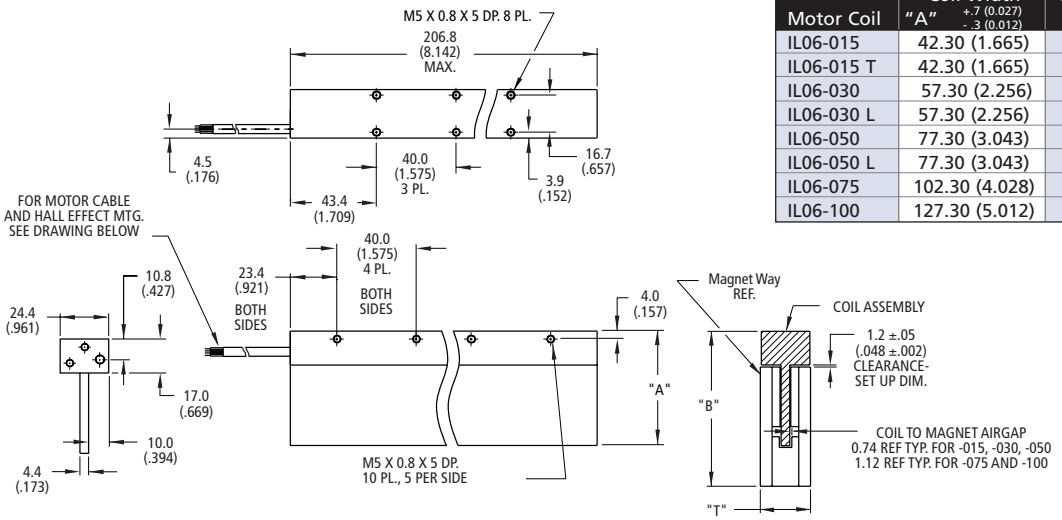

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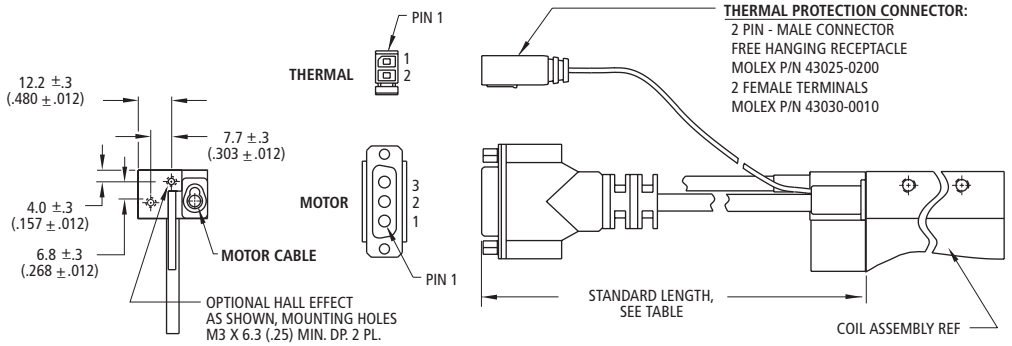
IL06-050	77.30 (3.043)	98.50 (3.878)	25.40 (1.000)
IL06-050 L	77.30 (3.043)	87.30 (3.437)	25.40 (1.000)
IL06-075	102.30 (4.028)	123.50 (4.862)	30.00 (1.181)
IL06-100	127.30 (5.012)	148.50 (5.846)	34.00 (1.339)

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

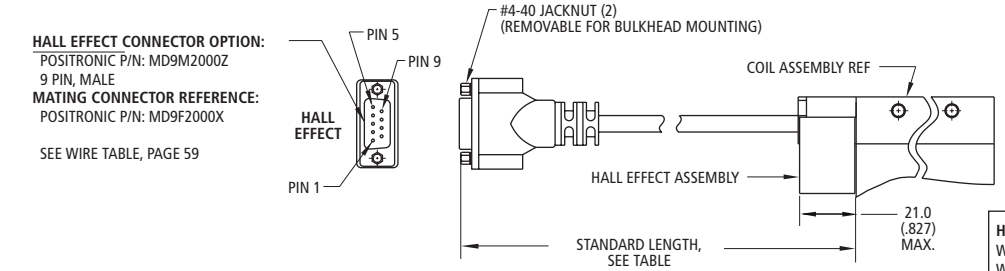
MATING CONNECTOR REFERENCE:
MOLEX "MICRO-FIT 3.0"
PLUG: 43020-0201
MALE TERMINALS: 43031-0010

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

18 Series Ironless - Non-cooled

Rated Performance	Symbol	Units	IL18-015				IL18-030				IL18-050			
Peak force	Fp	N	180				360				600			
		lbf	40				81				135			
Continuous force @ Tmax	Fc	N	62				114				184			
see note ①		lbf	14				26				41			
Motor constant @ 25°C	Km	$N/\sqrt{W}$	5.8				9.7				13.8			
Max. Cont. power dissipation	Pc	W	160				196				251			
Electrical Specifications														
		Winding Code	**A1**	**A2**	**A3**	**A4**	**A1**	**A2**	**A3**	**A4**	**A1**	**A2**	**A3**	**A4**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	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
@ 25°C±10%		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%	Kf	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
Mechanical Specifications														
Coil Assembly Mass ±15%	Mc	kg	0.46				0.57				0.72			
		lbs	1.0				1.3				1.6			
Magnetic Way Type			**MW**				**MW**				**MW**			
			015		**015T**		**030**		**030L**		**050**		**050L**	
Magnetic Way Mass ±15%	Mw	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	
Figures of Merit & Additional Data														
Electrical time constant	Te	ms	0.12				0.21				0.35			
Max.Theoretical Acceleration	Amax	g's	40.2				64.5				84.9			
Magnetic attraction	Fa	kN	0				0				0			
		lbf	0				0				0			
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.656				0.536				0.419			
Max. Allowable Coil Temp.	Tmax	°C	130				130				130			

Notes:
① 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

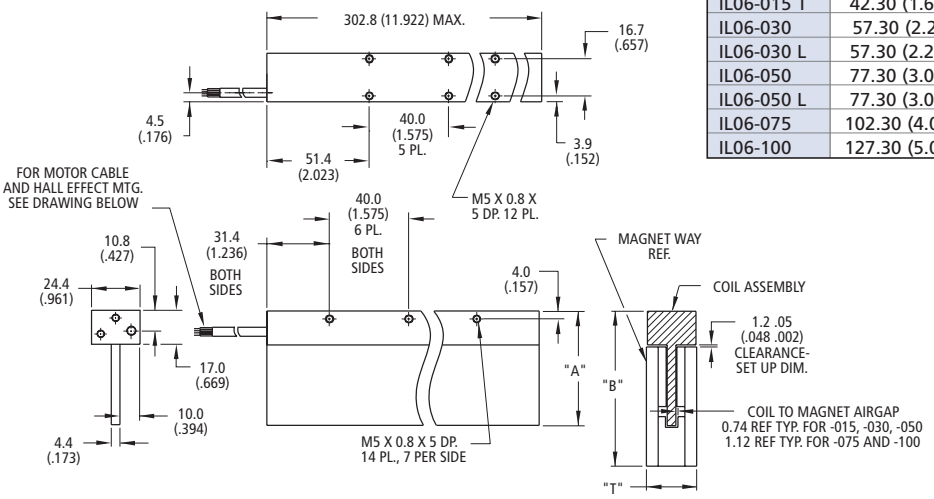
18 Series Ironless - Non-cooled

Rated Performance	Symbol	Units	IL18-075				IL18-100			
Peak force	Fp	N	900				1200			
		lbf	202				270			
Continuous force @ Tmax	Fc	N	260				338			
see note ①		lbf	59				76			
Motor constant @ 25°C	Km	N/√W	17.7				21.0			
Max. Cont. power dissipation	Pc	W	303				363			
Electrical Specifications										
		Winding Code	**A1**	**A2**	**A3**	**A4**	**A1**	**A2**	**A3**	**A4**
Peak current	Ip	Arms	7.0	14.0	21.0	42.1	7.0	14.0	21.0	42.1
Continuous Current @ Tmax	Ic	Arms	2.0	4.1	6.1	12.2	2.0	4.0	5.9	11.9
Electrical resistance @ 25°C±10%	Rm	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	Ke	Vpeak/m/s L-L	105	52.4	34.9	17.5	140	69.9	46.6	23.3
@ 25°C±10%		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%	Kf	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
Mechanical Specifications										
Coil Assembly Mass ±15%	Mc	kg	0.91				1.10			
		lbs	2.0				2.4			
Magnetic Way Type			**MW075**				**MW100**			
Magnetic Way Mass ±15%	Mw	kg/m	18.9				27.3			
		lbs/in	1.05				1.51			
Figures of Merit & Additional Data										
Electrical time constant	Te	ms	0.43				0.48			
Max.Theoretical Acceleration	Amax	g's	101				111			
Magnetic attraction	Fa	kN	0				0			
		lbf	0				0			
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.35				0.29			
Max. Allowable Coil Temp.	Tmax	°C	130				130			

Notes:
① 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

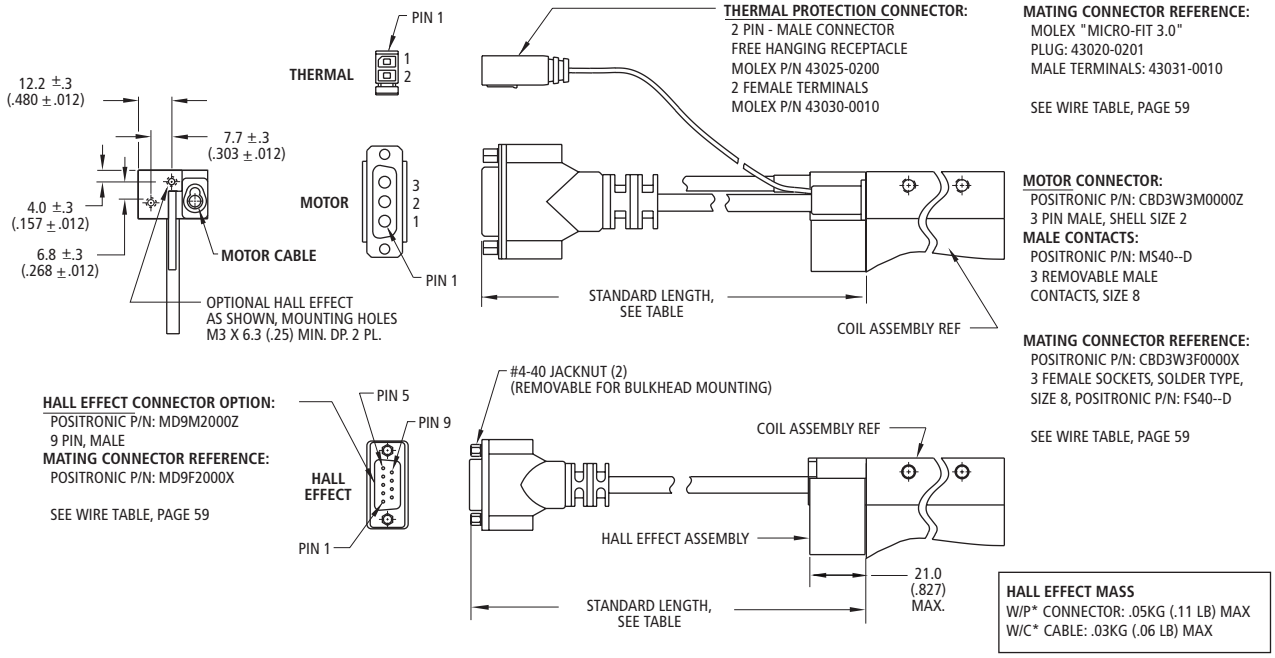
IL18-xxx

Motor Coil	Coil Width "A" +.7 (0.027) -.3 (0.012)	Typ. Assy. Width "B"±.6 (.024)	Typ. Assy. Height "T" ±.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 ± 0.8 (.03)
X decimal place ± 0.1 (.004)
XX decimal place ± 0.05 (.002)

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)

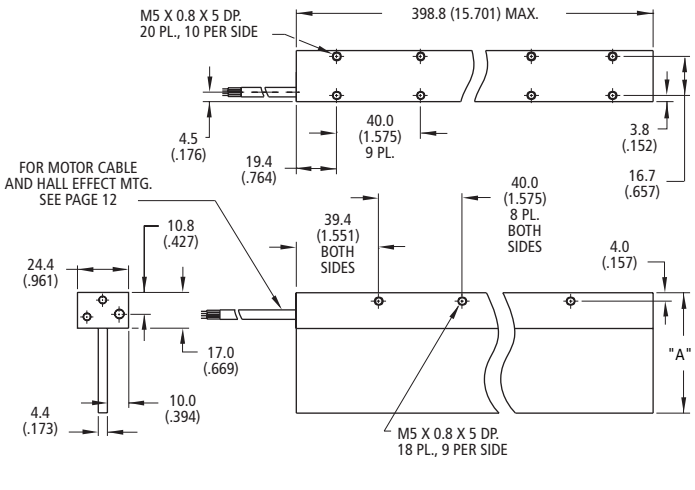
Note:
Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57

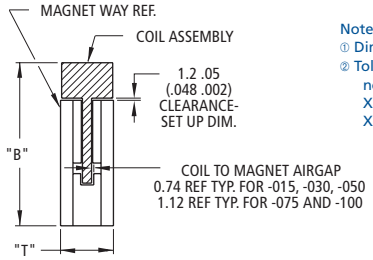
24 Series Ironless - Non-cooled

Rated Performance	Symbol	Units	IL24-015			IL24-030			IL24-050			IL24-075				IL24-100			
Peak force	Fp	N	240			480			800			1200				1600			
		lbf	54			108			180			270				360			
Continuous force @ Tmax	Fc	N	83			152			245			348				450			
see note ①		lbf	19			34			55			78				101			
Motor constant @ 25°C	Km	N/√W	6.7			11.2			15.9			20.6				24.4			
Max. Cont. power dissipation	Pc	W	213			261			333			405				484			
Electrical Specifications																			
		Winding Code	**A1**	**A2**	**A3**	**A1**	**A2**	**A3**	**A1**	**A2**	**A3**	**A1**	**A2**	**A3**	**A4**	**A1**	**A2**	**A3**	**A4**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	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
@ 25°C±10%		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%	Kf	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
Mechanical Specifications																			
Coil Assembly Mass ±15%	Mc	kg	0.57			0.72			0.92			1.17				1.42			
		lbs	1.3			1.6			2.0			2.6				3.1			
Magnetic Way Type			**MW**			**MW**			**MW**			**MW075**				**MW100**			
			015	015T		030	030L		050	050L									
Magnetic Way Mass ±15%	Mw	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			
Figures of Merit & Additional Data																			
Electrical time constant	Te	ms	0.12			0.21			0.35			0.43				0.48			
Max.Theoretical Acceleration	Amax	g's	42.9			68.0			88.7			105				115			
Magnetic attraction	Fa	kN	0			0			0			0				0			
		lbf	0			0			0			0				0			
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.49			0.40			0.32			0.26				0.22			
Max. Allowable Coil Temp.	Tmax	°C	130			130			130			130				130			

Notes:
① 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

IL24-xxx





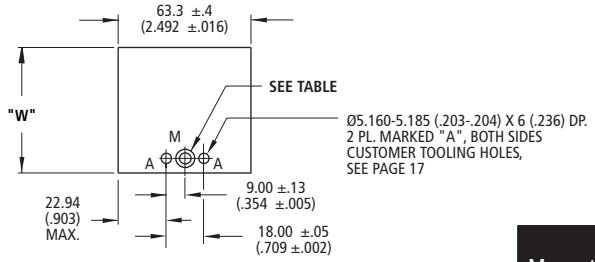
Motor Coil	Coil Width "A" +.7 (0.027) -.3 (0.012)	Typ. Assy. Width "B" ±.6 (.024)	Typ. Assy. Height "T" ±.4 (.016)
IL06-015	42.30 (1.665)	52.10 (2.051)	25.40 (1.000)
IL06-015 T	42.30 (1.665)	52.10 (2.051)	21.80 (.858)
IL06-030	57.30 (2.256)	78.50 (3.091)	25.40 (1.000)
IL06-030 L	57.30 (2.256)	67.30 (2.650)	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)

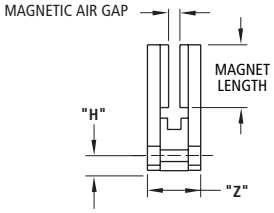
Notes:
① Dimensions in mm (inches)
② Tolerances unless otherwise specified:
no decimal place ± 0.8 (.03)
X decimal place ± 0.1 (.004)
XX decimal place ± 0.05 (.002)

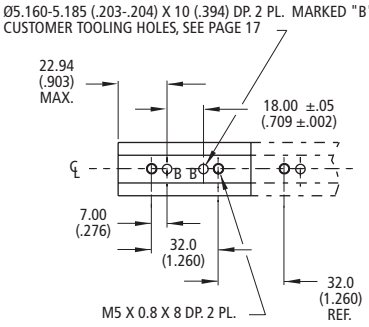
Ironless Magnet Ways

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





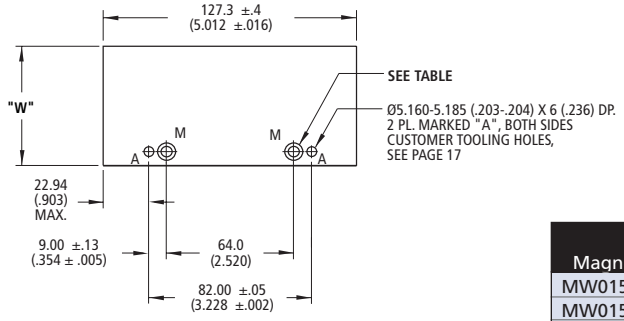


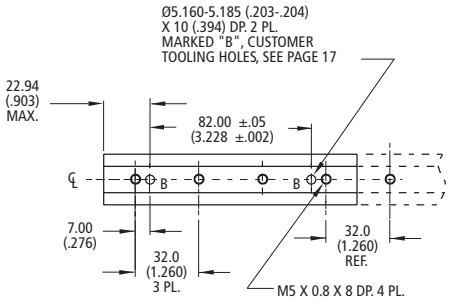
Magnet Way	Magnet Size Ref.	"H" ± .08 (.003)	"W" ± .4 (.016)	"Z" ± .4 (.016)
MW015-0064	15mm	5.69 (.224)	33.80 (1.331)	25.40 (1.000)
MW015T-0064	15mm	5.69 (.224)	33.80 (1.331)	21.80 (.858)
MW030-0064	30mm	7.11 (.280)	60.20 (2.370)	25.40 (1.000)
MW030L-0064	30mm	5.69 (.224)	49.00 (1.929)	25.40 (1.000)
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)

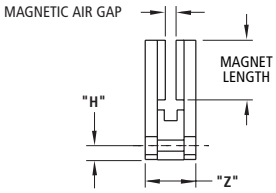
Magnet Way	Hardware (Hex, Socket Head Cap)					
	Hole Dia. ± .13 (.005)	C'bore Dia. ± .13 (.005)	C'bore Depth ± .13 (.005)	Metric	Inch	Bottom Mount Thread Option
MW015-0064	4.70 (.185)	7.80 (.307)	4.00 (.157)	M4	#8	M4 X 0.7 X 6.0 DP.
MW015T-0064	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 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 ± 0.8 (.03)
X decimal place ± 0.1 (.004)
XX decimal place ± 0.05 (.002)

MWxxx-0128





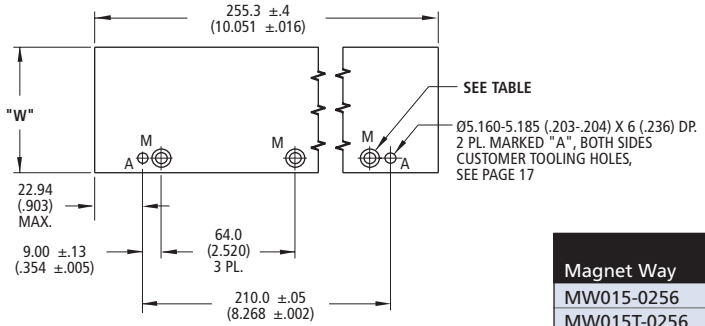


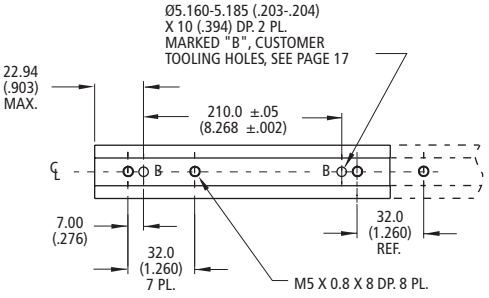
Notes:
① Dimensions in mm (inches)
② Tolerances unless otherwise specified:
no decimal place ± 0.8 (.03)
X decimal place ± 0.1 (.004)
XX decimal place ± 0.05 (.002)

