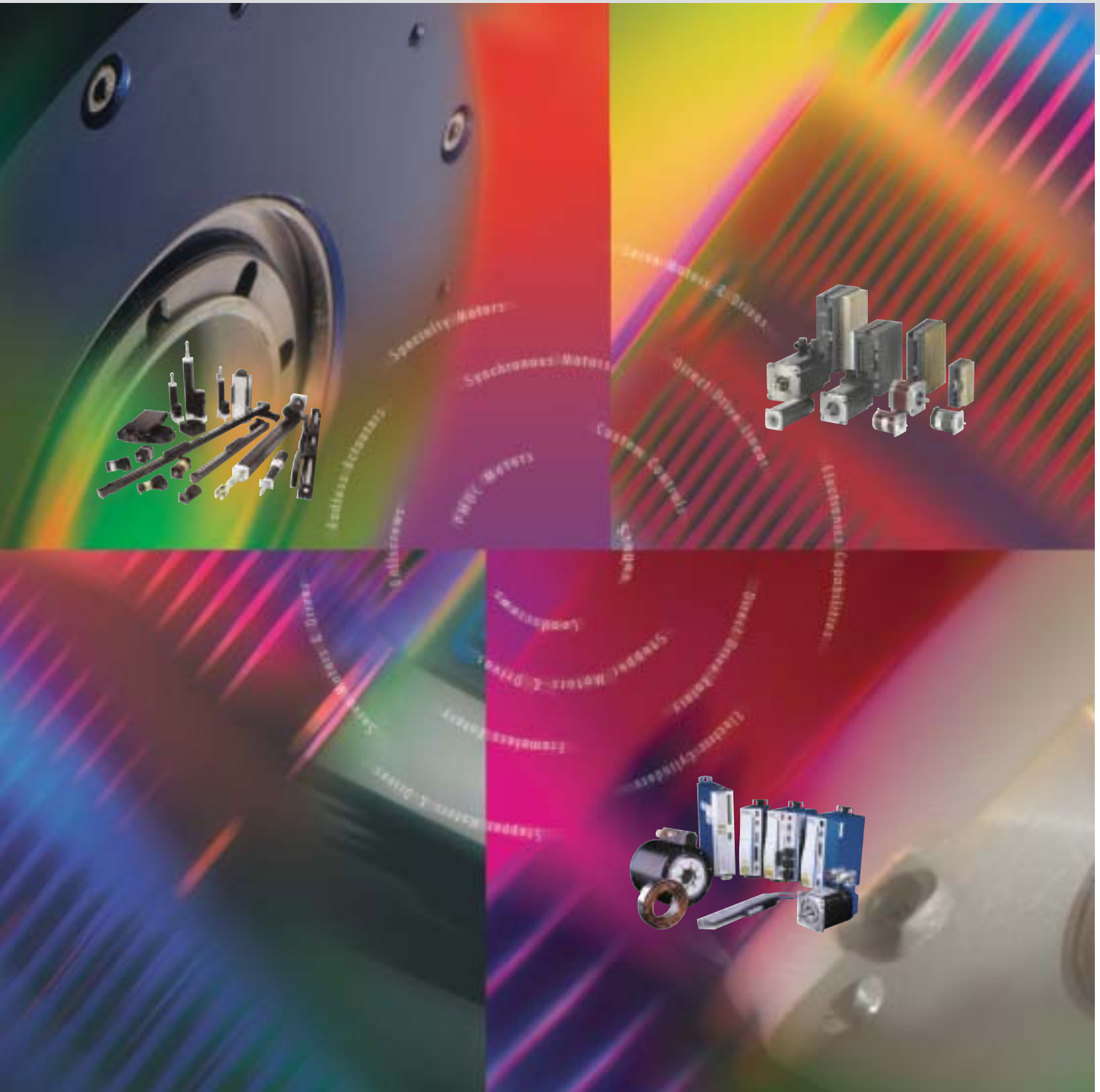


Servo & Stepper System Selection Guide



www.DanaherMotion.com

Danaher*Motion*

KOLLMORGEN

PACIFIC
SCIENTIFIC



Portescap



DANAHER MOTION SOLUTIONS

Choices. Choices. Choices.

In today's manufacturing climate, finding the right motion control equipment and then putting it together to create a smoothly functioning system can be more than a little daunting. First, there's an overload of product information to wade through. Different design components for seemingly similar applications. Which motors, drives and configurations are right for your specific needs? Then, how do you select, assemble and efficiently operate components from vastly different (and competing) suppliers - quickly, accurately and cost effectively? Finally, once your system is up and running, who do you call for support? One number or a dozen? Can anyone provide adequate assistance for your entire system?

Fortunately, now there is an answer. Danaher Motion. We're a select combination of the world's top brands of motors, drives and related motion control products/solutions for the precision electronic motion control market. In short, we are the experts in motion control. Bringing you an unprecedented breadth of customization and significantly improved motion control to all your machines. For the first time you have a clear choice in selecting the ideal combination of motion control technologies.

Now you can be confident in selecting the right motion control components for your application needs. Danaher Motion will provide the expert help necessary in determining the ideal products for your application. Then we'll help you put it together. And we'll do it right. Once your machine is up and running, you can count on Danaher Motion to provide complete support. From now on, Danaher Motion will be the only motion control company you'll ever need to know.

This is by design.

Danaher Motion has strategically selected brands you've come to trust over the years - Kollmorgen, Pacific Scientific, IDC, Portescap and BS&A to bring the best in motion control product quality, delivery and performance to such diverse innovations as motors for the Segway™ Human Transporter (HT), the first ever self-contained mechanical heart, and a revolutionary maintenance-free treadmill.

Solutions by **DanaherMotion**

HELPING YOU SUCCEED... IN A WORLD OF MOTION

Danaher Motion has enhanced the efficiency of numerous industrial applications, including semiconductor wafer fabrication, high speed electronic assembly, form, fill & seal machinery, pick & place robots, photographic film coating, automation of DNA testing and cartesian robotics. Danaher's approach creates cost-effective solutions in an ever-expanding range of application requirements. All designed to provide you with complete system solutions.

We can also work closely with your engineers to help develop complete customized product solutions, specially designed to accommodate your individual needs. Our years of collective experience and extensive application knowledge enable us to provide you with superior motion control quality and performance.

Our greatest strength is our commitment to the Danaher Business System (DBS), which is comprised of a unique set of robust, repeatable processes that help us constantly improve the operational efficiency of our factories. Based upon the time-tested methods of Kaizen, the DBS is a team-based mindset that continuously and aggressively eliminates waste in every facet of our business operations. Furthermore, the DBS focuses the entire organization on breakthrough objectives that culminate in maintainable, results-oriented business processes which, in turn, create competitive advantage in quality, delivery and performance. In short, it's this leading edge business system innovation that defines our future. And yours.

So whether it's semi-conductor assembly, packaging, robotics or equipment for medical, automation, fitness or human transportation, Danaher Motion has the depth of products, breadth of system experience, and unsurpassed results-oriented operational efficiency to help you succeed in your area of endeavor. Smoothly. Profitably.

It's this basic core of expertise that allows us to provide you with unsurpassed product selection, service and ultimately, lower machine integration costs and increased productivity. So you can help your customers more effectively meet their needs. From initial selection to final execution, we'll help you succeed - with every move you make.

Danaher Motion. The Name Behind Motion





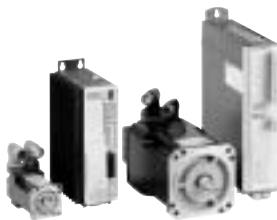
KOLLMORGEN

Kollmorgen has an extensive history in the design and development of high performance motion products for industrial, medical, aerospace and commercial applications. Our goal has always been to satisfy the needs of a diverse group of customers with a wide range of optimized solutions that include custom engineered and standard products.

Accordingly, today we have become a global supplier of the world's most comprehensive range of high precision electronic motion control products, including DDL (Direct Drive Linear) and DDR (Direct Drive Rotary.) And, with our custom solutions, we have become a major provider of high performance motion controls. Here are just a few of the industries we serve.



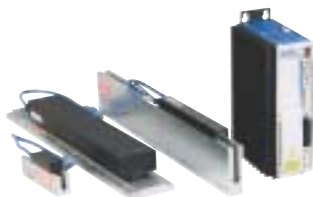
Semiconductor Market. Kollmorgen frameless direct drive motors can be incorporated directly into the design of machines such as wafer fabricating machinery and high speed electronic assembly. This can reduce the number of parts while providing absolute maximum performance. Efficiently. Precisely.