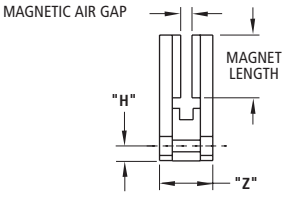
Magnet Way	Magnet Size Ref.	"H" ± .08 (.003)	"W" ± .4 (.016)	"Z" ± .4 (.016)
MW015-0128	15mm	5.69 (.224)	33.80 (1.331)	25.40 (1.000)
MW015T-0128	15mm	5.69 (.224)	33.80 (1.331)	21.80 (.858)
MW030-0128	30mm	7.11 (.280)	60.20 (2.370)	25.40 (1.000)
MW030L-0128	30mm	5.69 (.224)	49.00 (1.929)	25.40 (1.000)
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)

	Hardware (Hex, Socket Head Cap)					
Magnet Way	Hole Dia. ± .13 (.005)	C'bore Dia ± .13 (.005)	C'bore Depth ± .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





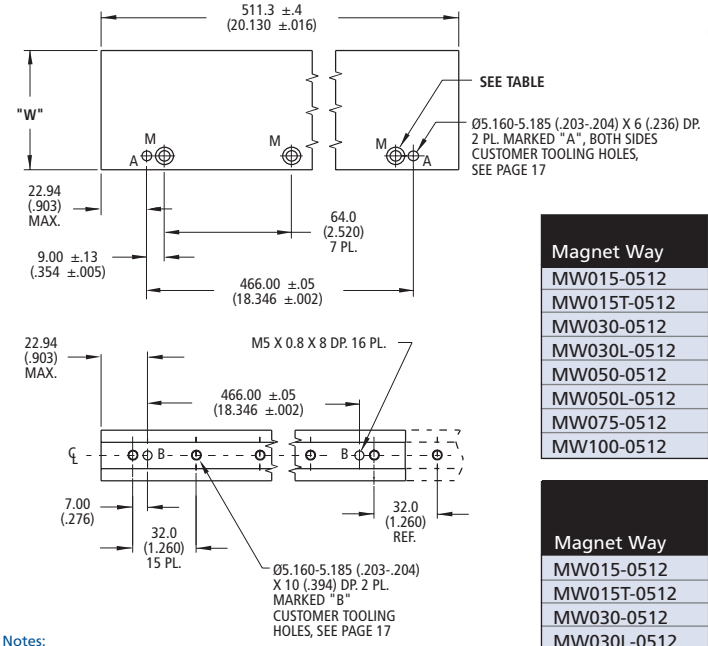


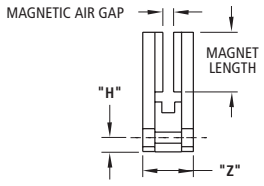
Notes:
① Dimensions in mm (inches)
② Tolerances unless otherwise specified:
no decimal place ± 0.8 (.03)
X decimal place ± 0.1 (.004)
XX decimal place ± 0.05 (.002)

Magnet Way	Magnet Size Ref.	"H" ± .08 (.003)	"W" ± .4 (.016)	"Z" ± .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)

	Hardware (Hex, Socket Head Cap)					
Magnet Way	Hole Dia. ± .13 (.005)	C'bore Dia. ± .13 (.005)	C'bore Depth ± .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.

MWxxx-0512



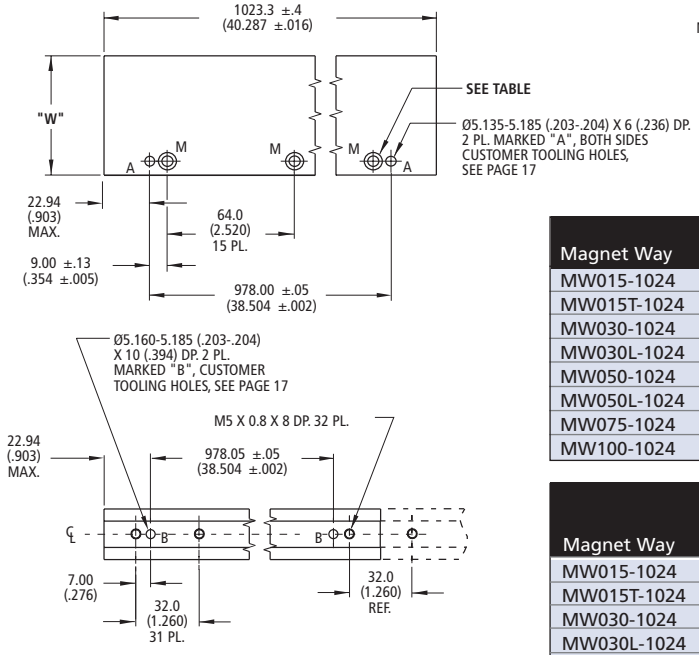


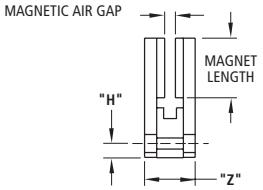
Magnet Way	Magnet Size Ref.	"H" ± .08 (.003)	"W" ± .4 (.016)	"Z" ± .4 (.016)
MW015-0512	15mm	5.69 (.224)	33.80 (1.331)	25.40 (1.000)
MW015T-0512	15mm	5.69 (.224)	33.80 (1.331)	21.80 (.858)
MW030-0512	30mm	7.11 (.280)	60.20 (2.370)	25.40 (1.000)
MW030L-0512	30mm	5.69 (.224)	49.00 (1.929)	25.40 (1.000)
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





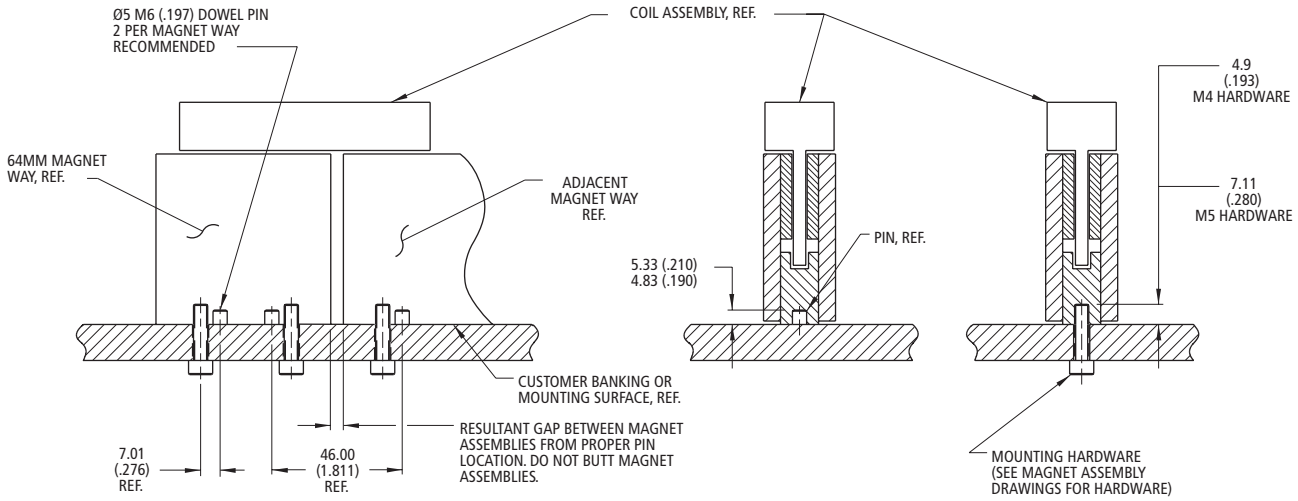
Notes:
① Dimensions in mm (inches)
② Tolerances unless otherwise specified:
no decimal place ± 0.8 (.03)
X decimal place ± 0.1 (.004)
XX decimal place ± 0.05 (.002)

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.

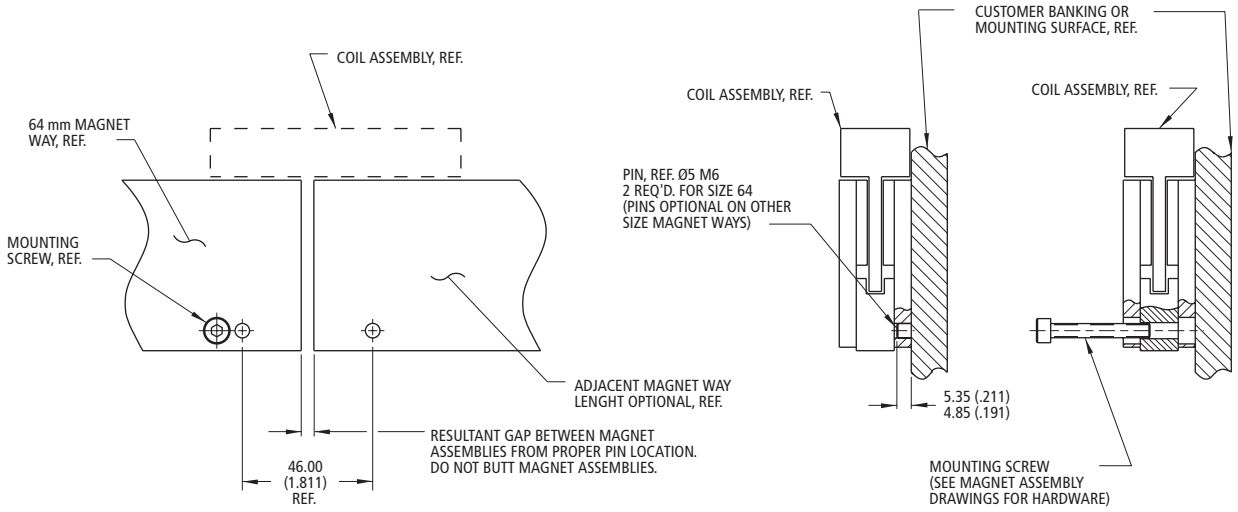
Magnet Way widths correspond to the mating coil assembly width. Magnet Way assemblies are modular and come in standard lengths: 64, 128, 256, 512, 1024 mm. Multiple magnet assemblies can be installed to obtain the desired length. Shown below is the method to mount multiple assemblies.

Bottom mounting installation



Dimensions in mm(in)

Side mounting installation



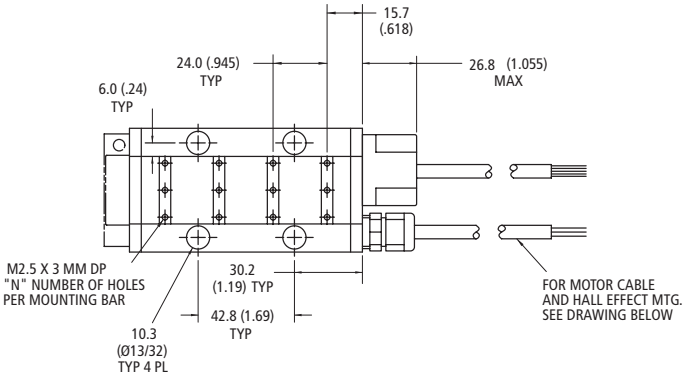
Dimensions in mm(in)

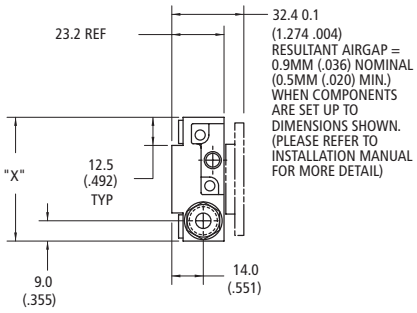
ICD05 Series Ironcore

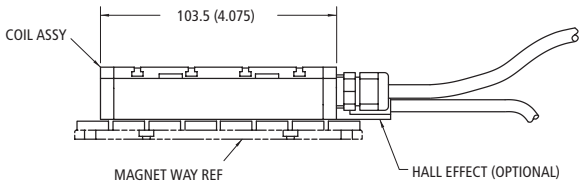
Rated Performance	Symbol	Units	ICD05-030		ICD05-050		ICD05-075		ICD05-100	
Peak force	Fp	N	170		280		425		550	
		lbf	38		63		96		124	
Continuous force @ Tmax see note ①	Fc	N	57		87		125		157	
		lbf	13		20		28		35	
Motor constant @ 130°C	Km	N/√W	10.3		14.5		18.6		22.0	
		lbf/√W	2.3		3.3		4.2		4.9	
Motor constant @ 25°C	Km25	N/√W	12.3		17.2		22.0		26.0	
		lbf/√W	2.8		3.9		4.9		5.9	
Max. Cont. power dissipation	Pc	W	30		36		46		51	
Electrical Specifications										
		Winding Code	**A1**	**A5**	**A1**	**A5**	**A1**	**A5**	**A1**	**A5**
Peak current	Ip	Arms	7.9	13.7	8.5	14.7	8.5	14.7	8.5	14.7
Continuous Current @ Tmax	Ic	Arms	2.1	3.7	2.0	3.4	1.9	3.3	1.8	3.1
Electrical resistance @ 25°C±10%	Rm	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	Ke	Vpeak/m/s L-L	21.8	12.6	36.3	21.0	54.3	31.4	72.4	41.8
@ 25°C±10%		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%	Kf	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
Mechanical Specifications										
Coil Assembly Mass ±15%	Mc	kg	0.62		0.95		1.36		1.71	
		lbs	1.4		2.1		3.0		3.8	
Magnetic Way Type			**MCD030**		**MCD050**		**MCD075**		**MCD100**	
Magnetic Way Mass ±15%	Mw	kg/m	2.70		3.93		5.48		7.04	
		lbs/in	0.15		0.22		0.31		0.39	
Figures of Merit & Additional Data										
Electrical time constant	Te	ms	2.9		3.2		3.4		3.6	
Max.Theoretical Acceleration	Amax	g's	28.0		30.2		31.9		32.8	
Magnetic attraction	Fa	kN	0.53		0.89		1.33		1.78	
		lbf	119		200		299		400	
Thermal Resistance - coils to external structure	Rth	°C/Watt	3.50		2.90		2.30		2.06	
Max. Allowable Coil Temp.	Tmax	°C	130		130		130		130	

Notes:
① 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

ICD05-xxx



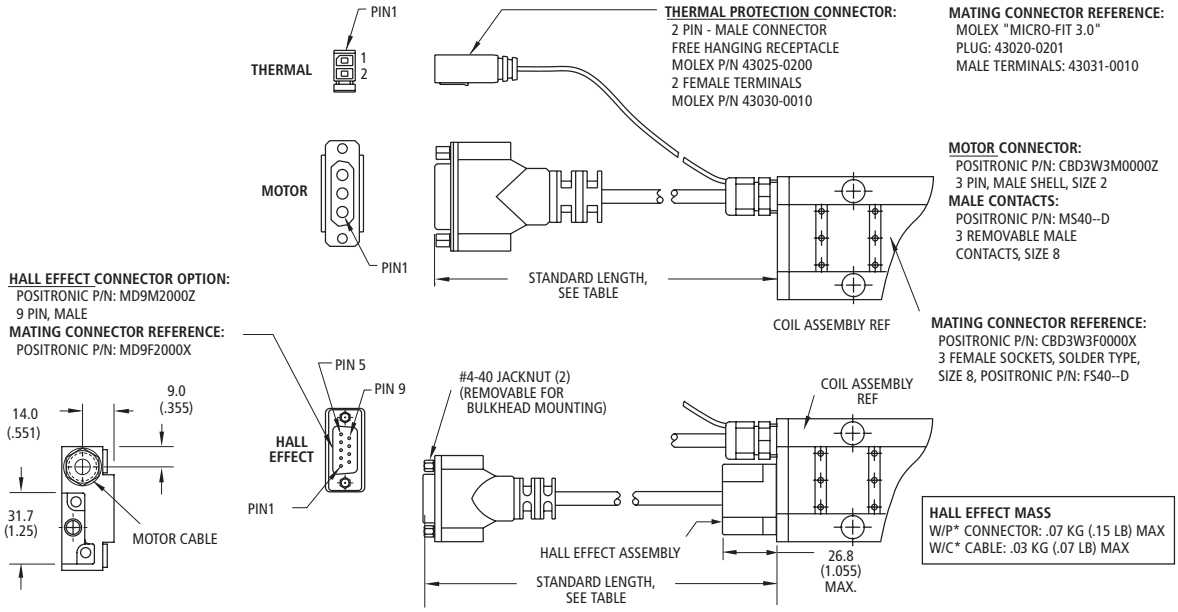




Motor Coil Type	Coil Width "X"	# Holes "N"
ICD05-030	55.0 (2.165) ± 1.0 (.04)	3
ICD05-050	75.0 (2.953) ±.1.0 (.04)	4
ICD05-075	100.0 (3.937) ± 1.0 (.04)	5
ICD05-100	125.0 (4.921) ± 1.0 (.04)	5

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

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

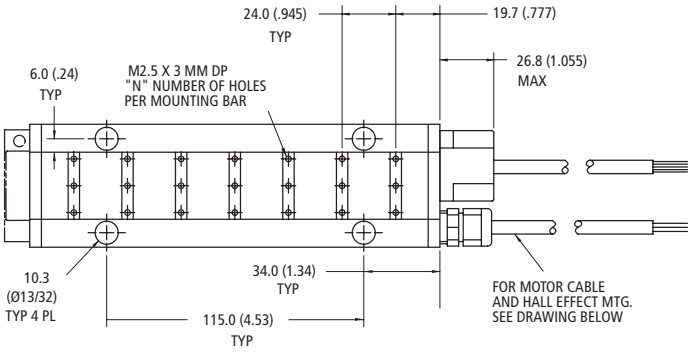
Flying Lead Option	
Leads	Length
C1	400 (16)
C2	200 (8)
C3	100 (4)

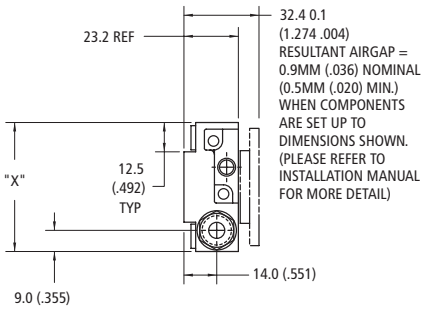
ICD10 Series Ironcore

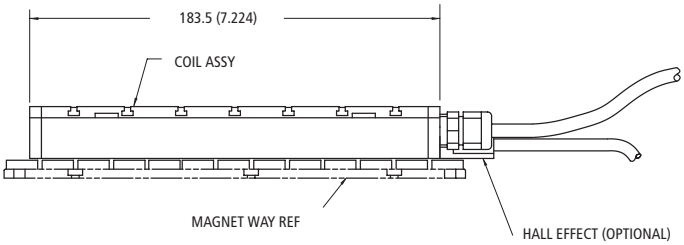
Rated Performance	Symbol	Units	ICD10-030				ICD10-050				ICD10-075				ICD10-100			
Peak force	Fp	N	340				560				850				1130			
		lbf	76				126				191				254			
Continuous force @ Tmax see note ①	Fc	N	104				171				246				315			
		lbf	23				38				55				71			
Motor constant @ 130°C	Km	N/√W	14.6				20.5				26.4				31.3			
		lbf/√W	3.3				4.6				5.9				7.0			
Motor constant @ 25°C	Km25	N/√W	17.3				24.3				31.3				37.1			
		lbf/√W	3.9				5.5				7.0				8.3			
Max. Cont. power dissipation	Pc	W	51				69				87				101			
Electrical Specifications																		
		Winding Code	**A1**	**A4**	**A5**	**A8**	**A1**	**A4**	**A5**	**A8**	**A1**	**A4**	**A5**	**A8**	**A1**	**A4**	**A5**	**A8**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	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
@ 25°C±10%		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%	Kf	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
Mechanical Specifications																		
Coil Assembly Mass ±15%	Mc	kg	1.1				1.9				2.7				3.4			
		lbs	2.5				4.1				5.9				7.5			
Magnetic Way Type			**MCD030**				**MCD050**				**MCD075**				**MCD100**			
Magnetic Way Mass ±15%	Mw	kg/m	2.70				3.93				5.48				7.04			
		lbs/in	0.15				0.22				0.31				0.39			
Figures of Merit & Additional Data																		
Electrical time constant	Te	ms	2.9				3.2				3.5				3.6			
Max. Theoretical Acceleration	Amax	g's	30.7				30.7				32.5				33.7			
Magnetic attraction	Fa	kN	1.06				1.78				2.66				3.56			
		lbf	238				400				598				800			
Thermal Resistance - coils to external structure	Rth	°C/Watt	2.05				1.52				1.21				1.04			
Max. Allowable Coil Temp.	Tmax	°C	130				130				130				130			