Textile Market. Servo technology applied to tufting machines improves system throughput and efficiency. For one machine - or an entire factory.

Injection Molding. Our high power servo drives and motors greatly reduce power consumption while providing a greater level of accuracy.

Elevator Systems. We've developed direct drive technology designed to significantly reduce the complexity of elevator mechanical systems. While reducing the required space by up to 40%, and improving electrical efficiency and overall safety of the operation.



As a direct result of Kollmorgen's expertise and experience in motion control, we offer customized servo drives and motors with high performance technology, increased efficiency, greater accuracy and improved profitability. It's just another example of the great depth of products available with Danaher Motion Control.





Our expertise in high performance servo and stepper technologies has bridged an important gap from traditional, mechanical technologies to more efficient, higher throughput and better controlled electronic technologies. In fact, we have designed and manufactured thousands of custom motion control systems which have significantly reduced the complexity and assembly time of operations in a wide variety of markets, including:

INDUSTRIAL APPLICATIONS

Packaging Market. Our expertise in stepper technology, as represented by the N & P Series motors, has increased the efficiency and performance of a variety of packaging applications.

Electronic Assembly. Our PMA servo motors and PC800 drives provide high accuracy, high performance and cost effectiveness for a wide range of pick & place machines.

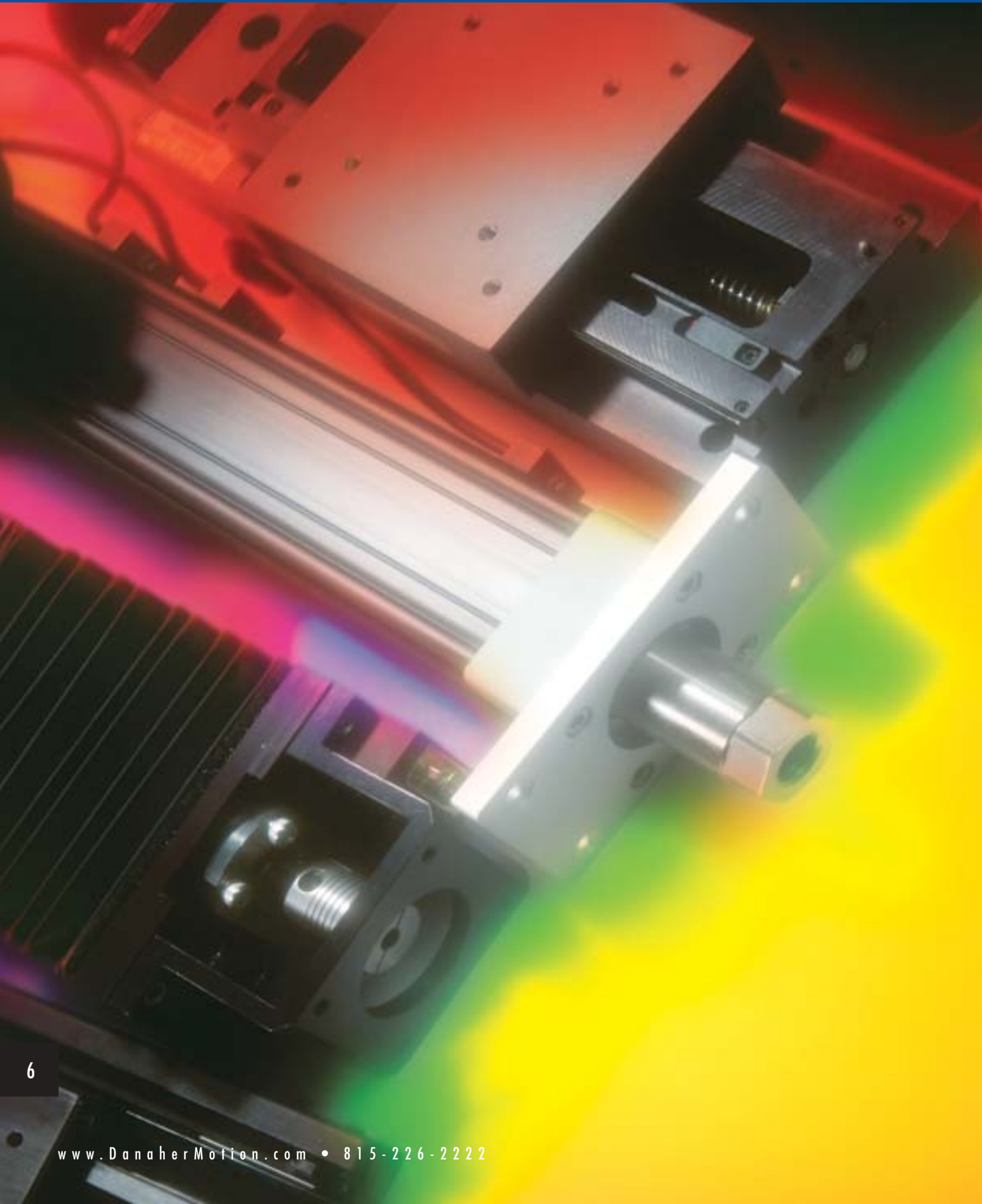
NON-INDUSTRIAL APPLICATIONS

Personal Transportation. Our innovative PMOE Series servo motor was integral to the development of the Segway™ Human Transporter (HT). Helping to revolutionize the future of personal transportation with quiet, brushless drives and efficient operation.

Fitness. Our PMC/PC2300 brushless servo system provides smoother, quieter, more efficient operation in fitness treadmills. These systems are extremely compact resulting in high power-to-weight and power-to-volume ratios. In addition, our brushless technology allows for cooler, more efficient operation with reduced maintenance.

All Pacific Scientific high performance drives and motors consistently deliver the best amount of power and control at a reasonable cost. Pacific Scientific. Just another integral entity of the Danaher Motion Control system, dedicated to providing superior accuracy and reliability in cost-effective products to an ever-changing world of electronic motion control applications.







The ever demanding markets such as semiconductor, fiber optics, life sciences, data storage, flat panel display and digital imaging all require precision machine automation to support superior equipment performance. IDC (Industrial Devices Corporation) designs and manufactures the very precision electromechanical positioning systems necessary for the proper function of advanced processes.



We combine servo, stepper and DC motor technologies with precision mechanics to deliver solutions to a variety of positioning system challenges. Everything from basic linear motor stages, Z elevators, electric cylinders, robotic actuators, and X-Y tables, to complete high-speed gantry platforms and nanometer resolution air bearing fiber optic alignment systems come under our banner.

IDC provides sophisticated motion control systems for use in the fabrication and inspection of semiconductor wafers and disc drive assemblies. Customers integrate our stages into microscopes for bio-medical applications like DNA mapping and cellular research. Our air bearing slides are now being used to write images on laser-sensitive printing plates for the graphic arts market. These are just a fraction of the uses that IDC products support.

We have extensive experience in designing, manufacturing and marketing electronic motion controls and electric linear actuators for industrial automation applications around the world.



We offer complete, cost-effective, reliable, rapid-delivery motion control solutions to hundreds of manufacturing industries. In fact, we pioneered the "electric cylinder" as a simpler, cleaner, more precise, more controllable alternative to hydraulic and pneumatic positioning technology.

IDC's goal is simply to provide complete electromechanical motion control solutions to the automated machinery market. And we've accomplished all this with an unprecedented level of competitiveness and quality.



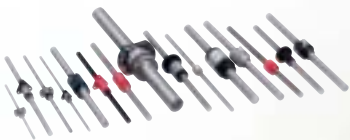
BS&A is a proven leader in linear motion components and actuators for a wide range of commercial and industrial applications.

The goal of BS&A has always been to design and manufacture the most reliable and efficient range of linear motion products including precision lead screws, precision ball screws, rod-type linear actuators, and rodless actuators.

And this is primarily what we have accomplished over the years in the most reliable and efficient manner to the satisfaction of countless numbers of satisfied customers on a worldwide scale.

Our primary industrial applications include the mobile off-highway, medical, ergonomic, and automated material handling industries.

Certainly, whatever your particular linear motion component and actuator needs might be, the design engineers at BS&A will have the appropriate solution.



Solutions by **DanaherMotion**

www.DanaherMotion.com • 815-226-2222



**DANAHER MOTION
WORKING FOR YOU**

The entire structure of Danaher Motion is designed to provide you with the utmost in service and support.

If it's important to you, it's important to Danaher Motion.

From initial inquiry to final delivery and throughout the life cycle of your purchased product, you will have a complete Danaher Motion support staff at your service. Our acclaimed Customer Support Group ties all phases of the product life cycle together. Supported by state-of-the-art technology, highly trained Danaher Motion professionals will provide ready answers to your needs to ensure a smooth and enjoyable relationship with Danaher Motion.

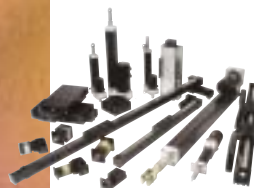
Importantly, for any day-to-day needs, help is always available with a knowledgeable Danaher Motion Sales Engineer, whether by phone or via e-mail. Bottom line: You'll have access to your very own support team!

In addition, Danaher Motion training is available to you! We conduct training classes throughout the year. These intensive, hands-on instructional programs are designed to teach interested individuals how to program and use Danaher Motion products in actual applications. These classes are regularly scheduled at our training centers and are also available to be taught on-site. As a participant, you'll learn the intricacies of Danaher Motion product features and benefits as well as overall motion control theory. These classes will provide you with invaluable information and training that you can apply directly to the successful operation of your particular system. Program details and registration are available online at www.DanaherMotion.com.

Exclusive technological support. Backed by the most sophisticated sizing and drive commissioning software in the industry, our expertly trained application engineering departments offer you complete application assistance for sizing, optimizing and troubleshooting. Our "systems approach" to sizing systems considers the load and applicable parameters in the sizing and implementation of motor/drive combinations. Our data bases consist of thousands of systems for products including brushless rotary servos, DC servos, frameless brushless servos, direct drive linear brushless servos, and stepper motors and drives. Whether helping you identify the right products for the job, or designing a system from scratch, we have the expertise and the technology to get your machines up and running.

As we've always promised, from initial selection to final execution, we'll help you succeed— with every move you make.

Danaher Motion



ABOUT DANAHER MOTION AND ITS BRANDS	Inside front cover - 8
USING THIS CATALOG	9
MOTION PRODUCT SELECTION TREES	10-11
SERVO PRODUCTS INTRODUCTION	12
ROTARY SERVO SYSTEMS AND PRODUCTS	13-47
DDR (DIRECT DRIVE ROTARY) SERVO SYSTEMS AND PRODUCTS	48-55
DDL (DIRECT DRIVE LINEAR) SERVO PRODUCTS OVERVIEW	56-63
SPECIALTY SERVO PRODUCTS - frameless rotary, custom motors and actuators	64-65
SINGLE-AXIS CONTROL SERVO PRODUCTS	66-67
CUSTOM SERVO SYSTEMS AND MULTI-AXIS CONTROL	68-69
STEPPER PRODUCTS INTRODUCTION	70-71
STEPPER DRIVE PRODUCTS	72-77
STEPPER MOTOR PRODUCTS	78-85
RECOMMENDED STEPPER SYSTEMS AND DATA	86-93
MECHANICAL COMPONENTS - screws, actuators, stages	94-115
WHERE TO APPLY OUR PRODUCTS	116
PRODUCT APPLICATION MATRICES	117-120
THE COMPLETE WORLD OF DANAHER MOTION	121
SPECIALTY MOTORS - miniature motors, synchronous motors, PMDC motors and ServoDisc™ motors	121-127
LET US MAKE ONE FOR YOU	128
MOTIONEERING® CD-ROM	Inside back cover

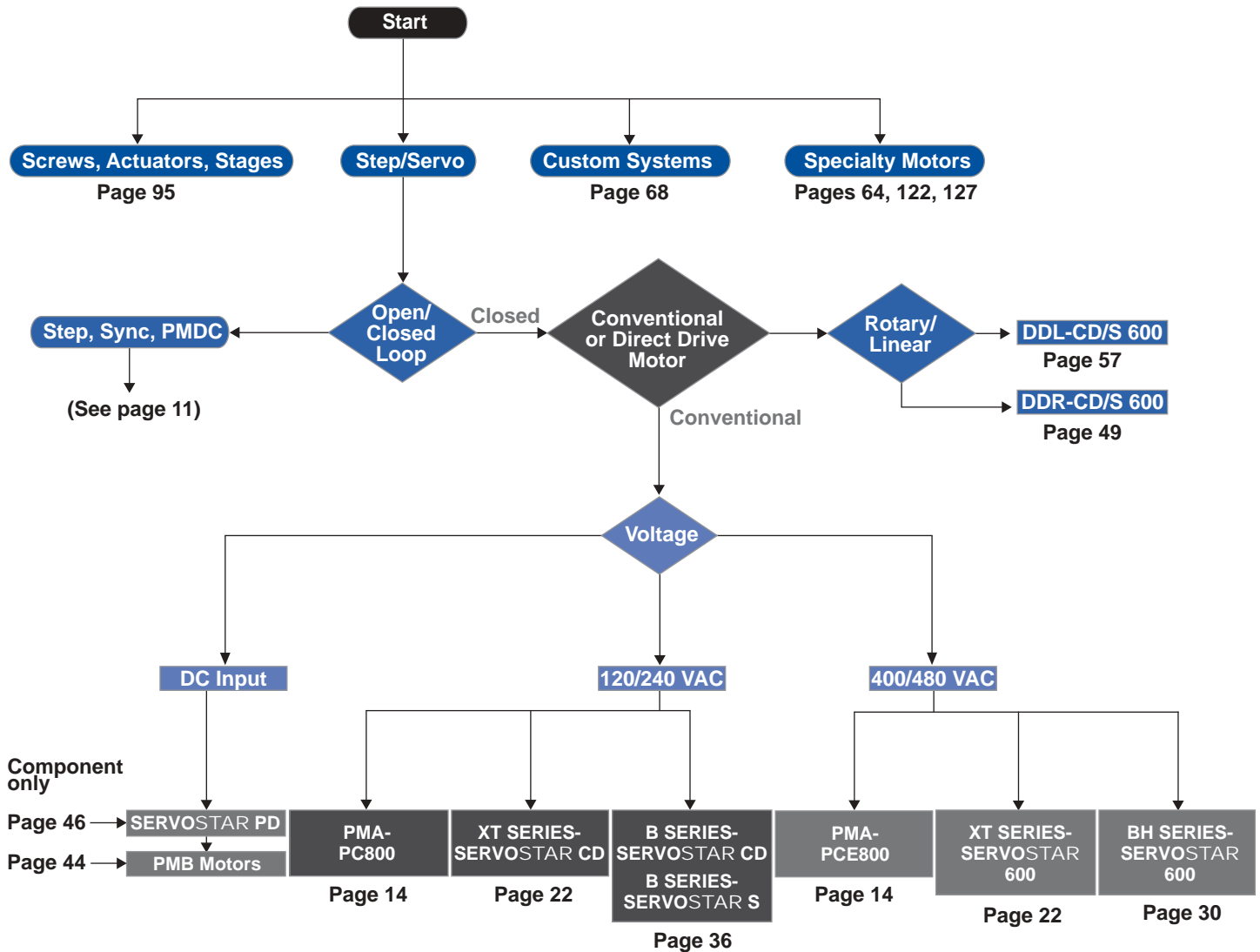
HOW TO USE THIS CATALOG



Use the “Motion Product Selection Trees” on pages 10-11 to identify motors and drives available to fit your system voltage, torque and speed requirements. Detailed servo system combinations with ratings are shown on pages 15, 22, 31, 37 and 50. Recommended stepper systems and stepper data are shown on pages 86-93. The table of contents to the left will help you find more information on each of our products.