Notes:
① 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

ICD10-xxx



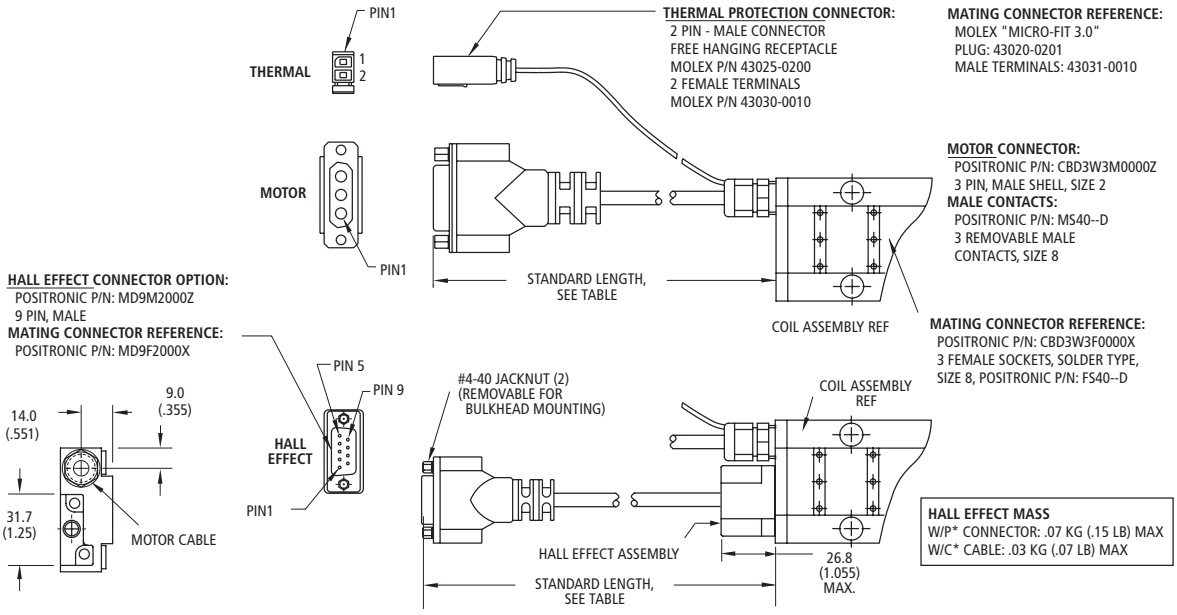




Motor Coil Type	Coil Width "X"	# Holes "N"
ICD10-030	55.0 (2.165) ± 1.0 (.04)	3
ICD10-050	75.0 (2.953) ±.1.0 (.04)	4
ICD10-075	100.0 (3.937) ± 1.0 (.04)	5
ICD10-100	125.0 (4.921) ± 1.0 (.04)	5

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



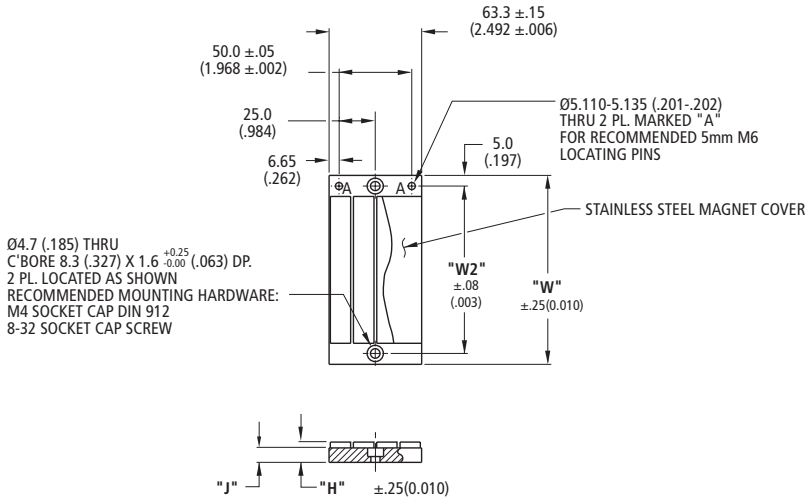
Note:
Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57

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)

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

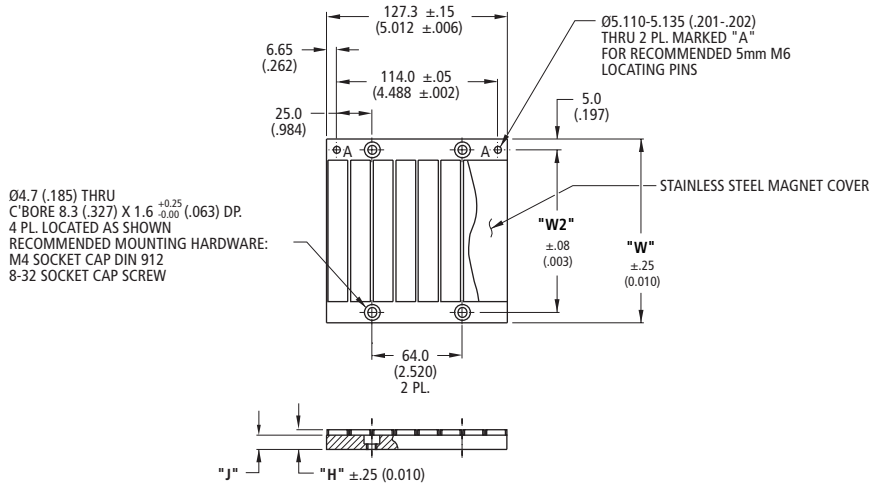
MCDxx-0064



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)

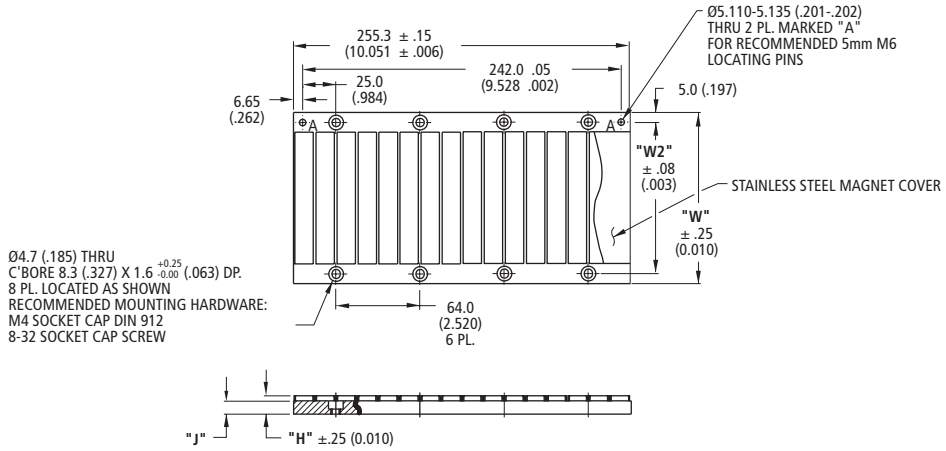
MCDxx-0128



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)

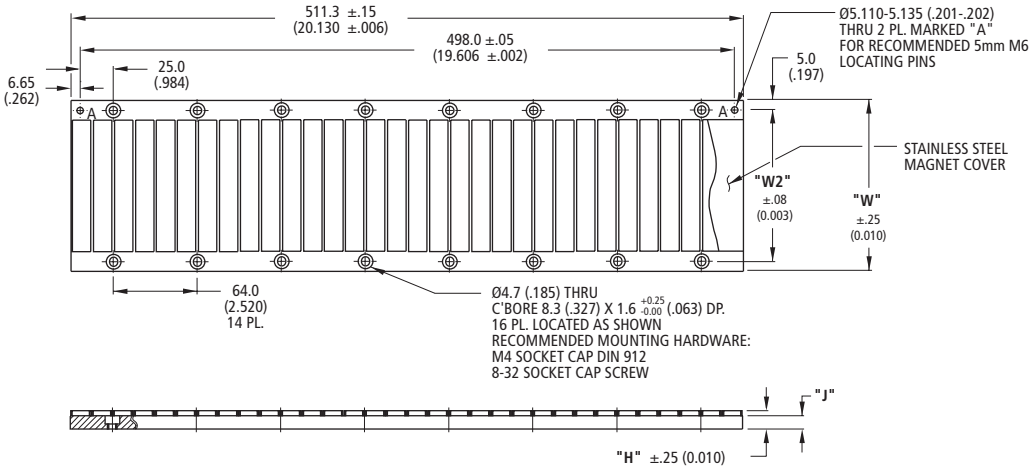
MCDxx-0256



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)

Dimensions in mm(in)

MCDxx-0512

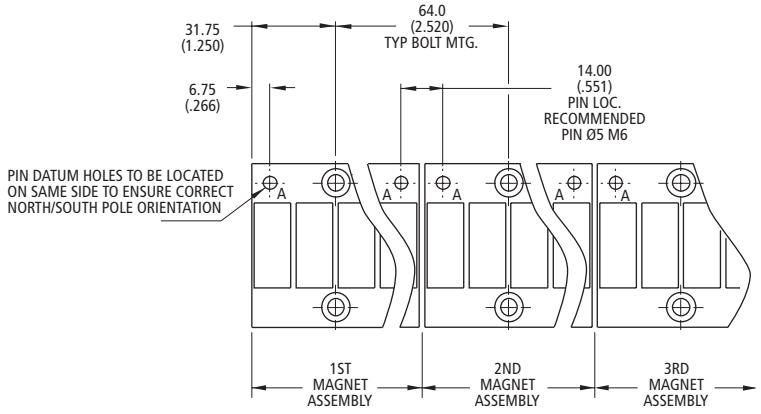


Type	"W"	"W2"	"J"	"H"
MCD030-0512-001	55.0 (2.165)	45.0 (1.772)	4.0 (.157)	8.25 (.325)
MCD050-0512-001	75.0 (2.953)	65.0 (2.559)	4.0 (.157)	8.25 (.325)
MCD075-0512-001	100.0 (3.937)	90.0 (3.543)	4.0 (.157)	8.25 (.325)
MCD100-0512-001	125.0 (4.921)	115.0 (4.528)	4.0 (.157)	8.25 (.325)

Dimensions in mm(in)

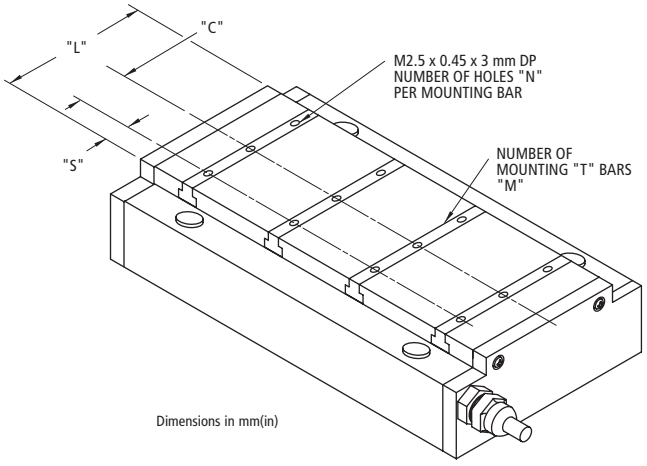
Typical Installation of Multiple Ironcore Magnet Assemblies

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.



Dimensions in mm(in)

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)

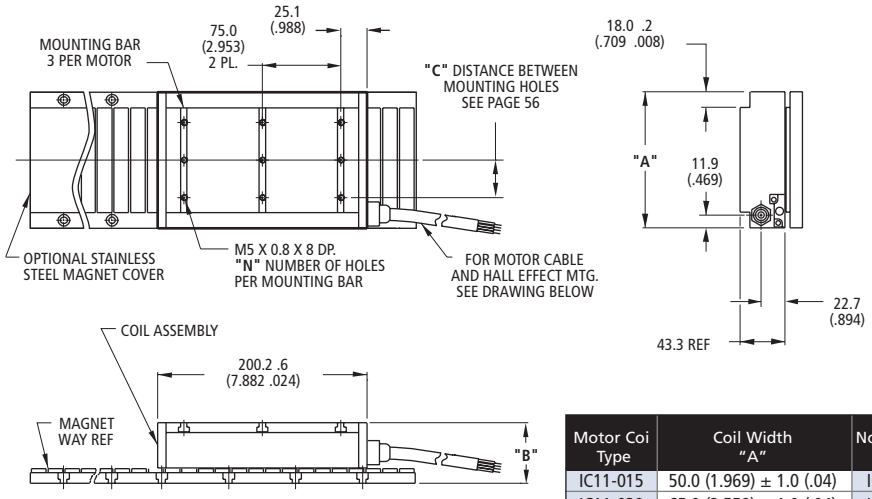
Motor Coil Type	Number of Bars "M"
ICD05-XXX	4
ICD10-XXX	7

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	
Peak force	Fp	N	190		375		625		940		1250		1875		2500		3125	
		lbf	43		84		141		211		281		422		562		703	
Continuous force @ Tmax	Fc	N	73		151		276		435		599		905		1255		1496	
see note ①		lbf	16		34		62		98		135		203		282		336	
Motor constant @ 25°C	Km	N/√W	13.1		22.5		32.0		41.4		49.1		62.0		73.0		79.5	
Max. Cont. power dissipation	Pc	W	44		64		106		157		210		300		418		500	
Electrical Specifications																		
		Winding Code	**A1**	**A5**	**A1**	**A5**	**A1**	**A5**	**A1**	**A5**	**A1**	**A5**	**A1**	**A5**	**A1**	**A5**	**A1**	**A5**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	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
@ 25°C±10%		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%	Kf	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
Mechanical Specifications																		
Coil Assembly Mass ±15%	Mc	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	
Magnetic Way Type			**MC015**		**MC030**		**MC050**		**MC075**		**MC100**		**MC150**		**MC200**		**MC250**	
Magnetic Way Mass ±15%	Mw	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	
Figures of Merit & Additional Data																		
Electrical time constant	Te	ms	6.5		8.8		10.3		11.3		11.8		12.5		12.8		13.2	
Max.Theoretical Acceleration	Amax	g's	11.4		15.3		17.7		19.2		19.6		20.3		20.7		21.0	
Magnetic attraction	Fa	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	Rth	°C/Watt	2.40		1.64		0.99		0.67		0.50		0.35		0.25		0.21	
Max. Allowable Coil Temp.	Tmax	°C	130		130		130		130		130		130		130		130	

Notes:
① 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

Non-Cooled IC11-xxx

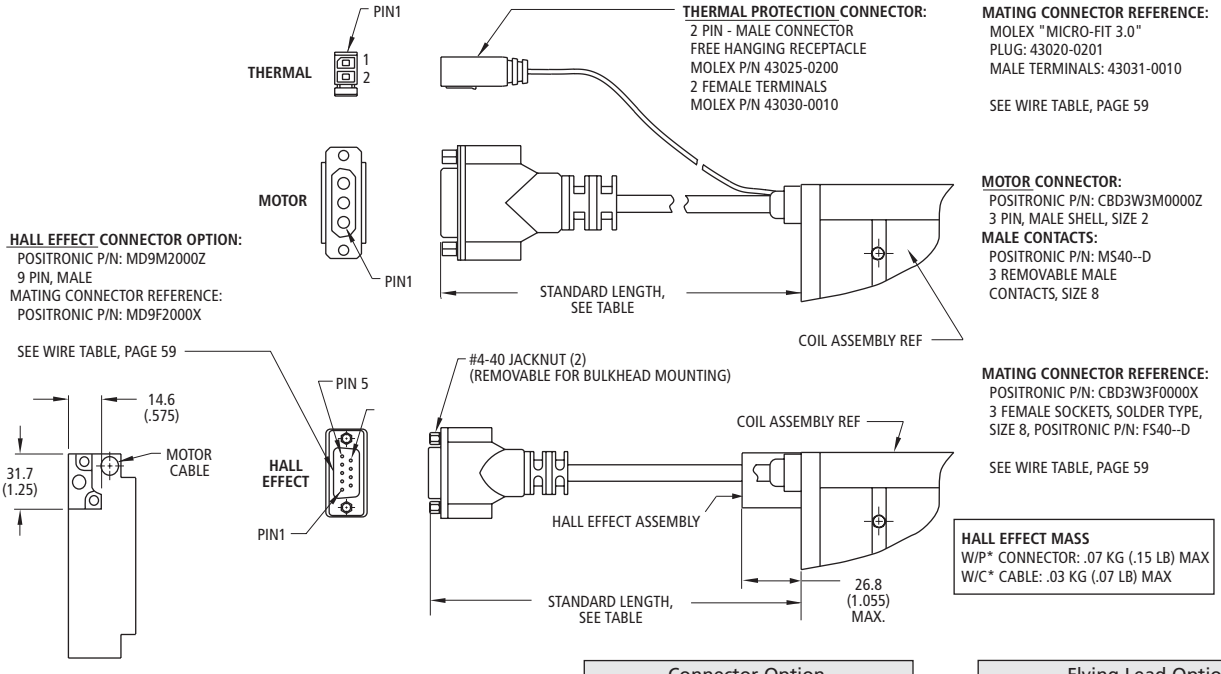


Resultant airgap = 0.9mm (.036) nominal (0.5mm (.020") minimum) when components are set up to dimension "B" in table below. (Please refer to installation manual for more detail)

Motor Coi 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

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

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)

22 SERIES IRONCORE - NON-COOLED

Rated Performance	Symbol	Units	IC22-015			IC22-030			IC22-050			IC22-075		
Peak force	Fp	N	375			750			1250			1875		
		lbf	84			169			281			422		
Continuous force @ Tmax	Fc	N	143			298			548			864		
see note ①		lbf	32			67			123			194		
Motor constant @ 25°C	Km	$N/\sqrt{W}$	18.2			31.4			44.8			58.0		
Max. Cont. power dissipation	Pc	W	88			128			212			313		
Electrical Specifications														
		Winding Code	**A1**	**A2**	**A6**	**A1**	**A2**	**A6**	**A1**	**A2**	**A6**	**A1**	**A2**	**A6**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	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
@ 25°C±10%		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%	Kf	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
Mechanical Specifications														
Coil Assembly Mass ±15%	Mc	kg	3.2			4.8			6.9			9.6		
		lbs	7.1			10.6			15.2			21.2		
Magnetic Way Type			**MC015**			**MC030**			**MC050**			**MC075**		
Magnetic Way Mass ±15%	Mw	kg/m	2.5			5.4			7.5			10.1		
		lbs/in	0.14			0.30			0.42			0.56		
Figures of Merit & Additional Data														
Electrical time constant	Te	ms	6.3			8.6			10.1			11.1		
Max.Theoretical Acceleration	Amax	g's	11.9			15.9			18.5			19.9		
Magnetic attraction	Fa	kN	1.5			2.9			4.9			7.3		
		lbf	328			654			1090			1637		
Thermal Resistance - coils to external structure	Rth	°C/Watt	1.20			0.82			0.50			0.34		
Max. Allowable Coil Temp.	Tmax	°C	130			130			130			130		

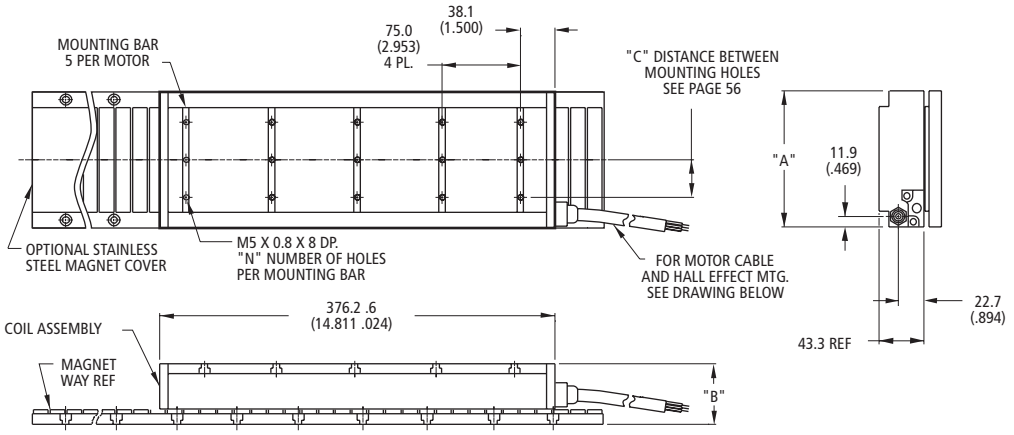
Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

22 Series Ironcore - Non-cooled

Rated Performance	Symbol	Units	IC22-100			IC22-150			IC22-200			IC22-250		
Peak force	Fp	N	2500			3750			5000			6250		
		lbf	562			843			1124			1405		
Continuous force @Tmax	Fc	N	1198			1810			2513			3000		
see note ①		lbf	269			407			565			674		
Motor constant @ 25°C	Km	$N/\sqrt{W}$	69.5			87.8			103.4			112.8		
Max. Cont. power dissipation	Pc	W	420			600			833			1000		
Electrical Specifications														
		Winding Code	**A1**	**A2**	**A6**	**A1**	**A2**	**A6**	**A1**	**A2**	**A6**	**A1**	**A2**	**A6**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	Vpeak/m/s L-L	206	103	59.3	308	154	89.0	411	206	119	494	247	143
@ 25°C±10%		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%	Kf	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
Mechanical Specifications														
Coil Assembly Mass ±15%	Mc	kg	12.5			18.1			23.7			29.3		
		lbs	27.6			39.9			52.2			64.6		
Magnetic Way Type			**MC100**			**MC150**			**MC200**			**MC250**		
Magnetic Way Mass ±15%	Mw	kg/m	12.7			20.7			26.8			33.2		
		lbs/in	0.71			1.16			1.50			1.86		
Figures of Merit & Additional Data														
Electrical time constant	Te	ms	11.8			12.5			12.9			13.2		
Max.Theoretical Acceleration	Amax	g's	20.4			21.1			21.5			21.8		
Magnetic attraction	Fa	kN	9.8			14.6			19.7			24.6		
		lbf	2205			3271			4433			5524		
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.25			0.18			0.13			0.11		
Max. Allowable Coil Temp.	Tmax	°C	130			130			130			130		

Notes:
① 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

Non-Cooled IC22-xxx

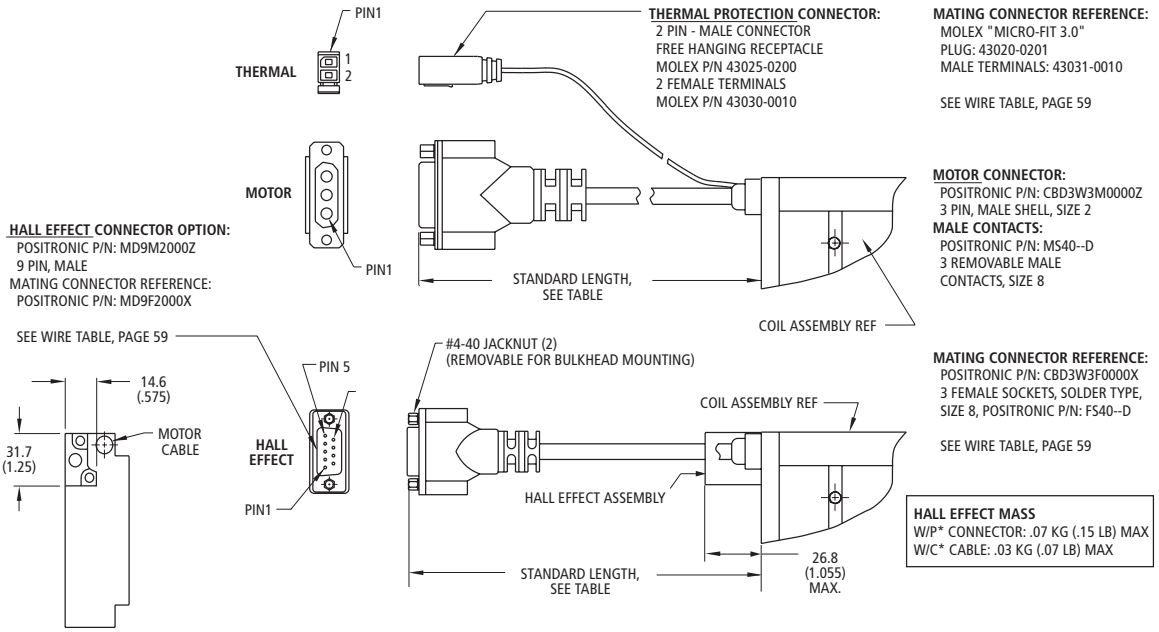


Resultant airgap = 0.9mm (.036) nominal (0.5mm (.020") minimum) when components are set up to dimension "B" in table below.
(Please refer to installation manual for more detail)

Motor Coil Type	Coil Width "A"	Non-Cooled	Dim "B" without cover	Dim "B" w/ Magnet cover	# Holes "N"
IC22-015	50.0 (1.969) ± 1.0 (.04)	ICXX-015	54.3±0.1 (2.138±.004)	54.6±0.1 (2.150±.004)	1
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

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 Effects Options



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

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)

33 Series Ironcore - Non-cooled

Rated Performance	Symbol	Units	IC33-015				IC33-030				IC33-050				IC33-075			
Peak force	Fp	N	565				1125				1875				2815			
		lbf	127				253				422				633			
Continuous force @Tmax	Fc	N	216				450				824				1301			
see note ①		lbf	49				101				185				292			
Motor constant @ 25°C	Km	N/ √W	22.3				38.5				55.0				71.2			
Max. Cont. power dissipation	Pc	W	131				192				317				471			
Electrical Specifications																		
		Winding Code	**A1**	**A3**	**A5**	**A7**	**A1**	**A3**	**A5**	**A7**	**A1**	**A3**	**A5**	**A7**	**A1**	**A3**	**A5**	**A7**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	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
@ 25°C±10%		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%	Kf	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
Mechanical Specifications																		
Coil Assembly Mass ±15%	Mc	kg	5.0				7.3				10.4				14.4			
		lbs	11.0				16.1				22.9				31.7			
Magnetic Way Type			**MC015**				**MC030**				**MC050**				**MC075**			
Magnetic Way Mass ±15%	Mw	kg/m	2.5				5.4				7.5				10.1			
		lbs/in	0.14				0.30				0.42				0.56			
Figures of Merit & Additional Data																		
Electrical time constant	Te	ms	6.4				8.6				10.2				11.2			
Max.Theoretical Acceleration	Amax	g's	11.5				15.7				18.4				19.9			
Magnetic attraction	Fa	kN	2.2				4.4				7.4				11.0			
		lbf	497				991				1652				2480			
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.80				0.55				0.33				0.22			
Max. Allowable Coil Temp.	Tmax	°C	130				130				130				130			

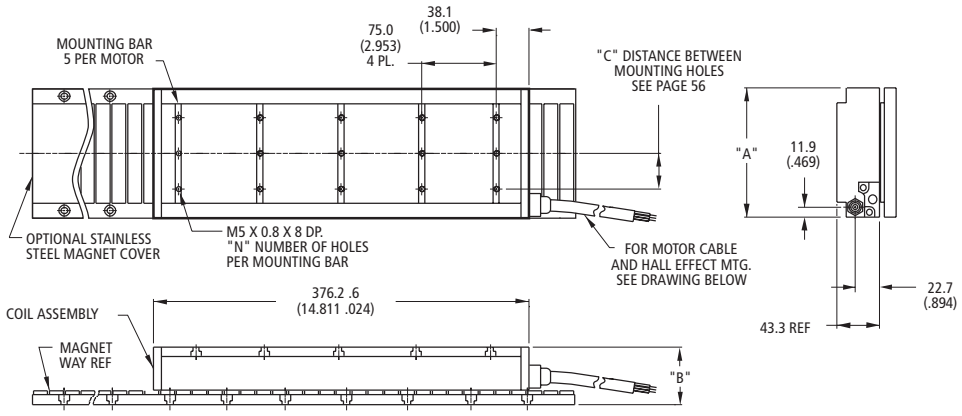
Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

33 Series Ironcore - Non-cooled

Rated Performance	Symbol	Units	IC33-100				IC33-150				IC33-200				IC33-250			
Peak force	Fp	N	3750				5625				7500				9375			
		lbf	843				1265				1686				2108			
Continuous force @ Tmax	Fc	N	1796				2718				3765				4496			
see note ①		lbf	404				611				846				1011			
Motor constant @ 25°C	Km	N/√W	85.1				107.8				127				138			
Max. Cont. power dissipation	Pc	W	629				897				1250				1500			
Electrical Specifications																		
		Winding Code	**A1**	**A3**	**A5**	**A7**	**A1**	**A3**	**A5**	**A7**	**A1**	**A3**	**A5**	**A7**	**A1**	**A3**	**A5**	**A7**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	Vpeak/m/s L-L	308	103	178	59.3	463	154	267	89.0	617	206	356	119	741	247	428	143
@ 25°C±10%		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%	Kf	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
Mechanical Specifications																		
Coil Assembly Mass ±15%	Mc	kg	18.9				27.3				35.7				44.1			
		lbs	41.7				60.2				78.7				97.2			
Magnetic Way Type			**MC100**				**MC150**				**MC200**				**MC250**			
Magnetic Way Mass ±15%	Mw	kg/m	12.7				20.7				26.8				33.2			
		lbs/in	0.71				1.16				1.50				1.86			
Figures of Merit & Additional Data																		
Electrical time constant	Te	ms	11.8				12.5				12.9				13.2			
Max.Theoretical Acceleration	Amax	g's	20.2				21.0				21.4				21.7			
Magnetic attraction	Fa	kN	14.7				22.1				29.4				36.8			
		lbf	3305				4957				6609				8262			
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.17				0.12				0.084				0.070			
Max. Allowable Coil Temp.	Tmax	°C	130				130				130				130			

Notes:
① 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

Non-Cooled IC33-xxx

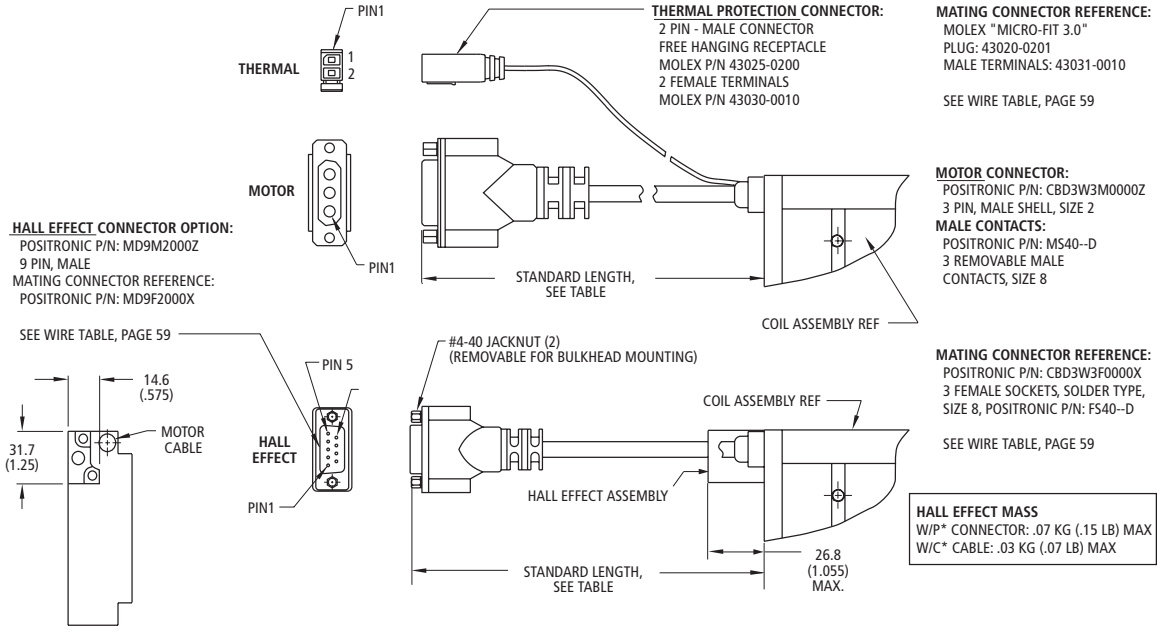


Resultant airgap = 0.9mm (.036) nominal (0.5mm (.020") minimum) when components are set up to dimension "B" in table below.
(Please refer to installation manual for more detail)

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 Effects Options



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

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)

44 Series Ironcore - Non-cooled

Rated Performance	Symbol	Units	IC44-015				IC44-030				IC44-050				IC44-075			
Peak force	Fp	N	750				1500				2500				3750			
		lbf	169				337				562				843			
Continuous force @ Tmax	Fc	N	286				597				1096				1732			
see note ①		lbf	64				134				246				389			
Motor constant @ 25°C	Km	N/√W	25.7				44.3				63.3				82.4			
Max. Cont. power dissipation	Pc	W	175				256				423				625			
Electrical Specifications																		
		Winding Code	**A1**	**A2**	**A3**	**A7**	**A1**	**A2**	**A3**	**A7**	**A1**	**A2**	**A3**	**A7**	**A1**	**A2**	**A3**	**A7**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	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
@ 25°C±10%		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%	Kf	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
Mechanical Specifications																		
Coil Assembly Mass ±15%	Mc	kg	6.4				9.6				13.9				19.2			
		lbs	14.1				21.2				30.6				42.3			
Magnetic Way Type			**MC015**				**MC030**				**MC050**				**MC075**			
Magnetic Way Mass ±15%	Mw	kg/m	2.5				5.4				7.5				10.1			
		lbs/in	0.14				0.30				0.42				0.56			
Figures of Merit & Additional Data																		
Electrical time constant	Te	ms	6.3				8.6				10.1				11.2			
Max.Theoretical Acceleration	Amax	g's	11.9				15.9				18.3				19.9			
Magnetic attraction	Fa	kN	2.9				5.9				9.8				14.7			
		lbf	661				1322				2203				3305			
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.60				0.41				0.25				0.17			
Max. Allowable Coil Temp.	Tmax	°C	130				130				130				130			

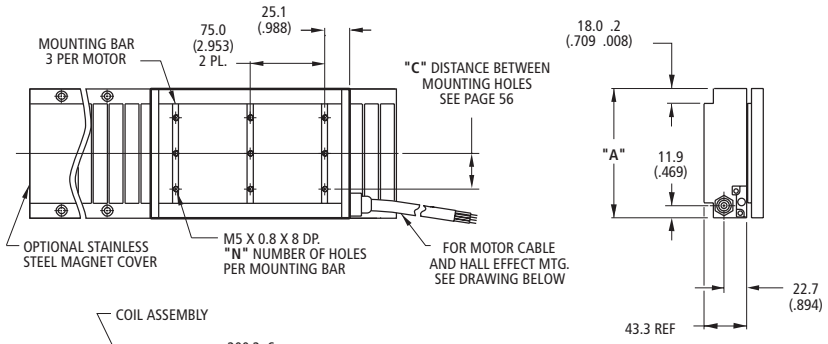
Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

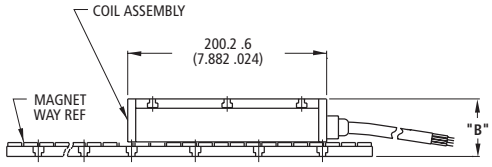
44 Series Ironcore - Non-cooled

Rated Performance	Symbol	Units	IC44-100				IC44-150				IC44-200				IC44-250			
Peak force	Fp	N	5000				7500				10000				12500			
		lbf	1124				1686				2248				2810			
Continuous force @Tmax	Fc	N	2397				3617				5025				6029			
see note ①		lbf	539				813				1130				1355			
Motor constant @ 25°C	Km	$N/\sqrt{W}$	98.3				124				146				160			
Max. Cont. power dissipation	Pc	W	840				1193				1667				2019			
Electrical Specifications																		
		Winding Code	**A1**	**A2**	**A3**	**A7**	**A1**	**A2**	**A3**	**A7**	**A1**	**A2**	**A3**	**A7**	**A1**	**A2**	**A3**	**A7**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	Vpeak/m/s L-L	411	206	103	59.3	617	308	154	89.0	823	411	206	119	988	494	247	143
@ 25°C±10%		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%	Kf	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
Mechanical Specifications																		
Coil Assembly Mass ±15%	Mc	kg	25.0				36.2				47.4				58.5			
		lbs	55.1				79.8				104				129			
Magnetic Way Type			**MC100**				**MC150**				**MC200**				**MC250**			
Magnetic Way Mass ±15%	Mw	kg/m	12.7				20.7				26.8				33.2			
		lbs/in	0.71				1.16				1.50				1.86			
Figures of Merit & Additional Data																		
Electrical time constant	Te	ms	11.8				12.5				12.9				13.3			
Max.Theoretical Acceleration	Amax	g's	20.4				21.1				21.5				21.8			
Magnetic attraction	Fa	kN	19.6				29.4				39.4				49.2			
		lbf	4406				6609				8858				11061			
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.13				0.088				0.063				0.052			
Max. Allowable Coil Temp.	Tmax	°C	130				130				130				130			

Notes:
① 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

Non-Cooled
IC44-xxx



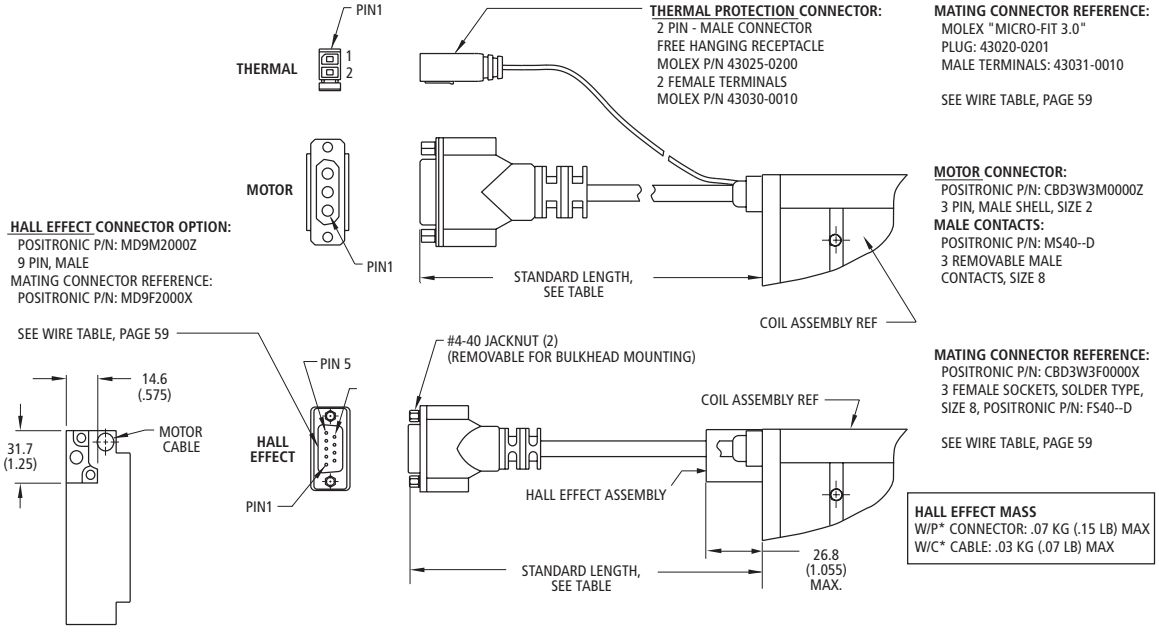


Resultant airgap = 0.9mm (.036) nominal (0.5mm (.020") minimum) when components are set up to dimension "B" in table below. (Please refer to installation manual for more detail)

Motor Coil Type	Coil Width "A"	Non-Cooled	Dim "B" without cover	Dim "B" w/ Magnet cover	# Holes "N"
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

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 Effects Options



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

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)

55 Series Ironcore - Non-cooled

Rated Performance	Symbol	Units	IC55-015				IC55-030				IC55-050			
Peak force	Fp	N	940				1875				3125			
		lbf	211				422				703			
Continuous force @Tmax	Fc	N	359				748				1374			
see note ①		lbf	81				168				309			
Motor constant @ 25°C	Km	N/√W	28.9				49.7				71.0			
Max. Cont. power dissipation	Pc	W	219				320				530			
Electrical Specifications														
		Winding Code	**A1**	**A3**	**A5**	**A7**	**A1**	**A3**	**A5**	**A7**	**A1**	**A3**	**A5**	**A7**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	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
@ 25°C±10%		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%	Kf	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
Mechanical Specifications														
Coil Assembly Mass ±15%	Mc	kg	8.0				12.0				17.3			
		lbs	17.6				26.5				38.1			
Magnetic Way Type			**MC015**				**MC030**				**MC050**			
Magnetic Way Mass ±15%	Mw	kg/m	2.5				5.4				7.5			
		lbs/in	0.14				0.30				0.42			
Figures of Merit & Additional Data														
Electrical time constant	Te	ms	6.3				8.6				10.1			
Max.Theoretical Acceleration	Amax	g's	12.0				15.9				18.4			
Magnetic attraction	Fa	kN	3.7				7.4				12.3			
		lbf	827				1652				2754			
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.48				0.33				0.20			
Max. Allowable Coil Temp.	Tmax	°C	130				130				130			

Notes:
① 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

55 Series Ironcore - Non-cooled

Rated Performance	Symbol	Units	IC55-015				IC55-030				IC55-050			
Peak force	Fp	N	940				1875				3125			
		lbf	211				422				703			
Continuous force @ Tmax	Fc	N	359				748				1374			
see note ①		lbf	81				168				309			
Motor constant @ 25°C	Km	N/√W	28.9				49.7				71.0			
Max. Cont. power dissipation	Pc	W	219				320				530			
Electrical Specifications														
		Winding Code	**A1**	**A3**	**A5**	**A7**	**A1**	**A3**	**A5**	**A7**	**A1**	**A3**	**A5**	**A7**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	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
@ 25°C±10%		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%	Kf	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
Mechanical Specifications														
Coil Assembly Mass ±15%	Mc	kg	8.0				12.0				17.3			
		lbs	17.6				26.5				38.1			
Magnetic Way Type			**MC015**				**MC030**				**MC050**			
Magnetic Way Mass ±15%	Mw	kg/m	2.5				5.4				7.5			
		lbs/in	0.14				0.30				0.42			
Figures of Merit & Additional Data														
Electrical time constant	Te	ms	6.3				8.6				10.1			
Max.Theoretical Acceleration	Amax	g's	12.0				15.9				18.4			
Magnetic attraction	Fa	kN	3.7				7.4				12.3			
		lbf	827				1652				2754			
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.48				0.33				0.20			
Max. Allowable Coil Temp.	Tmax	°C	130				130				130			