Additional information on the products mentioned in the following pages can be found on the MOTIONEERING® CD-ROM bound into the inside back cover of this catalog or by visiting our website at www.DanaherMotion.com

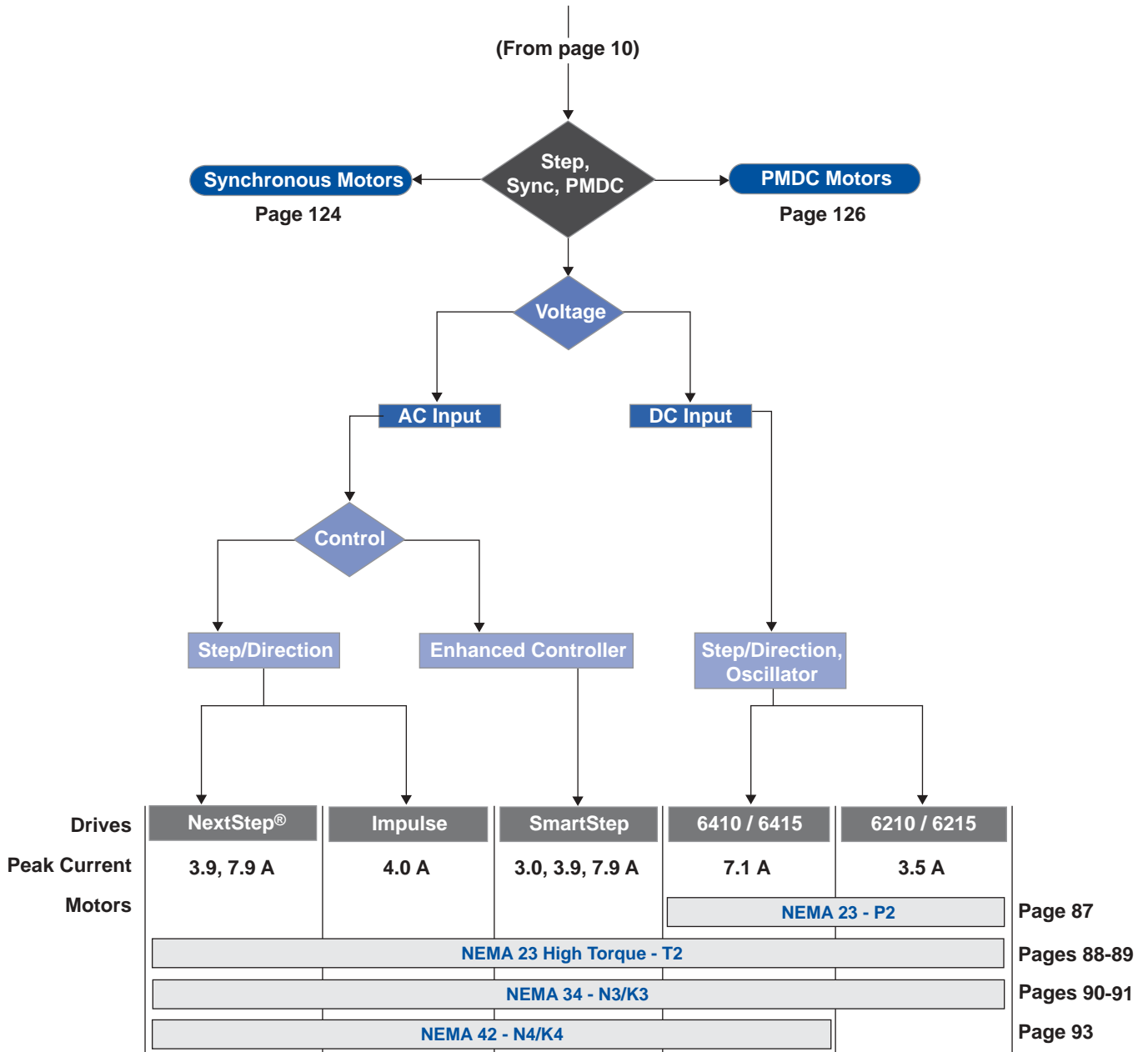
MOTION PRODUCT SELECTION TREE – SERVO SYSTEMS



www.DanaherMotion.com • 815-226-2222

Full Load Cont. Torque (N-m)	up to 2.0	0.26 -17.0	0.44-10.9	0.84-149	4.1-36	1.21-50.6	0.70-124
Feedback Type	Encoder, Sine Encoder, Resolver	Encoder, Resolver	Encoder, Sine Encoder, Resolver	Resolver	Encoder, Resolver	Sine Encoder, Resolver	Resolver
Servo/Fieldbus	SERCOS interface™	SERCOS interface	SERCOS interface	SERCOS interface	SERCOS interface	SERCOS interface, PROFIBUS, CANOpen	SERCOS interface, PROFIBUS, CANOpen
Tc/Jm (Rad/s ²)	n/a	up to 36,100	up to 46,900	up to 34,000	up to 11,300	up to 43,000	up to 24,800

MOTION PRODUCT SELECTION TREE – STEPPER SYSTEMS



INTRODUCTION

www.DanaherMotion.com • 815-226-2222



ROTARY SERVO



Danaher Motion brings Kollmorgen and Pacific Scientific – leading brands in brushless servo technology together to offer you rotary servo freedom of design. Broad product offerings in both brands give you the flexibility to choose the functionality and performance exactly appropriate for your application.

With drive functionality ranging from straightforward brushless servo amplifiers to multi-axis capable programmable motion controllers and continuous motor torques ranging from 0.21 to 149 N-m, Danaher Motion has the servo solution for your application.

The Kollmorgen **GOLDLINE**® B and M Series motors offer a wide range of solutions for servomotor applications. The B Series low-inertia models and M Series medium-inertia models are available in five frames ranging from 70 mm square to 190 mm square and a continuous rated torque range from 0.84 to 149 N-m. Explosion-proof models are also available. The interior permanent magnet design is key to achieving high torque and power density while eliminating problems associated with placing magnets directly in the airgap. This magnetic structure allows for low-inertia designs, making the Kollmorgen **GOLDLINE** series an industry standard for performance in high-response, point-to-point move applications.

The Kollmorgen **GOLDLINE** XT Series motors offer high performance in a compact rugged package, ready for your applications where space is at a premium. The XT Series has four frame sizes from 60 mm square to 174 mm square and continuous rated torques between 0.44 and 50.6 N-m. A patented magnetic design allows high torque-to-inertia for rapid acceleration, while providing extremely low cogging and torque ripple for smooth operation.



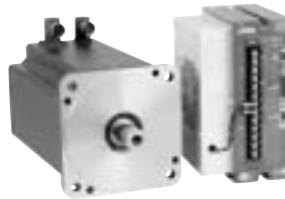
SERVOSTAR 600 is the most advanced all digital brushless servo amplifier from Kollmorgen. The **SERVOSTAR 600** can be configured to perform motion control that normally requires a full programmable drive with a motion language. Up to 180 motion tasks can be created, stored and linked together to create motion profiles. With a wide range of input voltages and seven output power levels, the **SERVOSTAR 600** is right for your application.

Kollmorgen **SERVOSTAR**® CD amplifiers combine compact size and integrated power supply into a fully digital package, designed to simplify installation and system setup. **SERVOSTAR** CD is available in three

continuous output current levels, from 3 to 10 A_{RMS} . Three control algorithms and self-tuning (to the load) functionality allows high performance operation to be realized quickly and easily.

SERVOSTAR S offers six continuous output power levels from 3 to 85 A_{RMS} . Using a stand-alone power supply, these amplifiers provide economical servo control.

Kollmorgen **SERVOSTAR MC** multi-axis motion controllers use Kollmorgen's MC-BASIC to provide the programming power of the BASIC language specifically geared to the motion control environment. **SERCOS** interface™ connects the **SERVOSTAR MC** to multiple drives. The **SERVOSTAR SC** combines the programming language and capabilities contained in the MC with the drive electronics of the **SERVOSTAR CD** to form a single axis drive capable of advanced programmable motion.



The Pacific Scientific **PMA** Series of brushless servomotors delivers a comprehensive line of cost-effective servomotors. Covering frame sizes from 55 mm square to 190 mm square and a continuous rated torque range of 0.21 to 54 N-m, these motors satisfy the requirements of your application. Standard IP65 sealing and the availability of IP67 washdown duty as an option on selected models allows the **PMA** Series to stand up to the rigors of the factory floor. Global certifications and input voltages on most models to 650 volts assure your machine's acceptance worldwide.

The **PMB** series of brushless servomotors feature an economical IP40 construction motor in three frames: size 17 and NEMA 23 & 34 to address your need for a high-performance motor in higher-volume applications. With a continuous rated torque range from 0.22 to 4.8 N-m, the cost-effective **PMB** motors complement our full line of servos.

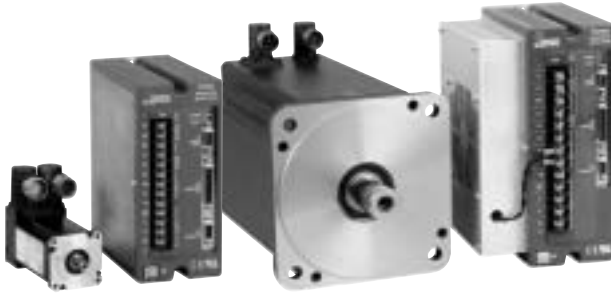
The **PC800** and **PCE800** brushless servo drives are the latest in digital brushless drive technology from Pacific Scientific. Bringing the functionality and output power capabilities of the venerable **SC930** and **940** Series drives in a package 40% smaller, these drives are available in multiple input voltage and output current levels to suit many applications.