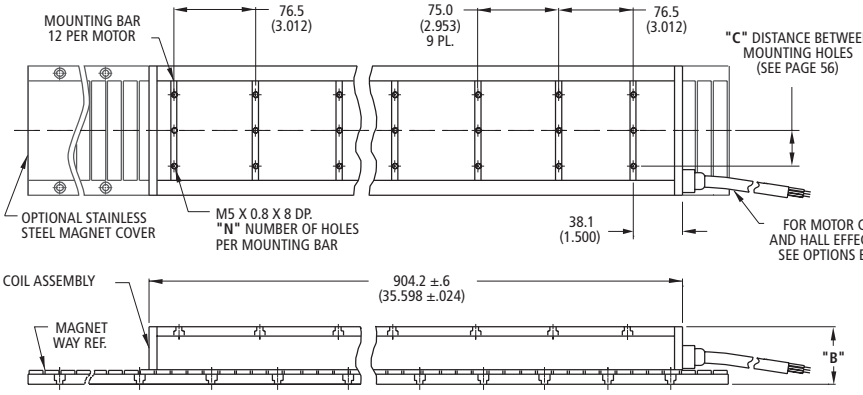
Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

55 Series Ironcore - Non-cooled

Rated Performance	Symbol	Units	IC55-200				IC55-250			
Peak force	Fp	N	12500				15625			
		lbf	2810				3513			
Continuous force @ Tmax	Fc	N	6303				7496			
see note ①		lbf	1417				1685			
Motor constant @ 25°C	Km	N/√W	163				178			
Max. Cont. power dissipation	Pc	W	2100				2500			
Electrical Specifications										
		Winding Code	**A1**	**A3**	**A5**	**A7**	**A1**	**A3**	**A5**	**A7**
Peak current	Ip	Arms	11.1	55.5	19.2	96.1	11.1	55.5	19.2	96.1
Continuous Current @Tmax	Ic	Arms	5.0	25.0	8.7	43.3	5.0	24.8	8.6	42.9
Electrical resistance @ 25°C±10%	Rm	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	Ke	Vpeak/m/s L-L	1028	206	594	119	1235	247	713	143
@ 25°C±10%		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%	Kf	N/Arms	1260	252	727	145	1512	302	873	175
		lbf / Arms	283	56.6	163	32.7	340	68.0	196	39.3
Mechanical Specifications										
Coil Assembly Mass ±15%	Mc	kg	59				73			
		lbs	130				161			
Magnetic Way Type			**MC200**				**MC250**			
Magnetic Way Mass ±15%	Mw	kg/m	26.8				33.2			
		lbs/in	1.50				1.86			
Figures of Merit & Additional Data										
Electrical time constant	Te	ms	12.9				13.2			
Max.Theoretical Acceleration	Amax	g's	21.6				21.8			
Magnetic attraction	Fa	kN	49.3				61.5			
		lbf	11072				13826			
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.050				0.042			
Max. Allowable Coil Temp.	Tmax	°C	130				130			

Notes:
① 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

Non-Cooled IC55-xxx

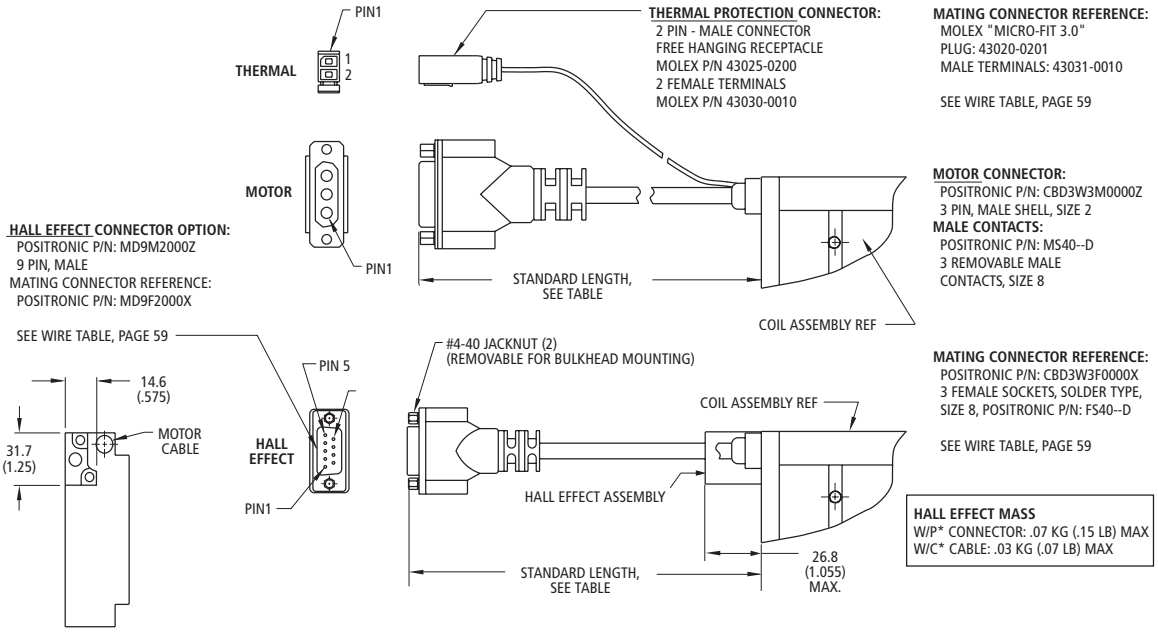


Resultant airgap = 0.9mm (.036) nominal (0.5mm (.020") minimum) when components are set up to dimension "B" in table below. (Please refer to installation manual for more detail)

Motor Coil Type	Coil Width "A"	Non-Cooled	Dim "B" without cover	Dim "B" w/ Magnet cover	# Holes "N"
IC55-015	50.0 (1.969) ± 1.0 (.04)	ICXX-015	54.3±0.1 (2.138±.004)	54.6±0.1 (2.150±.004)	1
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

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

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

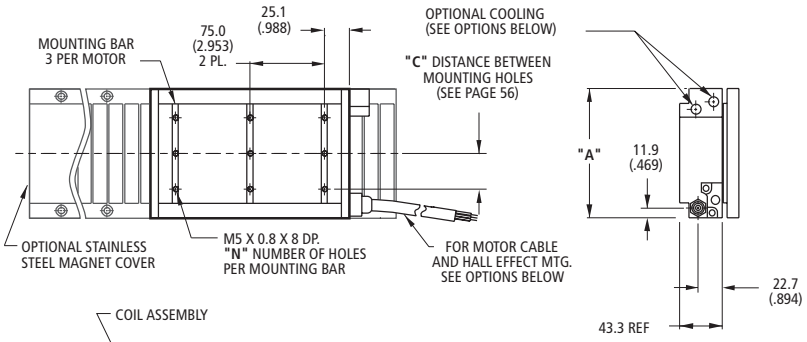
Flying Lead Option	
Leads	Length
C1	400 (16)
C2	200 (8)
C3	100 (4)

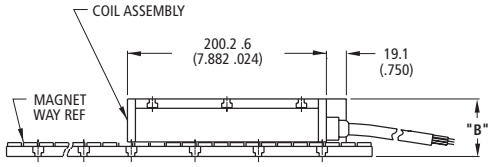
11 Series Ironcore - Water cooled

Rated Performance	Symbol	Units	IC11-030	IC11-050	IC11-075	IC11-100	IC11-150	IC11-200	IC11-250
Peak force	Fp	N	375	625	940	1250	1875	2500	3125
		lbf	84	141	211	281	422	562	703
Continuous force @ Tmax	Fc	N	296	502	754	1006	1490	1991	2410
see note ①		lbf	66	113	169	226	335	448	542
Motor constant @ 25°C	Km	N/√W	19.3	28.6	37.3	45.0	55.7	65.7	71.8
Max. Cont. power dissipation	Pc	W	319	434	577	724	1010	1296	1591
Electrical Specifications									
		Winding Code	**A1**	**A5**	**A1**	**A5**	**A1**	**A5**	**A1**	**A5**	**A1**	**A5**	**A1**	**A5**	**A1**	**A5**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	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
@ 25°C±10%		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%	Kf	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
Mechanical Specifications									
Coil Assembly Mass ±15%	Mc	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
Magnetic Way Type			**MC030**	**MC050**	**MC075**	**MC100**	**MC150**	**MC200**	**MC250**
Magnetic Way Mass ±15%	Mw	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
Figures of Merit & Additional Data									
Electrical time constant	Te	ms	6.4	7.9	8.7	9.2	9.5	9.9	10.2
Max.Theoretical Acceleration	Amax	g's	15.3	17.7	19.2	19.6	20.3	20.7	21.0
Magnetic attraction	Fa	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	Rth	°C/Watt	0.33	0.24	0.18	0.15	0.10	0.081	0.066
Max. Allowable Coil Temp.	Tmax	°C	130	130	130	130	130	130	130

Notes:
① 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

Cooled IC11-xxx



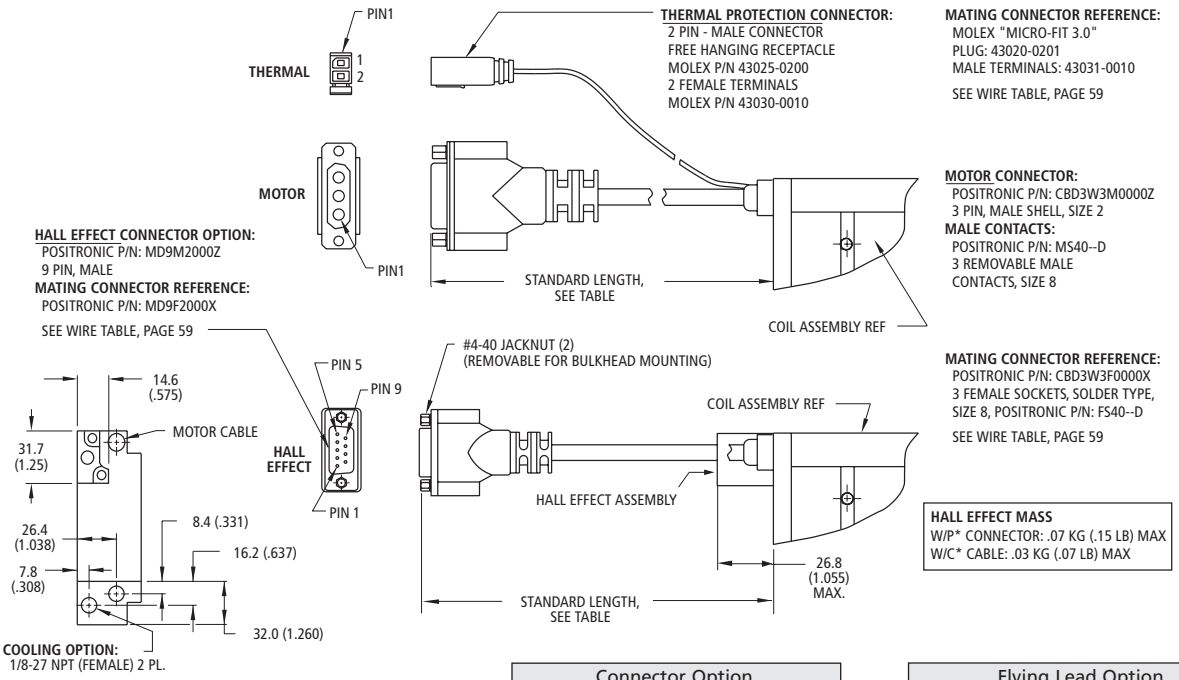


Resultant airgap = 0.9mm (.036)
nominal (0.5mm (.020") minimum)
when components are set up to dimension
"B" in table below.
(Please refer to installation manual
for more detail)

Motor Coil Type	Coil Width "A"	Cooled	Dim "B" without cover	Dim "B" w/ Magnet cover	# Holes "N"
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

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

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)

22 Series Ironcore - Water cooled

Rated Performance	Symbol	Units	IC22-030			IC22-050			IC22-075			IC22-100		
Peak force	Fp	N	750			1250			1875			2500		
		lbf	169			281			422			562		
Continuous force @Tmax	Fc	N	603			1005			1493			1995		
see note ①		lbf	136			226			336			448		
Motor constant @ 25°C	Km	N/√W	28.3			40.5			52.2			62.5		
Max. Cont. power dissipation	Pc	W	640			868			1154			1438		
Electrical Specifications														
		Winding Code	**A1**	**A2**	**A6**	**A1**	**A2**	**A6**	**A1**	**A2**	**A6**	**A1**	**A2**	**A6**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	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
@25°C±10%		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%	Kf	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
Mechanical Specifications														
Coil Assembly Mass ±15%	Mc	kg	4.8			6.9			9.6			12.5		
		lbs	10.6			15.2			21.2			27.6		
Magnetic Way Type			**MC030**			**MC050**			**MC075**			**MC100**		
Magnetic Way Mass ±15%	Mw	kg/m	5.4			7.5			10.1			12.7		
		lbs/in	0.30			0.42			0.56			0.71		
Figures of Merit & Additional Data														
Electrical time constant	Te	ms	6.6			7.9			8.5			9.0		
Max.Theoretical Acceleration	Amax	g's	15.9			18.5			19.9			20.4		
Magnetic attraction	Fa	kN	2.9			4.9			7.3			9.8		
		lbf	654			1090			1637			2205		
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.16			0.12			0.091			0.073		
Max. Allowable Coil Temp.	Tmax	°C	130			130			130			130		

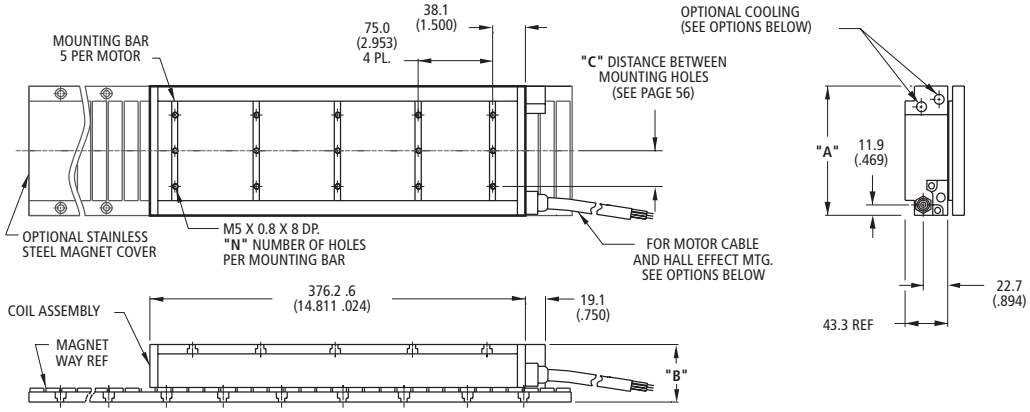
Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

22 Series Ironcore - Water cooled

Rated Performance	Symbol	Units	IC22-150			IC22-200			IC22-250		
Peak force	Fp	N	3750			5000			6250		
		lbf	843			1124			1405		
Continuous force @ Tmax	Fc	N	2996			4023			4806		
see note ①		lbf	674			904			1080		
Motor constant @ 25°C	Km	$N/\sqrt{W}$	79.3			93.3			101		
Max. Cont. power dissipation	Pc	W	2019			2625			3182		
Electrical Specifications											
		Winding Code	**A1**	**A2**	**A6**	**A1**	**A2**	**A6**	**A1**	**A2**	**A6**
Peak current	Ip	Arms	13.8	27.6	47.8	13.8	27.6	47.8	13.8	27.6	47.8
Continuous Current @ Tmax	Ic	Arms	9.8	19.7	34.1	9.9	19.8	34.3	9.9	19.7	34.2
Electrical resistance @ 25°C±10%	Rm	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	Ke	Vpeak/m/s L-L	249	124	71.8	332	166	95.7	398	199	115
@ 25°C±10%		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%	Kf	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
Mechanical Specifications											
Coil Assembly Mass ±15%	Mc	kg	18.1			23.7			29.3		
		lbs	39.9			52.2			64.6		
Magnetic Way Type			**MC150**			**MC200**			**MC250**		
Magnetic Way Mass ±15%	Mw	kg/m	20.7			26.8			33.2		
		lbs/in	1.16			1.50			1.86		
Figures of Merit & Additional Data											
Electrical time constant	Te	ms	9.6			10.0			10.2		
Max.Theoretical Acceleration	Amax	g's	21.1			21.5			21.8		
Magnetic attraction	Fa	kN	14.6			19.7			24.6		
		lbf	3271			4433			5524		
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.052			0.040			0.033		
Max. Allowable Coil Temp.	Tmax	°C	130			130			130		

Notes:
① 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

Cooled IC22-xxx

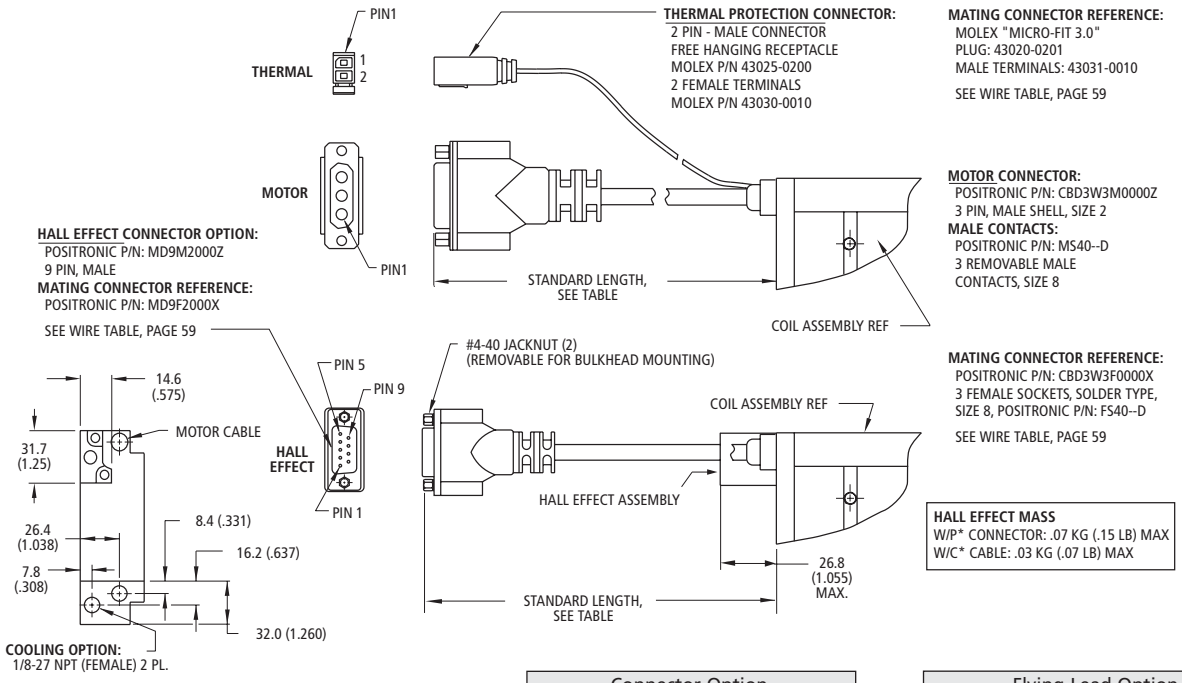


Resultant airgap = 0.9mm (.036) nominal (0.5mm (.020") minimum) when components are set up to dimension "B" in table below. (Please refer to installation manual for more detail)

Motor Coil Type	Coil Width "A"	Cooled1	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

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 Effects Options



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

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)

33 Series Ironcore - Water cooled

Rated Performance	Symbol	Units	IC33-030			IC33-050			IC33-075		
Peak force	Fp	N	1125			1875			2815		
		lbf	253			422			633		
Continuous force @ Tmax	Fc	N	896			1492			2240		
see note ①		lbf	202			335			504		
Motor constant @ 25°C	Km	N/√W	34.5			49.2			64.2		
Max. Cont. power dissipation	Pc	W	955			1296			1721		
Electrical Specifications											
		Winding Code	**A1**	**A3**	**A5**	**A1**	**A3**	**A5**	**A1**	**A3**	**A5**
Peak current	Ip	Arms	13.8	41.4	23.9	13.8	41.4	23.9	13.8	41.4	23.9
Continuous Current @ Tmax	Ic	Arms	9.8	29.5	17.0	9.8	29.4	17.0	9.8	29.4	17.0
Electrical resistance @ 25°C±10%	Rm	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	Ke	Vpeak/m/s L-L	74.5	24.8	43.0	124	41.4	71.7	187	62.2	108
@ 25°C±10%		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%	Kf	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
Mechanical Specifications											
Coil Assembly Mass ±15%	Mc	kg	7.3			10.4			14.4		
		lbs	16.1			22.9			31.7		
Magnetic Way Type			**MC030**			**MC050**			**MC075**		
Magnetic Way Mass ±15%	Mw	kg/m	5.4			7.5			10.1		
		lbs/in	0.30			0.42			0.56		
Figures of Merit & Additional Data											
Electrical time constant	Te	ms	6.6			7.7			8.6		
Max.Theoretical Acceleration	Amax	g's	15.7			18.4			19.9		
Magnetic attraction	Fa	kN	4.4			7.4			11.0		
		lbf	991			1652			2480		
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.11			0.081			0.061		
Max. Allowable Coil Temp.	Tmax	°C	130			130			130		

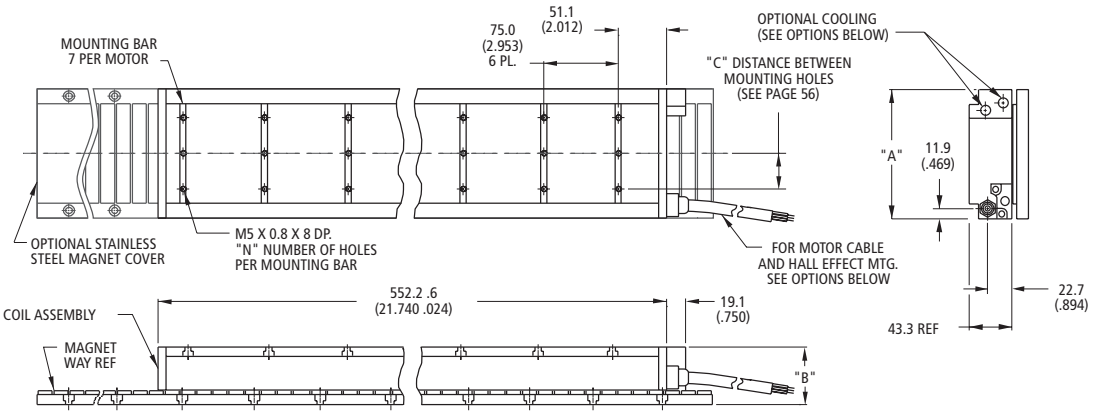
Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

33 Series Ironcore - Water cooled

Rated Performance	Symbol	Units	IC33-100			IC33-150			IC33-200			IC33-250		
Peak force	Fp	N	3750			5625			7500			9375		
		lbf	843			1265			1686			2108		
Continuous force @ Tmax	Fc	N	3014			4464			5990			7216		
see note ①		lbf	677			1004			1347			1622		
Motor constant @ 25°C	Km	N/√W	76.5			96.9			114			124		
Max. Cont. power dissipation	Pc	W	2188			3000			3889			4773		
Electrical Specifications														
		Winding Code	**A1**	**A3**	**A5**	**A1**	**A3**	**A5**	**A1**	**A3**	**A5**	**A1**	**A3**	**A5**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	Vpeak/m/s L-L	249	82.9	144	373	124	215	497	166	287	596	199	344
@ 25°C±10%		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%	Kf	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
Mechanical Specifications														
Coil Assembly Mass ±15%	Mc	kg	18.9			27.3			35.7			44.1		
		lbs	41.7			60.2			78.7			97.2		
Magnetic Way Type			**MC100**			**MC150**			**MC200**			**MC250**		
Magnetic Way Mass ±15%	Mw	kg/m	12.7			20.7			26.8			33.2		
		lbs/in	0.71			1.16			1.50			1.86		
Figures of Merit & Additional Data														
Electrical time constant	Te	ms	9.1			9.6			9.9			10.2		
Max.Theoretical Acceleration	Amax	g's	20.2			21.0			21.4			21.7		
Magnetic attraction	Fa	kN	14.7			22.1			29.4			36.8		
		lbf	3305			4957			6609			8262		
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.048			0.035			0.027			0.022		
Max. Allowable Coil Temp.	Tmax	°C	130			130			130			130		

Notes:
① 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

Cooled IC33-xxx

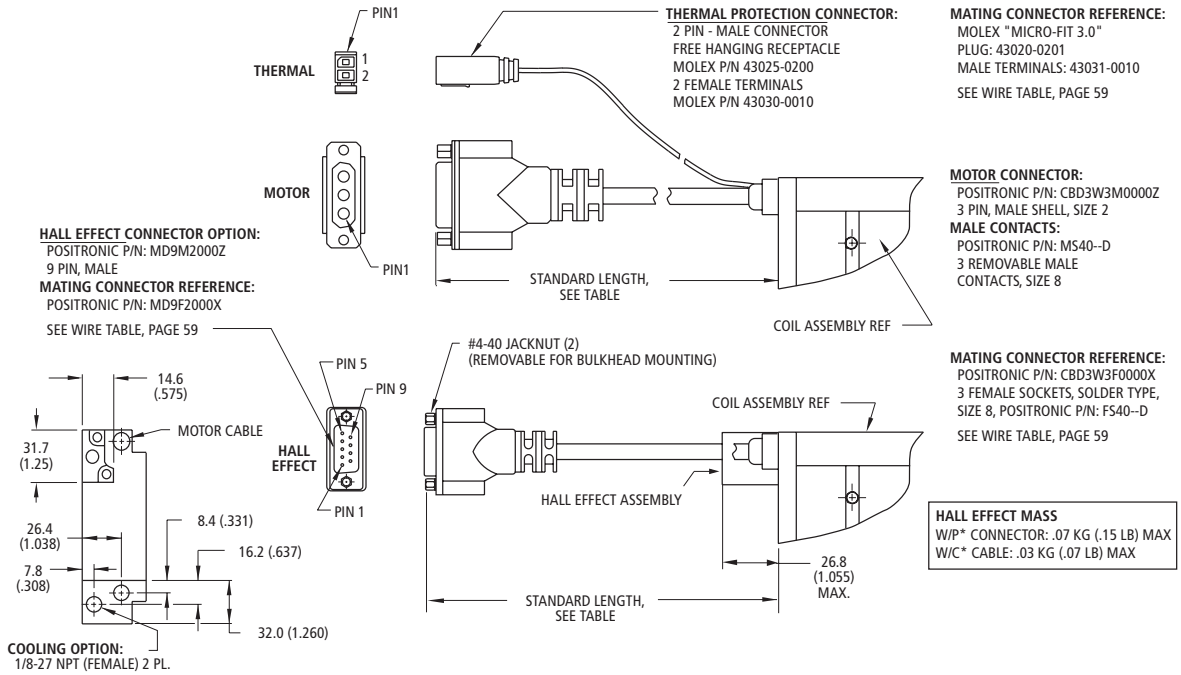


Resultant airgap = 0.9mm (.036) nominal (0.5mm (.020") minimum) when components are set up to dimension "B" in table below. (Please refer to installation manual for more detail)

Motor Coil Type	Coil Width "A"	Cooled	Dim "B" without cover	Dim "B" w/ Magnet cover	# Holes "N"
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 Effects Options



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

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)

44 Series Ironcore - Water cooled

Rated Performance	Symbol	Units	IC44-030			IC44-050			IC44-075			IC44-100		
Peak force	Fp	N	1500			2500			3750			5000		
		lbf	337			562			843			1124		
Continuous force @ Tmax	Fc	N	1201			1990			2980			4015		
see note ①		lbf	270			446			669			902		
Motor constant @ 25°C	Km	N/√W	39.9			56.8			74.0			88.3		
Max. Cont. power dissipation	Pc	W	1280			1721			2283			2917		
Electrical Specifications														
		Winding Code	**A1**	**A2**	**A3**	**A1**	**A2**	**A3**	**A1**	**A2**	**A3**	**A1**	**A2**	**A3**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	Vpeak/m/s L-L	99.4	49.7	24.8	166	82.9	41.4	249	124	62.2	331	166	82.9
@ 25°C±10%		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%	Kf	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
Mechanical Specifications														
Coil Assembly Mass ±15%	Mc	kg	9.6			13.9			19.2			25.0		
		lbs	21.2			30.6			42.3			55.1		
Magnetic Way Type			**MC030**			**MC050**			**MC075**			**MC100**		
Magnetic Way Mass ±15%	Mw	kg/m	5.4			7.5			10.1			12.7		
		lbs/in	0.30			0.42			0.56			0.71		
Figures of Merit & Additional Data														
Electrical time constant	Te	ms	6.7			7.8			8.6			9.1		
Max.Theoretical Acceleration	Amax	g's	15.9			18.3			19.9			20.4		
Magnetic attraction	Fa	kN	5.9			9.8			14.7			19.6		
		lbf	1322			2203			3305			4406		
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.082			0.061			0.046			0.036		
Max. Allowable Coil Temp.	Tmax	°C	130			130			130			130		

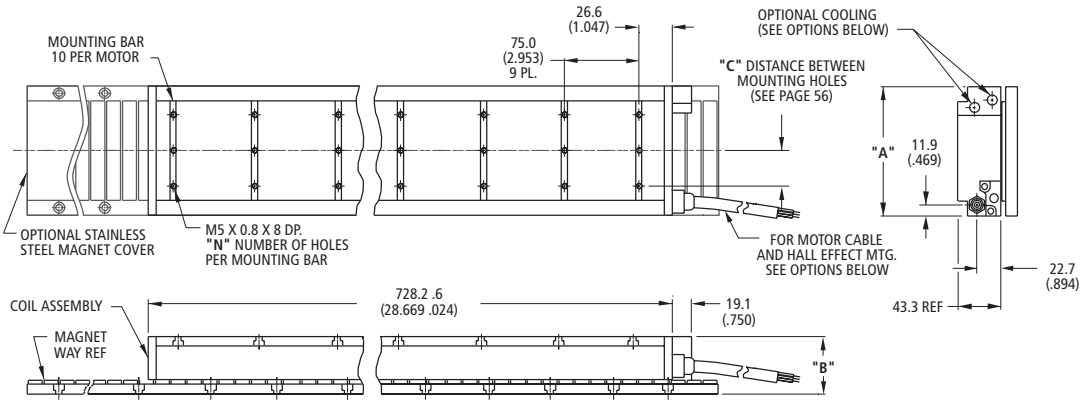
Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

44 Series Ironcore - Water cooled

Rated Performance	Symbol	Units	IC44-150			IC44-200			IC44-250	
Peak force	Fp	N	7500			10000			12500	
		lbf	1686			2248			2810	
Continuous force @ Tmax	Fc	N	5990			8035			9620	
see note ①		lbf	1343			1806			2165	
Motor constant @ 25°C	Km	N/√W	112			132			143	
Max. Cont. power dissipation	Pc	W	4038			5250			6364	
Electrical Specifications										
		Winding Code	**A1**	**A2**	**A3**	**A1**	**A2**	**A3**	**A2**	**A3**
Peak current	Ip	Arms	13.8	27.6	55.3	13.8	27.6	55.2	27.6	55.0
Continuous Current @ Tmax	Ic	Arms	9.8	19.6	39.2	9.9	19.8	39.6	19.8	39.5
Electrical resistance @ 25°C±10%	Rm	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	Ke	Vpeak/m/s L-L	497	249	124	663	332	166	397	199
@ 25°C±10%		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%	Kf	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
Mechanical Specifications										
Coil Assembly Mass ±15%	Mc	kg	36.2			47.4			58.5	
		lbs	79.8			104			129	
Magnetic Way Type			**MC150**			**MC200**			**MC250**	
Magnetic Way Mass ±15%	Mw	kg/m	20.7			26.8			33.2	
		lbs/in	1.16			1.50			1.86	
Figures of Merit & Additional Data										
Electrical time constant	Te	ms	9.6			9.9			10.2	
Max.Theoretical Acceleration	Amax	g's	21.1			21.5			21.8	
Magnetic attraction	Fa	kN	29.4			39.4			49.2	
		lbf	6609			8855			11061	
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.026			0.020			0.017	
Max. Allowable Coil Temp.	Tmax	°C	130			130			130	

Notes:
① 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

Cooled IC44-xxx

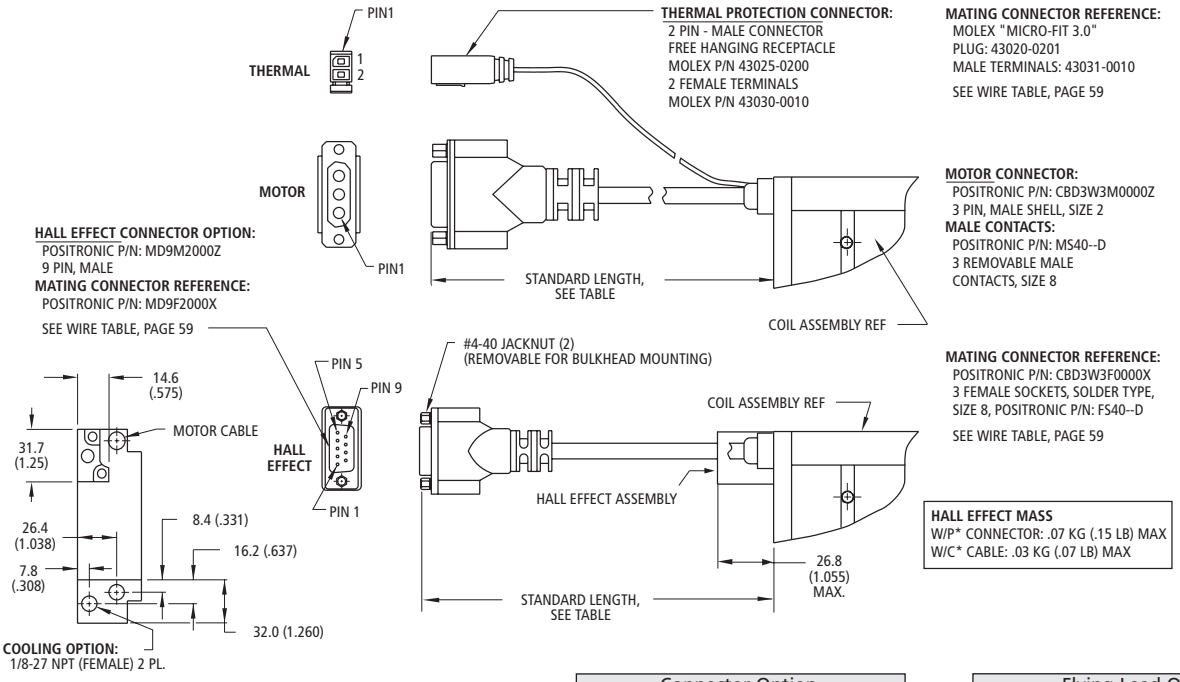


Resultant airgap = 0.9mm (.036) nominal (0.5mm (.020") minimum) when components are set up to dimension "B" in table below. (Please refer to installation manual for more detail)

Motor Coil Type	Coil Width "A"	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

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

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)

55 Series Ironcore - Water cooled

Rated Performance	Symbol	Units	IC55-030			IC55-050			IC55-075			IC55-100		
Peak force	Fp	N	1875			3125			4690			6250		
		lbf	422			703			1054			1405		
Continuous force @ Tmax	Fc	N	1497			2511			3773			5001		
see note ①		lbf	336			564			848			1124		
Motor constant @ 25°C	Km	N/ √W	44.6			63.8			83.1			98.8		
Max. Cont. power dissipation	Pc	W	1591			2188			2917			3621		
Electrical Specifications														
		Winding Code	**A1**	**A3**	**A5**	**A1**	**A3**	**A5**	**A1**	**A3**	**A5**	**A1**	**A3**	**A5**
Peak current	Ip	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	Ic	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%	Rm	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	Ke	Vpeak/m/s L-L	124	24.8	71.7	207	41.4	120	311	62.2	180	414	82.9	239
@ 25°C±10%		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%	Kf	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
Mechanical Specifications														
Coil Assembly Mass ±15%	Mc	kg	12.0			17.3			23.9			31.2		
		lbs	26.5			38.1			52.7			68.8		
Magnetic Way Type			**MC030**			**MC050**			**MC075**			**MC100**		
Magnetic Way Mass ±15%	Mw	kg/m	5.4			7.5			10.1			12.7		
		lbs/in	0.30			0.42			0.56			0.71		
Figures of Merit & Additional Data														
Electrical time constant	Te	ms	6.6			7.8			8.6			9.1		
Max.Theoretical Acceleration	Amax	g's	15.9			18.4			20.0			20.4		
Magnetic attraction	Fa	kN	7.4			12.3			18.4			24.5		
		lbf	1652			2754			4132			5508		
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.066			0.048			0.036			0.029		
Max. Allowable Coil Temp.	Tmax	°C	130			130			130			130		

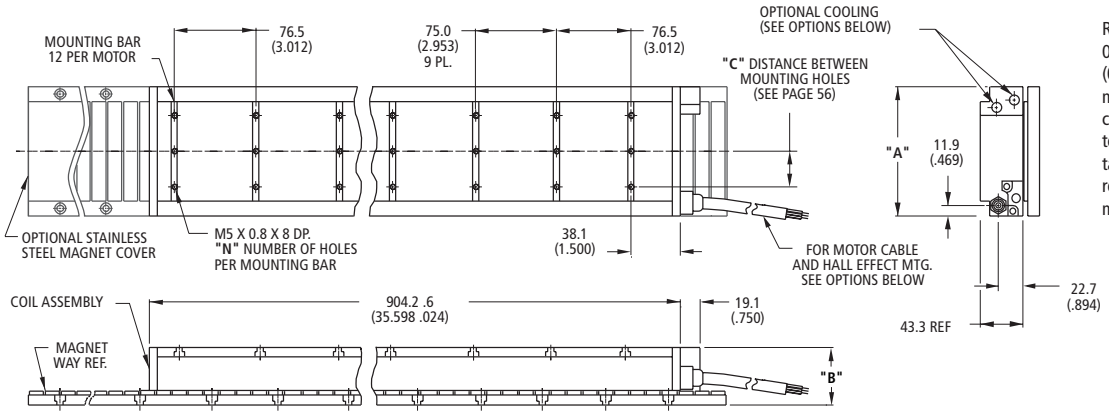
Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation Pc. The heat load can be limited to 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

55 Series Ironcore - Water cooled

Rated Performance	Symbol	Units	IC55-150		IC55-200		IC55-250	
Peak force	Fp	N	9375		12500		15625	
		lbf	2108		2810		3513	
Continuous force @ Tmax	Fc	N	7446		10033		12023	
see note ①		lbf	1674		2256		2703	
Motor constant @ 25°C	Km	$N/\sqrt{W}$	125		147		160	
Max. Cont. power dissipation	Pc	W	5000		6563		7955	
Electrical Specifications								
		Winding Code	**A3**	**A5**	**A3**	**A5**	**A3**	**A5**
Peak current	Ip	Arms	68.7	23.8	69.4	24.0	69.4	24.0
Continuous Current @ Tmax	Ic	Arms	48.9	16.9	49.4	17.1	49.4	17.1
Electrical resistance @ 25°C±10%	Rm	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	Ke	Vpeak/m/s L-L	124	359	166	479	199	574
@ 25°C±10%		Vpeak/in/sec L-L	3.16	9.11	4.21	12.2	5.05	14.6
Force constant @ 25°C±10%	Kf	N/Arms	152	439	203	586	243	703
		lbf / Arms	34.2	98.8	45.7	132	54.7	158
Mechanical Specifications								
Coil Assembly Mass ±15%	Mc	kg	45.1		59		73	
		lbs	99.4		130		161	
Magnetic Way Type			**MC150**		**MC200**		**MC250**	
Magnetic Way Mass ±15%	Mw	kg/m	20.7		26.8		33.2	
		lbs/in	1.16		1.50		1.86	
Figures of Merit & Additional Data								
Electrical time constant	Te	ms	9.6		9.9		10.2	
Max.Theoretical Acceleration	Amax	g's	21.2		21.6		21.8	
Magnetic attraction	Fa	kN	36.8		49.3		61.5	
		lbf	8262		11072		13826	
Thermal Resistance - coils to external structure	Rth	°C/Watt	0.021		0.016		0.013	
Max. Allowable Coil Temp.	Tmax	°C	130		130		130	

Notes:
① 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.
② Alternate windings can be made available. Please consult the Danaher Motion Customer Assistance Center for design options.
③ 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.
④ Please see our Application Sizing pages in the back of this publication for more details on sizing and thermal considerations.