SC/SCE950 single-axis controllers offer programmable motion control using Pacific Scientific's **ServoBASIC Plus**™ programming language. Twenty-one separately configurable I/O points and 8 programmable limit switches give flexible control of motion parameters. Multiple input voltage and output current levels ensure applicability for your machine.

The systems shown in this catalog are only the tip of the iceberg. All of the brushless servomotors are customizable – often with minimal impact on delivery times. From feedback options to application-specific windings, we can help with your servo needs. These servo products are examples of Danaher Motion's commitment to offering you leading-edge technology and the highest-performance products available, customized to suit your applications and backed by unmatched customer support and quality. We want to help make your job easier.

SYSTEM OVERVIEW

Pacific Scientific PMA & PC800/PCE800 Systems

**PC800/PCE800 SERIES DRIVES** SEE PAGES 18-21

The PC800 and PCE800 Series are the next generation of Pacific Scientific's all-digital brushless servo drives. They provide a cost-effective, high-performance alternative to previous generation drives in a package 40% smaller than equivalent older servos.

The PC800 uses 240 VAC input power. The new PCE800 family uses 480 VAC input power for global acceptance of your machine.

These drives use a single DSP to close the current, velocity, and position loops. All system and application parameters are set in software to insure repeatability and eliminate drift. The PC800 Family is available in multiple power levels, all with integral power supplies. The drives comply with the CE low-voltage directive without requiring additional isolation.

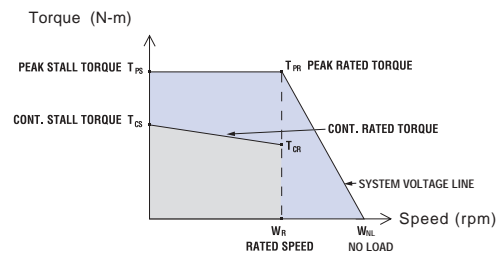
Like all Pacific Scientific drives, the PC/PCE800 Series can accept either step and direction or analog commands. Motion profiling is standard – the PC/PCE800 Series' internal profile generator allows pre-set index moves. The PC/PCE800 Series features Pacific Scientific's patented, 24-bit DRDC (Digital Resolver to Digital Conversion) algorithm to provide the smoothest low-speed performance in its class and position accuracy as low as five arc seconds. And, its 400 Hz velocity-loop bandwidth is the highest in the industry. These features bring you the utmost in simplified drive set-up and tuning for complicated mechanical systems. Advanced tuning also allows systems to settle quickly.

Now manufacturers around the world can take advantage of SERCOS (Serial Real-time Communications System) technology with the PC/PCE840 Series digital brushless servo drives. The PC/PCE840 Series brings you the same quality, reliability and performance you've come to expect from Pacific Scientific and now it delivers the capability to utilize the enhanced digital two-way control and drive communication capabilities of SERCOS interface™.

Using the latest SERCOS816 ASIC, the PC/PCE840 Series delivers network communication rates for distributed motion control up to 16 MHz. The PC/PCE840 Series complies with IEC/EN 61491, the industry's only open control standard, assuring integration with controls or devices supporting SERCOS. Its noise-immune fiber-optic cable and ring network topology greatly reduce wiring costs, installation and set-up time, and speed tuning and troubleshooting by supporting a rich set of diagnostic capabilities.

PMA SERIES MOTORS SEE PAGE 16

The PMA Series of brushless servomotors delivers a comprehensive line of rugged, cost effective servomotors. Covering frame sizes from 55 mm square to 190 mm square and a continuous rated torque of 0.21 to 54 N-m, these motors offer an economic means to satisfy the requirements of your application. Standard IP65 sealing and the availability of IP67 washdown duty as an option on selected models allows the PMA Series to stand up to the rigors of the factory floor. Global certifications and input voltages on most models to 650 volts assure your machine's acceptance worldwide.



System torque/speed information on the following pages is designed to help you select the optimum brushless servo motor/controller combination.

The nominal values in this data illustrate performance for the recommended motor/controller systems.

The performance characteristics of a brushless servo system (motor/controller combination) are described by a torque/speed operating envelope. As shown above, the shaded areas of the curve indicate the continuous duty and intermittent duty zones of the system.

Continuous Duty Zone

The continuous duty zone is bordered by the maximum continuous torque line up to the rated speed of the motor. The continuous torque line is set by either the motor's maximum rated temperature, or the controller's rated continuous current output, whichever is less. The system voltage line is set by the voltage rating of the controller, the line voltage supplied, and the motor winding. The system can operate on a continuous basis anywhere within this area, assuming the motor temperature is 40°C or less, ambient. Refer to the Test Conditions on the pages that follow.

Intermittent Duty Zone

The intermittent duty zone is bordered by the peak torque line and the system voltage line. The peak torque line is set by either the controller's peak current rating, which the controller can produce for a limited time, or the maximum rated current for the motor, whichever is less. Refer to the Rating Data on the pages that follow. NOTE: higher torque levels may be achievable at higher power levels. Consult Pacific Scientific for more details. The system voltage line is set by the voltage rating of the controller, the line voltage applied and the motor winding. Operation in the intermittent zone must be limited to a duty cycle that will produce an RMS system torque falling within the continuous duty area. The RMS torque value is defined by the magnitude of the intermittent torque and the percentage of the time spent at that torque.

Zero - Peak, or RMS?

Current brushless drive technology uses a sinusoidal output. Pacific Scientific rates its systems using RMS values to accurately reflect system performance operating with a sinusoidal waveform. Older published ratings were based on 0 - peak values, using a trapezoidal waveform.

MOTIONEERING® Application Engine is the comprehensive engineering resource tool to help you size and select the appropriate servo or stepper system for your application. An intuitive interface lets you build your motion application, then find the right Danaher Motion system to fill your needs.

The **MOTIONEERING** CD-ROM also includes electronic files of detailed selection information and product literature on all the products mentioned in this catalog.

A copy of this useful engineering tool has been bound into the back inside cover of this catalog.