Cooled
IC55-xxx

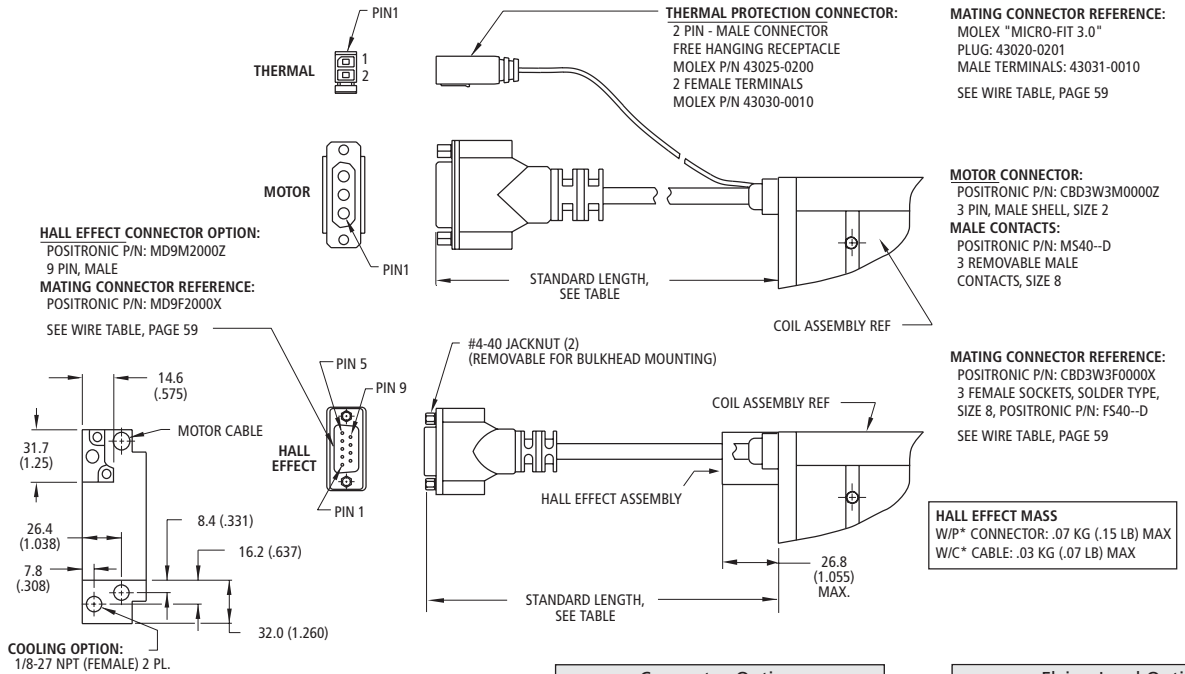


Resultant airgap = 0.9mm (.036) nominal (0.5mm (.020") minimum) when components are set up to dimension "B" in table below. (Please refer to installation manual for more detail)

Motor Coil Type	Coil Width "A"	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

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



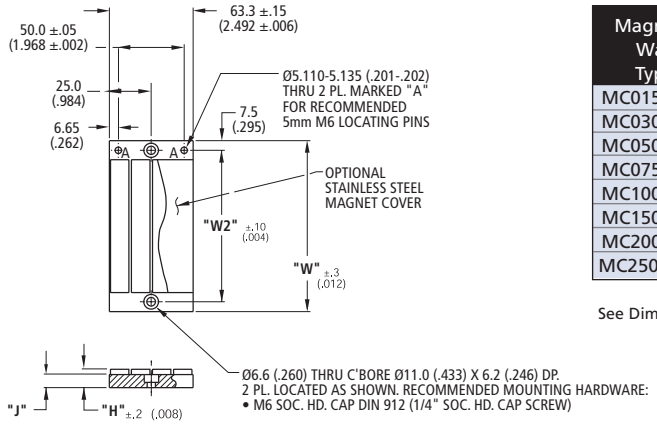
Note:
Cables exiting motor and hall effects are not dynamic flex cables. For high life flex extension cables, see page 57

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)

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

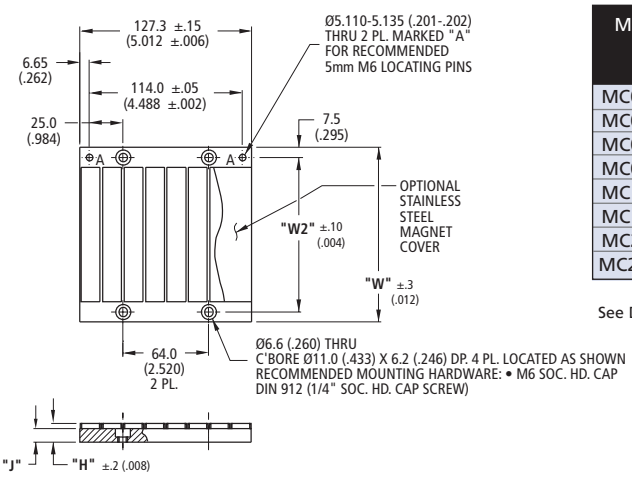
MCxxx-0064



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.

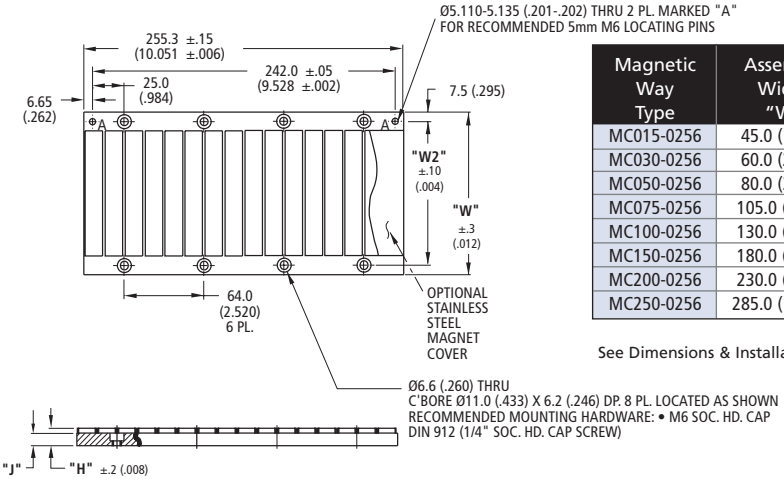
MCxxx-0128



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

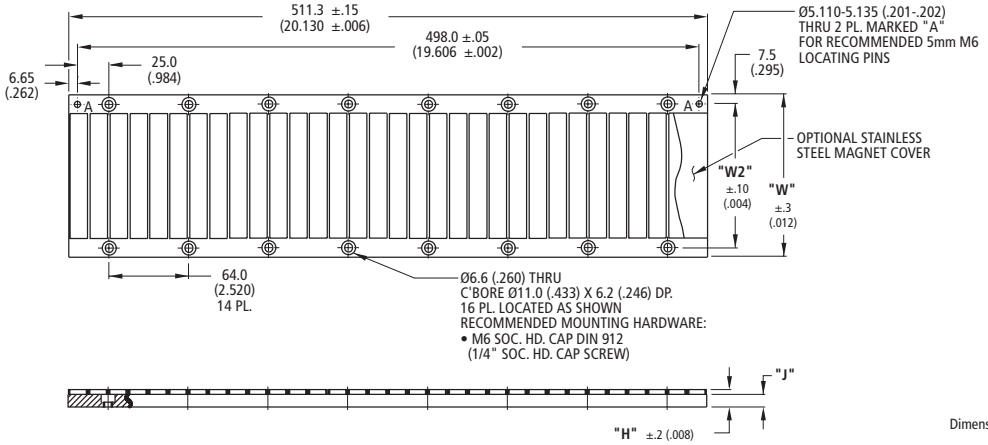


Magnetic Way Type	Assembly Width "W"	Mounting Hole Width "W2"	"J"	"H" With Cover	"H" Without Cover
MC015-0256	45.0 (1.772)	30.0 (1.181)	6.0 (.236)	10.4 (.409)	10.1 (.397)
MC030-0256	60.0 (2.362)	45.0 (1.772)	10.0 (.394)	14.4 (.566)	14.1 (.555)
MC050-0256	80.0 (3.150)	65.0 (2.560)	10.0 (.394)	14.4 (.566)	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)

MCxxx-0512

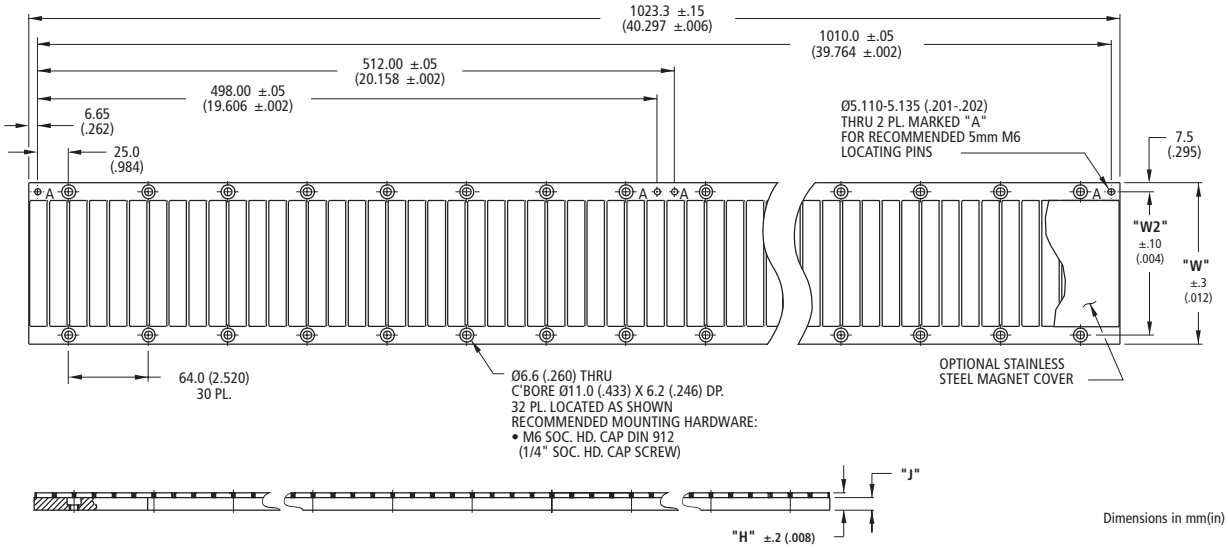


Dimensions in mm(in)

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



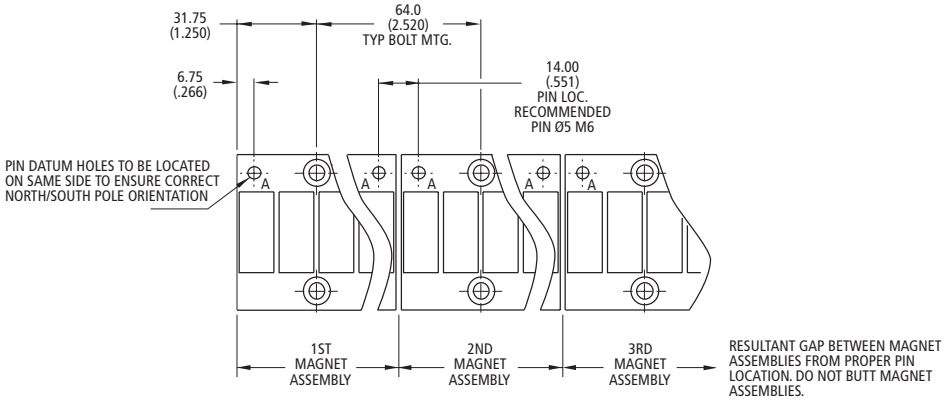
Dimensions in mm(in)

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)

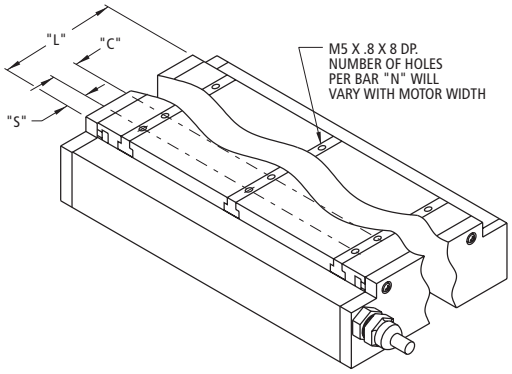
See Dimensions & Installation page for MC250-xx mounting hole details.

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.



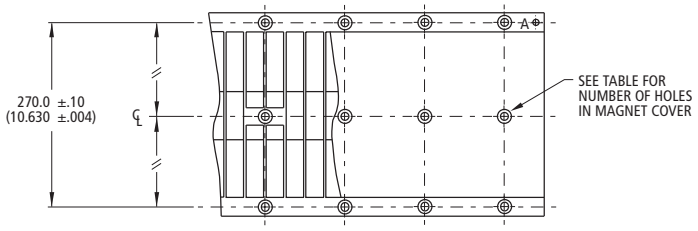
Typical Mounting Bar Lengths & Mounting Holes Tabulation



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)

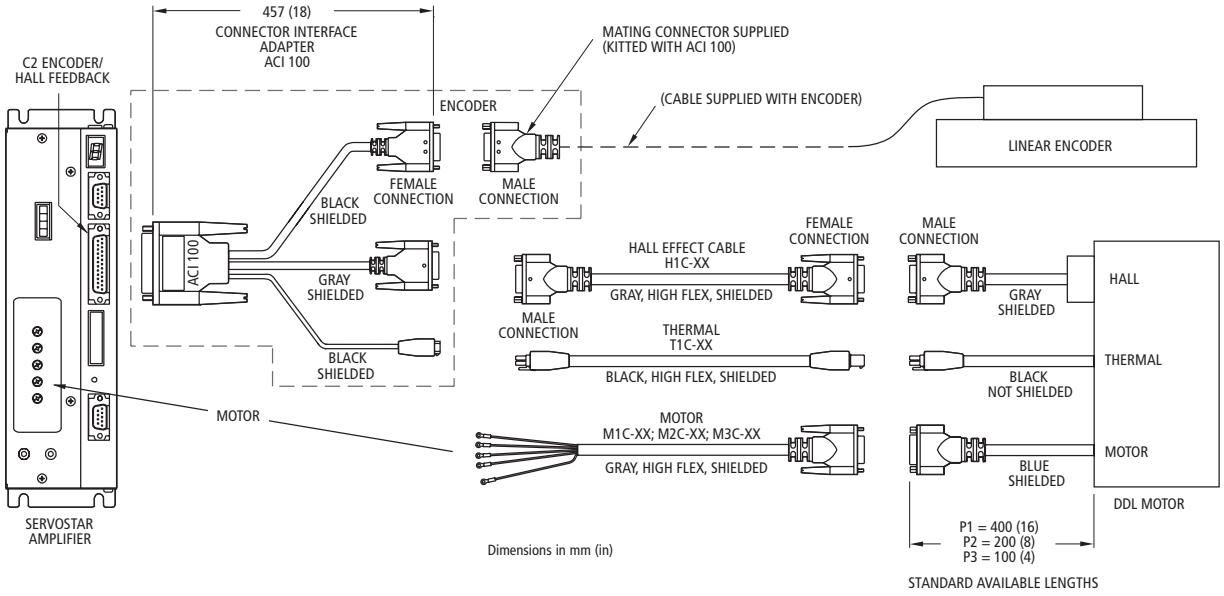
Dimensions in mm(in)

250 Width Magnet Ways with 3 rows of Mounting Holes

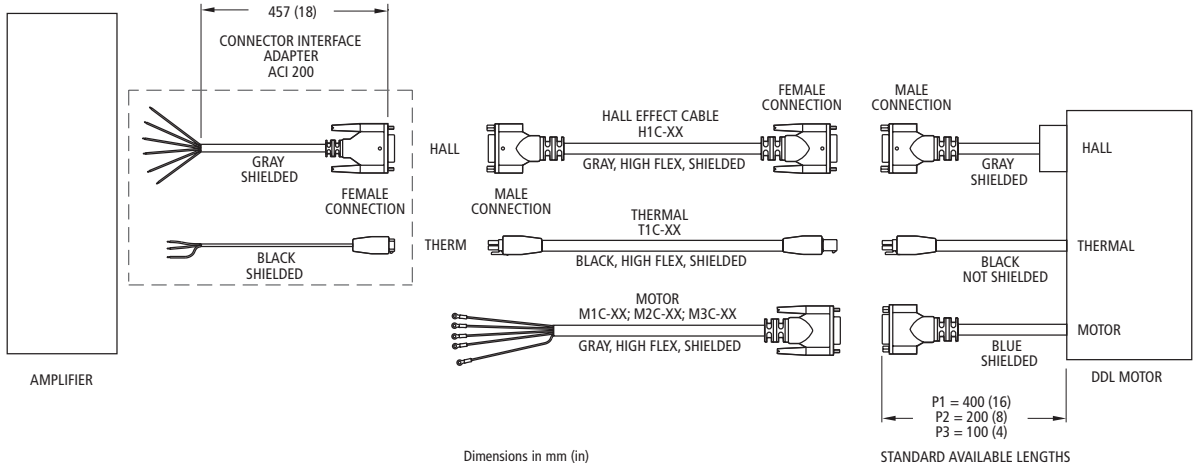


Magnet Way	Number of Holes
MC250-0064	3
MC250-0128	6
MC250-0256	12
MC250-0512	24
MC250-1024	48

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)

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

M1C - 01

High Flex Motor Cable
M - Motor

Length in meters
01 - 1 meter
03 - 3 meters
06 - 6 meters
09 - 9 meters
12 - 12 meters
15 - 15 meters

Wire Size
1C - 18 AWG for SE03, SE06 amplifiers
2C - 14 AWG for SE10, SE20 amplifiers *
3C - 12 AWG for SE10, SE20 amplifiers *

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

H1C - 01

High Flex Hall Effect Cable
H1C - Hall Effect

Length in meters
01 - 1 meter
03 - 3 meters
06 - 6 meters
09 - 9 meters
12 - 12 meters
15 - 15 meters

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

T1C - 01

High Flex Thermal Cable
T1C - Thermal
T2C - Thermal (S300, S600)

Length in meters
01 - 1 meter
03 - 3 meters
06 - 6 meters
09 - 9 meters
12 - 12 meters
15 - 15 meters

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

ACI - 100

ACI
Connector interface and adapter

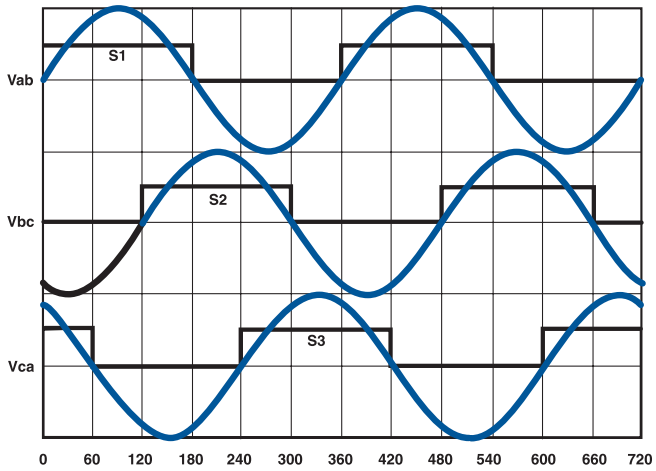
Type
100 - SERVOSTAR
200 - Non-SERVOSTAR

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

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) 90°C (IL)
2	White	ØB	2	Green	S1			
3	Black	ØC	3	Yellow	S2	2	Black / White	120°C (IC/ICD) 90°C (IL)
Connector Shell	Grn/Yel	GND	4	Brown	S3			
Connector Shell	Violet	Shield	5	White	Return		see note 2	
			Shell	Shield	Shield			

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

note
②TIC-X extender cable is shielded



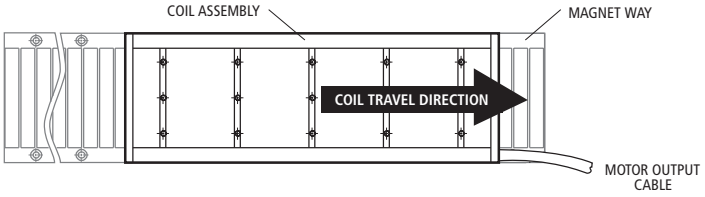
• Motor BEMF phases A,B,C relative to Hall effect devices S1,S2,S3 with coil travel direction towards the motor output cable assembly exit as shown below.