SYSTEM OVERVIEW

Pacific Scientific PMA & PC800/PCE800 Systems

RECOMMENDED MOTOR/DRIVE SYSTEMS, 240 VAC, 320 VDC bus ^①

Servo Motor Model ^⑤	Servo Drive Model	Peak Stall Torque T_{FS} ^② N-m (lb-in)	Peak Rated Torque T_{FR} ^② N-m (lb-in)	Cont. Stall Torque T_{CS} N-m (lb-in)	Cont. Rated Torque T_{CR} N-m (lb-in)	Rated Speed W_R ^③ rpm	No-Load Speed W_{NL} rpm	Cont. Stall Current I_{CS} A_{RMS}	Current at Peak Torque I_{FS} A_{RMS}	Inertia J kgm ² x 10 ⁻³ (lb-in-S ² x 10 ⁻³) ^④	Inductance Line-Line L mH
PMA Series motors with PC8xx											
PMA11A	PC8x2 ^②	1.4 (12.4)	1.4 (12.4)	0.26 (2.3)	0.22 (1.9)	6,600	12,900	0.96	5.3	0.012 (0.102)	7.1
PMA12A	PC8x2 ^②	1.7 (14.8)	1.7 (14.7)	0.6 (5.3)	0.47 (4.2)	8,500	10,800	1.88	5.3	0.019 (0.164)	4.3
PMA13B	PC8x2 ^②	1.7 (15.3)	1.7 (15.2)	0.9 (8.0)	0.6 (5.3)	9,000	10,600	2.73	5.3	0.026 (0.226)	2.7
PMA21B	PC8x2 ^②	1.8 (16.3)	1.8 (16.2)	0.63 (5.6)	0.50 (4.4)	6,050	9,250	1.72	5.3	0.022 (0.19)	10.5
PMA22B	PC8x3 ^②	4.7 (42.0)	4.7 (41.9)	1.3 (11.5)	1.1 (9.4)	4,650	7,100	2.65	10.6	0.038 (0.34)	7.4
PMA22B	PC8x2 ^②	2.6 (22.7)	2.5 (22.5)	1.3 (11.5)	1.0 (8.9)	5,750	7,100	2.65	5.3	0.038 (0.34)	7.4
PMA23B	PC8x2 ^②	3.9 (34.2)	3.9 (34.1)	2.0 (17.7)	1.6 (14.6)	3,600	4,700	2.7	5.3	0.055 (0.49)	6.8
PMA23C	PC8x3 ^②	5.9 (52.4)	5.9 (52.2)	2.0 (17.7)	1.6 (14.2)	4,200	5,850	3.4	10.6	0.055 (0.49)	10.6
PMA23D	PC8x4 ^②	7.3 (64.6)	7.3 (64.3)	2.0 (17.7)	1.4 (12.3)	6,400	8,750	5.0	20.0	0.055 (0.49)	3.0
PMA24C	PC8x3 ^②	7.9 (70.2)	7.9 (70.9)	2.6 (23.0)	2.2 (19.5)	3,000	4,350	3.3	10.6	0.072 (0.64)	8.9
PMA24D	PC8x4 ^②	9.5 (84.1)	9.5 (83.8)	2.6 (23.0)	1.9 (17.2)	4,950	6,950	5.3	21.2	0.072 (0.64)	3.5
PMA42M	PC8x2 ^②	7.7 (67.9)	7.6 (67.7)	4.1 (36.3)	3.9 (34.5)	1,600	2,350	2.8	5.3	0.36 (3.2)	26.0
PMA42N	PC8x3 ^②	11.3 (99.9)	11.2 (99.6)	4.0 (35.4)	3.8 (33.6)	1,950	3,100	3.6	10.6	0.36 (3.2)	14.3
PMA42Q	PC8x4 ^②	12.6 (111)	12.5 (111)	4.1 (36.3)	3.4 (30.1)	3,800	5,450	6.5	21.2	0.36 (3.2)	4.7
PMA43N	PC8x3 ^②	16.9 (149)	16.8 (149)	5.9 (52.2)	5.8 (51.3)	1,250	2,050	3.6	10.6	0.52 (4.6)	20.0
PMA43Q	PC8x4 ^②	17.3 (153)	17.2 (152)	6.0 (53.2)	5.2 (46.0)	3,000	4,050	7.1	21.2	0.52 (4.6)	5.3
PMA44N	PC8x3 ^②	23.3 (206)	23.2 (206)	8.2 (72.6)	7.9 (70.0)	850	1,550	3.6	10.6	0.68 (6.0)	27.0
PMA44P	PC8x3 ^②	15.9 (141)	15.9 (140)	8.0 (71.3)	7.4 (65.5)	1,750	2,250	5.3	10.6	0.68 (6.0)	12.4
PMA44Q	PC8x4 ^②	23.2 (205)	23.1 (205)	8.1 (71.6)	7.3 (64.4)	2,100	3,000	7.1	21.2	0.68 (6.0)	7.1
PMA45N	PC8x3 ^②	29.0 (256)	28.9 (256)	10.2 (90.3)	9.9 (87.6)	600	1,200	3.6	10.6	0.84 (7.4)	33.0
PMA45Q	PC8x4 ^②	29.3 (259)	29.2 (258)	10.2 (90.3)	9.4 (83.2)	1,650	2,350	7.1	21.2	0.84 (7.4)	8.7
PMA53Q	PC8x4 ^②	26.9 (238)	26.8 (237)	10.5 (92.9)	9.6 (85.0)	1,300	2,250	6.8	21.2	1.92 (17.0)	15.0
PMA54Q	PC8x4 ^②	34.1 (302)	34.1 (301)	13.5 (120)	12.4 (110)	1,200	1,800	7.1	21.2	2.49 (22.0)	16.0
PMA55Q	PC8x4 ^②	43.0 (380)	42.9 (379)	17.0 (151)	16.0 (141)	900	1,450	7.1	21.2	3.06 (27.1)	20.0

RECOMMENDED MOTOR/DRIVE SYSTEMS, 480 VAC, 640 VDC bus ^①

PMA Series motors with PCE8xx Drives											
Servo Motor Model ^⑤	Servo Drive Model	Peak Stall Torque T_{FS} ^② N-m (lb-in)	Peak Rated Torque T_{FR} ^② N-m (lb-in)	Cont. Stall Torque T_{CS} N-m (lb-in)	Cont. Rated Torque T_{CR} N-m (lb-in)	Rated Speed W_R ^③ rpm	No-Load Speed W_{NL} rpm	Cont. Stall Current I_{CS} A_{RMS}	Current at Peak Torque I_{FS} A_{RMS}	Inertia J kgm ² x 10 ⁻³ (lb-in-S ² x 10 ⁻³) ^④	Inductance Line-Line L mH
PMA42N	PCE8x3 ^②	8.2 (72.6)	8.1 (71.7)	4.1 (36.3)	2.8 (24.8)	5,500	6,250	3.7	7.5	0.36 (3.2)	14.3
PMA43N	PCE8x3 ^②	12.2 (108)	12.1 (107)	6.1 (54.0)	5.1 (45.1)	3,350	4,150	3.7	7.5	0.52 (4.6)	20.0
PMA43Q	PCE8x5 ^②	18.2 (161)	18.1 (160)	6.1 (54.0)	3.8 (33.6)	6,450	8,100	7.2	22.5	0.52 (4.6)	5.3
PMA44N	PCE8x3 ^②	16.9 (150)	16.8 (149)	8.2 (72.6)	7.2 (63.7)	2,400	3,050	3.6	7.5	0.68 (6.0)	27.0
PMA44Q	PCE8x5 ^②	24.4 (216)	24.3 (215)	8.2 (72.6)	4.7 (41.6)	4,700	6,000	7.2	22.5	0.68 (6.0)	7.1
PMA45N	PCE8x3 ^②	21.0 (186)	20.9 (185)	10.2 (90.3)	9.3 (82.3)	1,900	2,450	3.6	7.5	0.84 (7.4)	33.0
PMA45Q	PCE8x5 ^②	30.8 (273)	30.7 (272)	10.2 (90.3)	7.6 (67.3)	3,700	4,750	7.1	22.5	0.84 (7.4)	8.7
PMA53Q	PCE8x5 ^②	27.9 (247)	27.8 (246)	10.5 (92.9)	8.2 (72.6)	2,900	4,450	6.8	22.5	1.92 (17.0)	15.0
PMA53R	PCE8x5 ^{②⑥}	21.6 (191)	21.5 (190)	10.5 (92.9)	6.8 (60.2)	4,750	6,400	9.7	22.5	1.92 (17.0)	7.2
PMA54Q	PCE8x5 ^②	35.6 (315)	35.5 (314)	13.5 (120)	11.3 (100)	2,500	3,650	7.1	22.5	2.49 (22.0)	16.0
PMA54R	PCE8x5 ^{②⑥}	26.0 (230)	25.8 (228)	13.5 (120)	9.7 (85.9)	4,300	5,450	10.6	22.5	2.49 (22.0)	7.1
PMA55Q	PCE8x5 ^②	44.8 (397)	44.7 (396)	17.0 (151)	19.0 (130)	2,000	2,900	7.1	22.5	3.06 (27.1)	20.0
PMA55R	PCE8x5 ^{②⑥}	32.8 (290)	32.6 (289)	17.0 (151)	13.3 (109)	3,400	4,300	10.6	22.5	3.06 (27.1)	8.8
PMA57R	PCE8x5 ^{②⑥}	45.9 (406)	45.7 (404)	22.0 (195)	18.6 (165)	2,400	3,050	9.8	22.5	4.21 (37.3)	12.5
PMA65R	PCE8x5 ^{②⑥}	55.9 (495)	55.7 (493)	30.0 (266)	24.0 (212)	1,900	2,600	11.3	22.5	7.9 (70.0)	20.0
PMA66R	PCE8x5 ^{②⑥}	67.1 (594)	66.9 (592)	36.0 (319)	30.5 (270)	1,600	2,150	11.3	22.5	9.4 (83.3)	24.0

① See page 17 for definitions of ratings.

② Peak torque ratings are for 5 seconds.

③ Rated speed is provided for operation on 480 VAC 3-phase line.

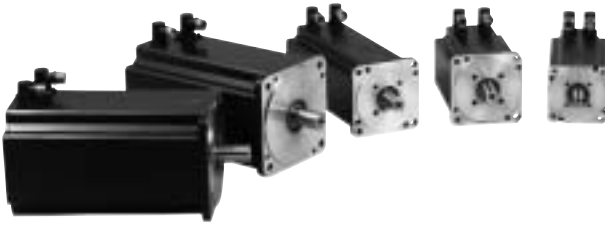
④ Includes resolver feedback inertia.

⑤ Each system requires one feedback and one motor power cable.

⑥ Optional fan kit required to achieve continuous torque ratings.

PMA MOTORS

Pacific Scientific PMA & PC800/PCE800 Systems



Features

PMA Series Motors

Rugged Brushless Construction

High torque over wide speed range

Anti-cog motor design

IP65 TENV construction standard

IP67 protection on selected PMA models

Class H insulation

Overtemperature thermistor

Multiple feedback options

Brake option

Neodymium-iron-boron magnets

High quality Interconnectron connectors

High voltage models available

Global approvals and agency recognition

Two year warranty

Benefits

Eliminates brush replacement maintenance. Stands up to the rigors of the factory floor

Improved machine throughput

Smooth low-speed operation

Withstands rigorous environments

Withstands washdown

Longer life for reduced machine downtime

Protection against motor damage

Allows numerous control methods

Improved machine safety

Maximum performance, maximum value

Faster installation and maintenance connectors

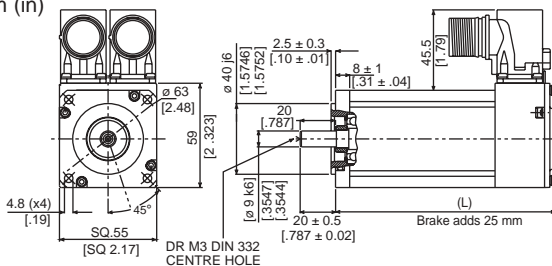
Improved application flexibility

Eases recognition process for a machine

Quality and reliability for reduced machine downtime

PMA1 SERIES MOTOR

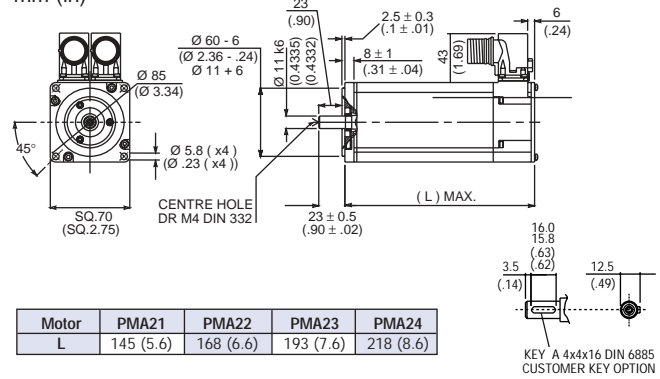
mm (in)



Motor	PMA13	PMA12	PMA11
L	175 (6.89)	150 (5.906)	125 (4.921)

PMA2 SERIES MOTOR

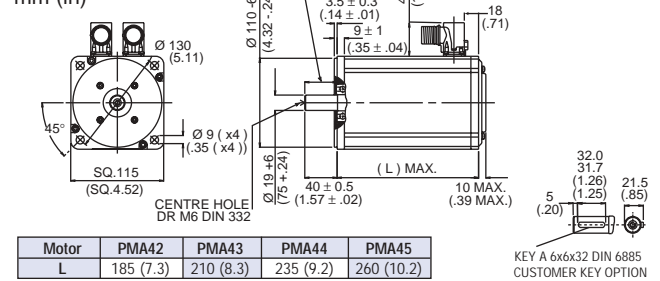
mm (in)



Motor	PMA21	PMA22	PMA23	PMA24
L	145 (5.6)	168 (6.6)	193 (7.6)	218 (8.6)

PMA4 SERIES MOTOR

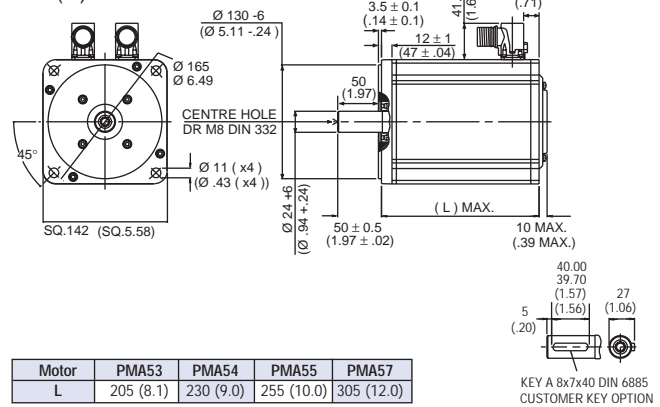
mm (in)



Motor	PMA42	PMA43	PMA44	PMA45
L	185 (7.3)	210 (8.3)	235 (9.2)	260 (10.2)

PMA5 SERIES MOTOR

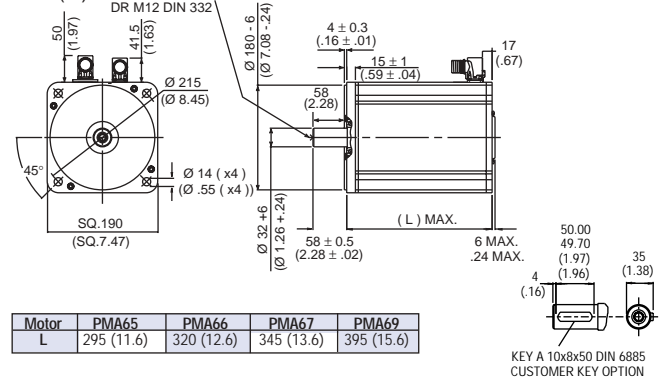
mm (in)



Motor	PMA53	PMA54	PMA55	PMA57
L	205 (8.1)	230 (9.0)	255 (10.0)	305 (12.0)

PMA6 SERIES MOTOR

mm (in)



Motor	PMA65	PMA66	PMA67	PMA69
L	295 (11.6)	320 (12.6)	345 (13.6)	395 (15.6)

RATINGS AND CHARACTERISTICS

Motor parameters and winding data. See system data beginning on page 15 for typical torque/speed performance.