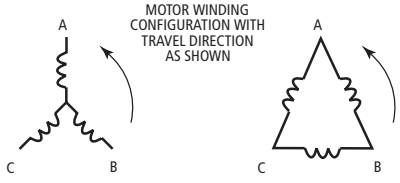
IL WIRE TABLE		
WINDING CODE	AWG	APPROX. CBL. DIA.
ALL (A1,A2,A3,A4)	18	5.6mm (.22 IN)

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

WINDING CODE	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)





Magnet pole pitch:

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

note
① The diagrams above refer to both Ironless and Ironcore motors

To size a Linear Motor, you will need to:

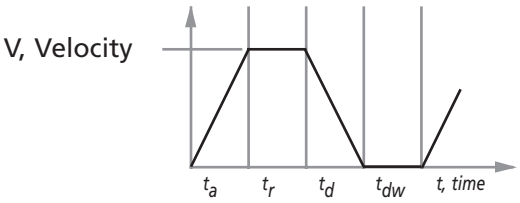
1. Define a Move Profile
2. Define the Load
3. Size the Motor and the Amplifier

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



	Units SI	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^2	inches/sec^2
D_m - Deceleration	meter/sec^2	inches/sec^2

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

Max Speed: $V_m = 2 \bullet S_m / (t_a + t_d + 2 \bullet t_r)$

$V_m = 2 \bullet 0.1 / (100E\text{-}3)$

$= 2$ meter/sec

Max Acceleration/Deceleration

Acceleration

$A_m = Vm / ta$

$A_m = 2 / 50E\text{-}3$

$= 40$ meter/sec^2

A_m "g" $= A_m/9.81$

a (g) $= 40 / 9.81$

$= 4.08$ g

Deceleration

$D_m = V_m/t_d$

$D_m = 2/50E\text{-}3$

$= 40$ meter/sec^2

D_m "g" $= D_m/9.81$

d(g) $= 40/9.81$

$= 4.08$ g

2. Load

	Units SI	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
μ - 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 %	–	–
θ - Angle of Linear Displacement with horizontal (0°= horizontal, 90° vertical)	degrees	degrees
g - Gravity coefficient	9.81 m/s^2	386 in/s^2
n - Number of motors in parallel	–	–

BASIC FORMULAS*:

We assume a general case where we have n motors solidly coupled pushing the load and a possible counterbalance weight Mcb (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:
$M_{cb} = Ml \bullet CB/100$

Acceleration Force only:
$Facc = [(M_l /n) \bullet (1 + CB/100) + M_c] \bullet Am$

Run Force at constant speed:
$F_r = (M_l /n + M_c) \bullet g \bullet SIN(q) + m \bullet COS(q) - (Mcb/n) \bullet g + F_a \bullet \mu + F_{ext}/n$

Deceleration Force only:
$F_{dec} = [(M_l /n) \bullet (1 + CB/100) + M_c] \bullet D_m$

Maximum Acceleration Force:
$F_{am} = F_{acc} + F_r$

Maximum Deceleration Force:
$F_{dm} = F_{dec} - F_r$

Dwell Force:
$F_{dw} = (M_l /n+M_c) \bullet g \bullet [SIN(\theta)] - (M_{cb}/n) \bullet g$

RMS Force:

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

* 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:	Ml = 0.5kg
Number of Motors:	n = 1
Horizontal Move:	θ = 0
Counterbalance Force:	$M_{cb} = 0$
External Force:	$F_{ext} = 0$
Friction Coefficient:	μ = 0.01

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

Run Force at Constant Speed:	$F_r = 0.5 \bullet 9.81 \bullet 0.01 = 0$	.05 N
Acceleration Force only:	$F_a = 0.5 \bullet 40$	= 20 N
Deceleration Force only:	$F_d = 0.5 \bullet 40$	= 20 N
Maximum Accel Force:	$F_{am} = 20 + 0.05$	= 20.05 N
Maximum Decel Force:	$F_{dm} = 20 - 0.05$	= 19.95 N

Rms Force:

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

$F_{rms} = 16.3$ 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_a - Max. Acceleration Current	A	A
I_r - Run Current	A	A
I_d - Max Deceleration Current	A	A
I_{dw} - Dwell Current	A	A
I_{rms} - RMS Current	A	A
K_f - Force Constant	N/A	lbf/A
R_m - Motor Electrical Resistance	Ohms L-L	Ohms L-L
K_e - Back EMF Constant	Vpeak/m/s	Vpeak/in/s
V_{bus} - Bus Voltage	VDC	VDC
L - Electrical Inductance	H L-L	H L-L

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 φ (degrees) and full conduction, the minimum bus voltage (see Fig. 1) is:

$V_{b1} = 2.4$ (Volts)

$V_{b2} = K_e \bullet V_m$

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

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

$\alpha v = ARCTANGENT\ (V_{b4}/V_{b3})$

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

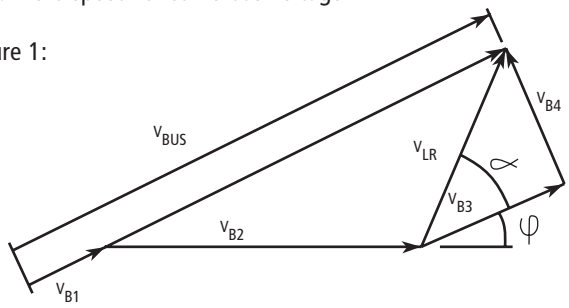
$V_{bre} = V_{b2} + Vlr \bullet COS(\alpha v + \varphi)$

$V_{bim} = V_{lr} \bullet SIN(\alpha v + \varphi)$

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

Note: If there is no Phase advance take φ=0°. Using an amplifier with Phase advance such as Kollmorgen SERVO**STAR**® gives you up to 30% more speed for same bus voltage.

Figure 1:



THERMAL CONSIDERATIONS:

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

Coil Temperature rise

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

Resistance of Coil hot (copper)

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

Power Losses

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

Output Power

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

Example: In above example with:

$R_{th} = 1.61$ °C/W

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

Coil Temperature rise: $\Delta\theta = 1.61 \bullet (23.19/4.7)^2 = 39.2$ °C

Power Losses Pl = 39.2/1.61 = 24.34 Watts

Max output Power $P_{out}(max) = 57$ 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:

$$K_m = \frac{F}{\sqrt{P_c}}$$

where the RMS force F is in Newtons, the RMS heat load Pc is in watts and Km is in units of N/$\sqrt{W}$

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 motorís 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 N/ $\sqrt{W}$. Therefore, since resistance rises 1.405 times at 130°C from the ambient value at 25°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 N/ $\sqrt{W}$, 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 Fc as a Function of Ambient Temperature

In our data sheets the continuous rated force Fc 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 Fc of the motor must be adjusted by a factor that is determined by the following equation:

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

where θ_{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

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^2	☐ inches/sec^2	☐ 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

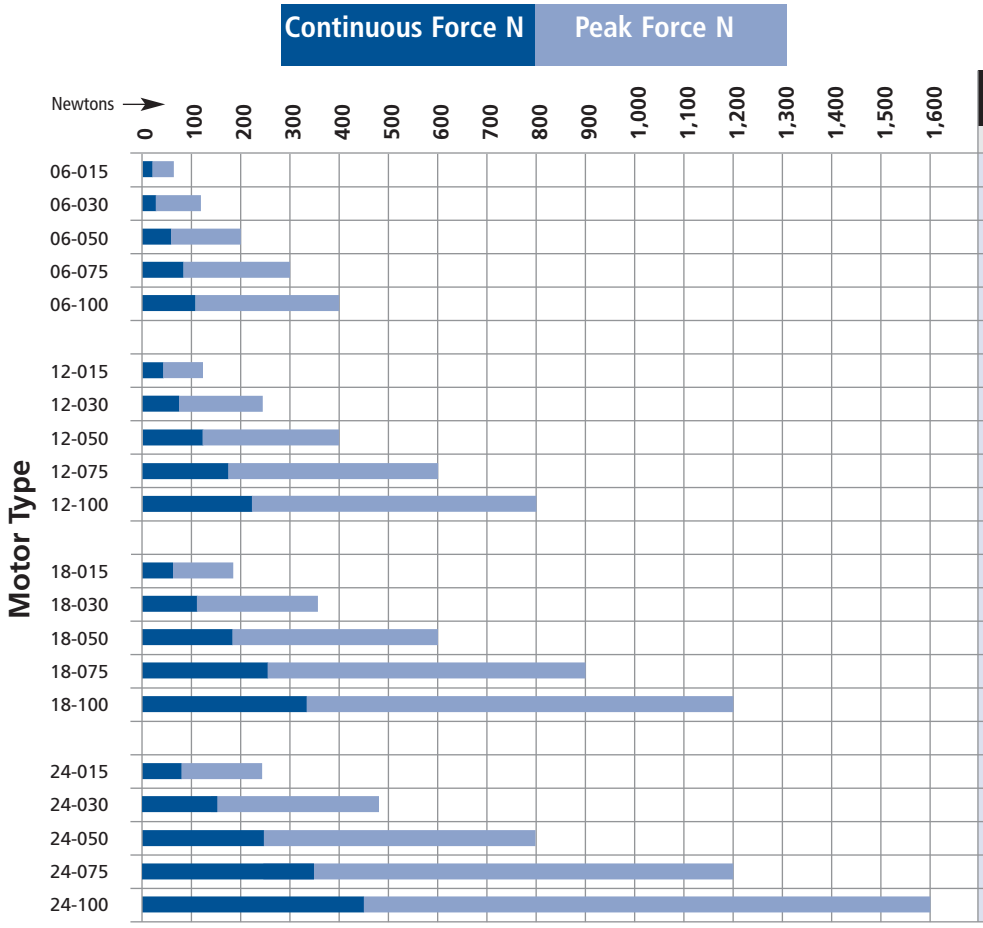
Ambient Temperature _____	☐ °C	☐ ° F	
Max Permissible Temperature Rise _____	☐ °C	☐ ° F	
Clean Room Environment	☐ Yes	☐ No	If yes Class: _____
Is Water or Air cooling permissible?	☐ Yes	☐ No	
Vacuum?	☐ Yes	☐ No	Pressure: _____

Amplifier & Power Supply

Max Voltage _____	VDC	
Max Current _____	Amps	
Power Supply _____	☐ Single Phase	☐ Three phase
Voltage _____ V	☐ 50 Hz	☐ 60 Hz

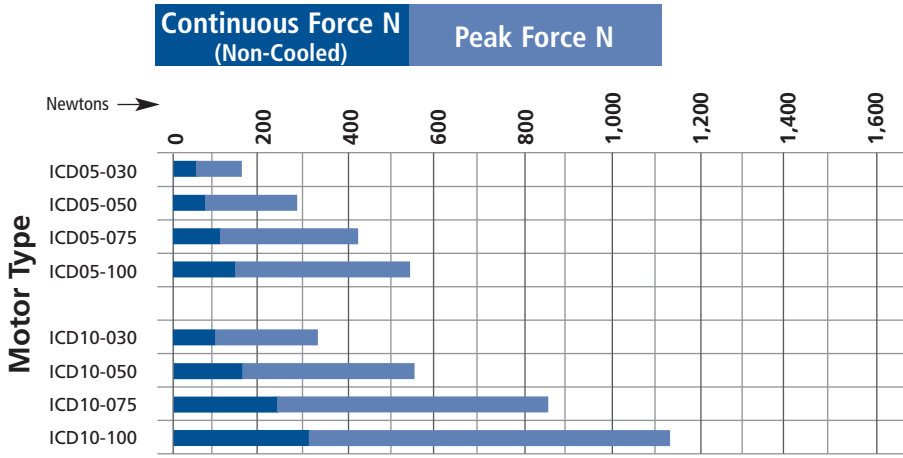
Also see MOTIONEERING®, Danaher Motion's Application Sizing Program.

Ironless Linear Motors



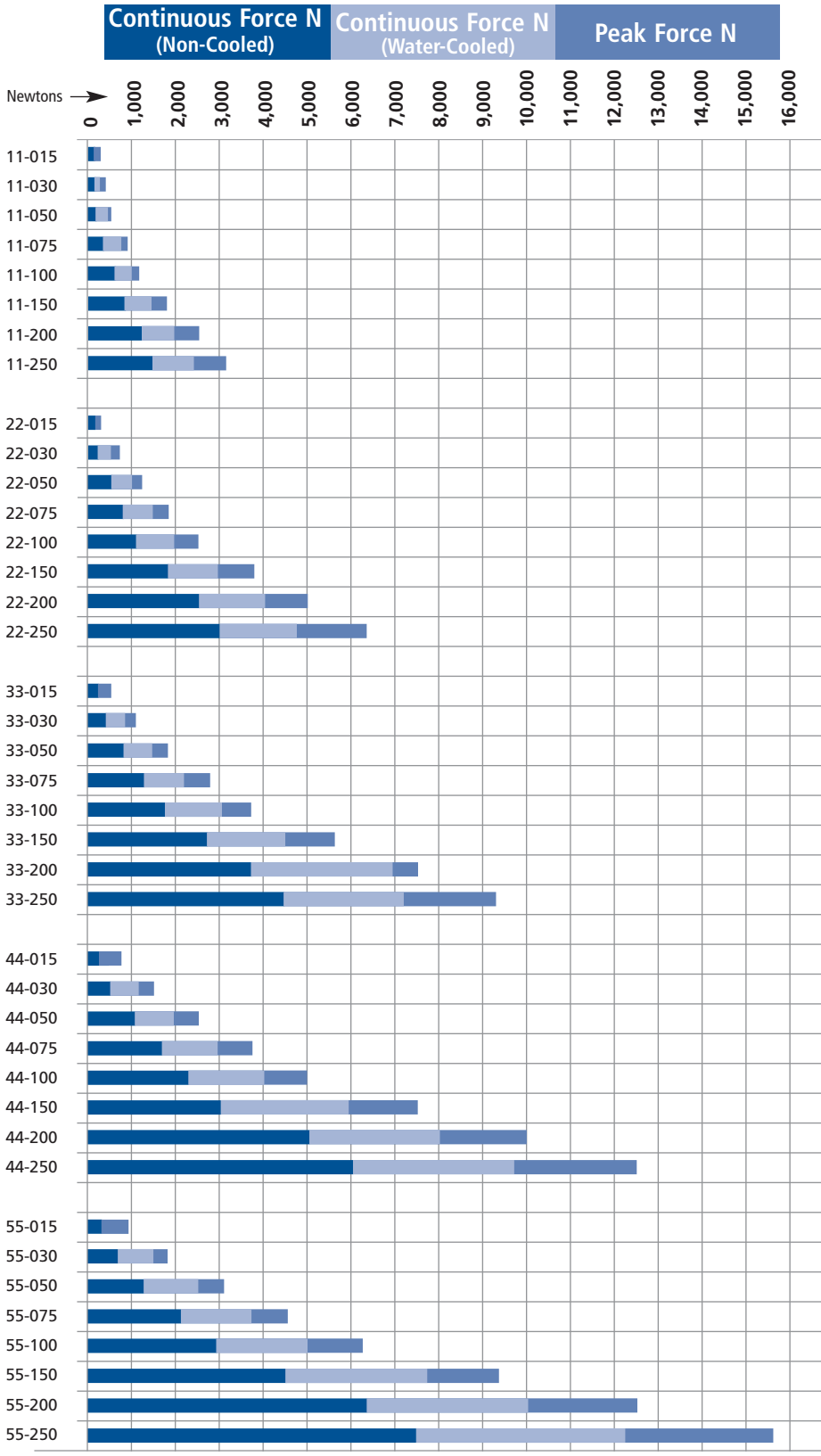
Motor Type	Continuous Force N	Continuous Force (lbf)	Peak Force N	Peak Force (lbf)	See Page No.
06-015	21	5	60	13	6
06-030	38	9	120	27	6
06-050	61	14	200	45	6
06-075	87	20	300	67	6
06-100	113	25	400	90	6
12-015	41	9	120	27	8
12-030	76	17	240	54	8
12-050	122	27	400	90	8
12-075	174	39	600	135	8
12-100	226	51	800	180	8
18-015	62	14	180	40	10
18-030	114	26	360	81	10
18-050	184	41	600	135	10
18-075	260	58	900	202	11
18-100	338	76	1200	270	11
24-015	83	19	240	54	13
24-030	152	34	480	108	13
24-050	245	55	800	180	13
24-075	348	78	1200	270	13
24-100	450	101	1600	360	13

ICD Linear Motors



Motor Type	Max. Continuous Force N	Max. Continuous Force (lbf)	Peak Force N	Peak Force (lbf)	See Page No.
ICD05-030	57	13	170	28	18
ICD05-050	87	20	280	63	18
ICD05-075	125	28	425	96	18
ICD05-100	157	35	550	124	18
ICD10-030	104	23	340	76	20
ICD10-050	171	38	560	126	20
ICD10-075	246	55	850	191	20
ICD10-100	315	71	1130	254	20

Ironcore Linear Motors



Motor Type	Max. Continuous Force N	Max. Continuous Force (lbf)	Peak Force N	Peak Force (lbf)	See Page No.
11-015	73	16	190	43	25
11-030	296	66	375	84	25/40
11-050	502	113	625	141	25/40
11-075	754	169	940	211	25/40
11-100	1006	226	1250	281	25/40
11-150	1490	335	1875	422	25/40
11-200	1991	448	2500	562	25/40
11-250	2410	542	3125	703	25/40
22-015	143	32	375	84	27
22-030	603	136	750	169	27/42
22-050	1005	226	1250	281	27/42
22-075	1493	336	1875	422	27/42
22-100	1995	448	2500	562	28/42
22-150	2996	674	3750	843	28/43
22-200	4023	904	5000	1124	28/43
22-250	4806	1080	6250	1405	28/43
33-015	216	49	565	127	30
33-030	896	202	1125	253	30/45
33-050	1492	335	1875	422	30/45
33-075	2240	504	2815	633	30/45
33-100	3014	677	3750	843	31/46
33-150	4464	1004	5625	1265	31/46
33-200	5990	1347	7500	1686	31/46
33-250	7216	1622	9375	2108	31/46
44-015	286	64	750	169	33
44-030	1201	270	1500	337	33/48
44-050	1990	446	2500	562	33/48
44-075	2980	669	3750	843	33/48
44-100	4015	902	5000	1124	34/48
44-150	5990	1343	7500	1686	34/49
44-200	8035	1806	10000	2248	34/49
44-250	9620	2165	12500	2810	34/49
55-015	359	81	940	211	36
55-030	1497	336	1875	422	36/51
55-050	2511	564	3125	703	36/51
55-075	3773	848	4690	1054	37/51
55-100	5001	1124	6250	1405	37/51
55-150	7446	1674	9375	2108	37/52
55-200	10033	2256	12500	2810	38/52
55-250	12023	2703	15625	3513	38/52

Coil Model Number Description

Options

IL 06 - 030 A1 AC TR xx

Coil Type
IL - Ironless
ICD - Low Profile Ironcore
IC - Ironcore

Coil Series
06 - 06 Series Ironless
12 - 12 Series Ironless
18 - 18 Series Ironless
24 - 24 Series Ironless
05 - 05 Series ICD
10 - 10 Series ICD
11 - 11 Series Ironcore
22 - 22 Series Ironcore
33 - 33 Series Ironcore
44 - 44 Series Ironcore
55 - 55 Series Ironcore

Magnetic Way Width (mm)
015 - 15mm (IL & IC only)
030 - 30mm
050 - 50mm
075 - 75mm
100 - 100mm
150 - 150mm (IC only)
200 - 200mm (IC only)
250 - 250mm (IC only)

Winding Code
A1 "Y" Windings
A2
A3
A4
see performance specifications
A5 "△" Windings
A6
A7
A8

Cooling Option (IC Only)
AC - Integral Cooling
If No Cooling, leave blank

Thermal Protection Option
TS - Thermostat (IC only)
TR - Thermistor
If No Thermal Protection, leave blank.

Termination Option Px or Cx
Px - Cable with Connector:
Configuration (P1) includes 400 mm (16") shielded cable with connector.
P1 - 400 mm (16")
P2 - 200 mm (8")
P3 - 100 mm (4")
Cx - Motor cable and thermal cable with flying leads:
C1 - 400 mm (16")
C2 - 200 mm (8")
C3 - 100 mm (4")

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

HDIL-100 xx

Hall Effect
HDIL - Digital for Ironless (Microswitch SS461A)
HDIC - Digital for Ironcore (Microswitch SS461A)

Winding Code
100 (A1, A2, A3, A4)
200 (A5, A6, A7, A8)

Termination Option
Px - Cable with Connector:
Configuration (P1) includes 400 mm (16") shielded cable with connector.
(lengths as above)
Cx - flying leads (lengths as above)

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

Magnetic Way Model Number Description

MW 030 L - 0128 - 001

Magnet Way Type
MW - Ironless
MCD - ICD
MC - Ironcore

Magnet Way Width (mm)
015 - 15mm (IL & IC only)
030 - 30mm
050 - 50mm
075 - 75mm
100 - 100mm
150 - 150mm (IC only)
200 - 200mm (IC only)
250 - 250mm (IC only)

T - Thin
(15 mm Ironless only)
L - Low Profile
(30 & 50 mm Ironless only)
For standard Assemblies or Ironcore, leave blank.

Magnet Assembly Way Length (mm)
0064 - 64mm
0128 - 128mm
0256 - 256mm
0512 - 512mm
1024 - 1024mm (IL & IC only)

Magnet Way Cover (Ironcore only)
(Leave blank for Ironless or no cover)

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

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