PMA1-2 SERIES MOTORS	PARAMETER	SYMBOL	UNITS	PMA11	PMA12	PMA13	PMA21	PMA22	PMA23	PMA24
	Continuous stall torque ① ②	T_{CS}	N-m (lb-in)	0.26 (2.3)	0.6 (5.3)	0.9 (8.0)	0.63 (5.6)	1.3 (11.5)	2 (17.7)	2.6 (23.0)
Peak torque ③ ④	T_{PK}	N-m (lb-in)	1.4 (12.4)	2.9 (25.6)	4.3 (38.0)	2.3 (20.4)	4.7 (41.6)	7.2 (63.7)	9.6 (85.0)	
Inertia ⑤ ⑥	J_M	$kgm^2 \times 10^{-3}$ (lb-in-sec ² × 10 ⁻³)	0.012 (0.102)	0.019 (0.164)	0.026 (0.226)	0.022 (0.19)	0.038 (0.34)	0.055 (0.49)	0.072 (0.64)	
Static friction (max.)	T_f	N-m (lb-in)	0.008 (0.071)	0.012 (0.106)	0.018 (0.160)	0.016 (0.14)	0.033 (0.29)	0.050 (0.44)	0.065 (0.58)	
Viscous damping coefficient	K_{DV}	N-m/krpm (lb-in/krpm)	0.001 (0.009)	0.002 (0.018)	0.003 (0.027)	0.003 (0.03)	0.006 (0.05)	0.009 (0.08)	0.012 (0.11)	
Thermal resistance	R_{TH}	deg. C/watt	3.1	2.0	1.6	1.83	1.41	1.13	0.89	
Thermal time constant	t_{TH}	min	10.0	13.0	16.0	13.0	15.0	18.0	20.0	
Weight (motor only)	W	kg (lbs)	1.2 (2.6)	1.5 (3.3)	1.9 (4.2)	1.7 (3.7)	2.3 (5.0)	2.9 (6.4)	3.5 (7.7)	
WINDING DATA										
Torque constant (RMS)	K_T	N-m/A _{RMS} (lb-in/A _{RMS})	0.27 (2.38)	0.32 (2.85)	0.33 (2.90)	0.37 (3.3)	0.49 (4.3)	0.74 (6.5)-0.4 (3.5)	0.79 (7.0)-0.5 (4.4)	
Voltage constant (RMS) (I-I)	K_E	V _{RMS} /rad/sec (V _{RMS} /krpm)	0.16 (17.2)	0.20 (20.6)	0.20 (21.0)	0.23 (24.0)	0.30 (31.2)	0.45 (47.4)-0.24 (25.4)	0.49 (50.9)-0.31 (31.9)	
Continuous stall current ① ②	I_{CS}	A _{RMS}	0.96	1.88	2.73	1.72	2.65	2.7-5.0	3.3-5.3	
Current at peak torque ④	I_{PK}	A _{RMS}	5.3	9.4	13.8	6.88	10.6	10.8-20.0	13.2-21.2	
Resistance (line-to-line)	R_C	ohms	16.3	6.8	3.9	8.8	4.81	6.1-1.7	4.6-1.9	
Inductance (line-to-line)	L	mH	7.1	4.3	2.7	10.5	7.4	10.6-3.0	8.9-3.5	
Typical Rated Speed @ 240 VAC, 320 VDC bus	W_R	rpm	6,600	8,500	9,000	6,050	4,650	3,600-6,400	3,000-4,950	
Typical Rated Torque @ 240 VAC, 320 VDC bus	T_{CR}	N-m (lb-in)	0.22 (1.9)	0.48 (4.2)	0.60 (5.3)	0.5 (4.4)	1.06 (9.4)	1.7 (14.6)-1.4 (12.4)	2.2 (19.5)-2.2 (19.5)	
PMA4-5 SERIES MOTORS	PARAMETER	SYMBOL	UNITS	PMA42	PMA43	PMA44	PMA45	PMA53	PMA54	
	Cont. stall torque ① ②	T_{CS}	N-m (lb-in)	4.1 (36.3)	6.1 (54.0)	8.2 (72.6)	10.2 (90.3)	10.5 (92.9)	13.5 (120)	
Peak torque ③ ④	T_{PK}	N-m (lb-in)	14.6 (129)	21.7 (192)	29.4 (260)	36.8 (326)	31.0 (274)	41.0 (363)		
Inertia ⑤ ⑥	J_M	$kgm^2 \times 10^{-3}$ (lb-in-sec ² × 10 ⁻³)	0.36 (3.2)	0.52 (4.6)	0.68 (6.0)	0.84 (7.4)	1.92 (17)	2.49 (22)		
Static friction (max.)	T_f	N-m (lb-in)	0.11 (1.0)	0.15 (1.3)	0.21 (1.9)	0.26 (2.3)	0.26 (2.3)	0.34 (3.0)		
Viscous damping coefficient	K_{DV}	N-m/krpm (lb-in/krpm)	0.03 (0.27)	0.05 (0.44)	0.06 (0.53)	0.08 (0.71)	0.08 (0.71)	0.11 (0.97)		
Thermal resistance	R_{TH}	deg. C/watt	0.68	0.59	0.51	0.45	0.55	0.53		
Thermal time constant	t_{TH}	min	25.0	30.0	35.0	40.0	35.0	40.0		
Weight (motor only)	W	kg (lbs)	6.2 (13.6)	7.6 (16.7)	9.0 (20.0)	10.4 (22.9)	11 (24.2)	13.0 (28.6)		
WINDING DATA										
Torque constant (RMS)	K_T	N-m/A _{RMS} (lb-in/A _{RMS})	1.48 (13.1)-1.11 (9.8) 0.87 (7.7)-0.63 (5.6)	1.67 (14.8)-1.34 (11.9) 0.85 (7.5)-.61 (5.4)	2.26 (20.0)-1.34 (11.9) 1.15 (10.2)-0.82 (7.3)	2.85 (25.2)-1.46 (12.9) 1.04 (9.2)	1.55 (13.7)-1.08 (9.6)	1.9 (16.8)-1.27 (11.3)		
Voltage constant (RMS) (I-I)	K_E	V _{RMS} /rad/sec (V _{RMS} /krpm)	0.91 (94.8)-0.68 (7.1) 0.53 (55.8)-0.39 (40.6)	1.02 (107)-0.82 (86.1) 0.52 (54.9)-0.37 (39.2)	1.38 (145)-0.94 (98.8) 0.71 (74)-0.5 (52.8)	1.74 (183)-0.89 (93.4) 0.64 (66.7)	0.95 (99.3)-0.66 (69.2)	1.16 (122)-0.78 (81.5)		
Cont. stall current ① ②	I_{CS}	A _{RMS}	2.8-3.7-4.7-6.5	3.7-4.6-7.2-10.1	3.6-5.4-7.2-10.1	3.6-7.1-10.0	6.8-9.7	7.1-10.6		
Current at peak torque ④	I_{PK}	A _{RMS}	11.2-14.8-18.8-26.0	14.8-18.4-28.8-40.4	14.4-21.6-28.8-40.4	14.4-28.4-40.0	27.2-38.8	28.4-42.4		
Resistance (line to line)	R_C	ohms	9.0-5.1-3.2-1.65	6.0-3.9-1.54-0.79	7.1-3.3-1.8-0.92	8.2-2.1-1.1	1.9-0.92	1.8-0.8		
Inductance (line to line)	L	mH	26.0-14.3-8.9-4.7	20.0-13.0-5.3-2.7	27.0-12.4-7.1-3.6	33.0-8.7-4.4	15.0-7.2	16.0-7.1		
Typical Rated Speed @ 240 VAC, 320 VDC bus	W_R	rpm	1,600-1,950 2,950-3,800	1,250-1,850 3,000-4,700	850-1,750 2,100-3,450	600-1,650 2,700	1,300-2,350	1,200-2,100		
Typical Rated Torque @ 240 VAC, 320 VDC bus	T_{CR}	N-m (lb-in)	3.9 (34.5)-3.8 (33.6) 3.6 (31.9)-34.0 (30.1)	5.8 (51.3)-5.6 (49.6) 5.2 (46.0)-4.5 (39.8)	7.9 (70.0)-7.5 (66.4) 7.3 (64.4)-6.7 (59.3)	9.9 (87.6)-9.4 (83.2) 8.9 (78.8)	9.6 (85.0)-8.8 (77.9)	12.4 (110)-11.6 (102.7)		
PMA5-6 SERIES MOTORS	PARAMETER	SYMBOL	UNITS	PMA55	PMA57	PMA65	PMA66	PMA67	PMA69	
	Cont. stall torque ① ②	T_{CS}	N-m (lb-in)	17.0 (151)	22.0 (195)	30.0 (266)	36.0 (319)	42.0 (372)	54.0 (478)	
Peak torque ③ ④	T_{PK}	N-m (lb-in)	51.5 (456)	69.0 (611)	95.0 (841)	114 (1009)	133 (1177)	170 (1505)		
Inertia ⑤ ⑥	J_M	$kgm^2 \times 10^{-3}$ (lb-in-sec ² × 10 ⁻³)	3.06 (27.1)	4.21 (37.3)	7.90 (70.0)	9.40 (83.3)	10.9 (96.5)	13.9 (123)		
Static friction (max.)	T_f	N-m (lb-in)	0.43 (3.8)	0.57 (5.0)	0.75 (6.60)	0.90 (8.0)	1.05 (9.30)	1.35 (11.9)		
Viscous damping coefficient	K_{DV}	N-m/krpm (lb-in/krpm)	0.14 (1.24)	0.18 (1.59)	0.25 (2.20)	0.30 (2.70)	0.35 (3.10)	0.45 (4.0)		
Thermal resistance	R_{TH}	deg. C/watt	0.47	0.45	0.38	0.35	0.32	0.28		
Thermal time constant	t_{TH}	min	45.0	55.0	40.0	45.0	50.0	60.0		
Weight (motor only)	W	kg (lbs)	15.0 (33.0)	19.0 (41.9)	31.0 (68.3)	36.0 (79.3)	42.0 (92.5)	54.0 (119)		
WINDING DATA										
Torque constant (RMS)	K_T	N-m/A _{RMS} (lb-in/A _{RMS})	2.4 (21.3)-0.8 (7.1) 0.8 (7.1)	2.26 (20)-1.13 (10)	2.66 (23.5)-1.44 (12.7)	3.21 (28.5)-1.74 (15.4)	2.04 (18.0)	2.63 (23.3)		
Voltage constant (RMS) (I-I)	K_E	V _{RMS} /rad/sec (V _{RMS} /krpm)	1.47 (154)-0.98 (103) 0.49 (51.3)	1.38 (145)-0.69 (72.5)	1.63 (171)-0.88 (92.3)	1.96 (206)-1.06 (112)	1.25 (131)	1.61 (169)		
Continuous stall current ① ②	I_{CS}	A _{RMS}	7.1-10.6-21.3	9.8-19.5	11.3-20.9	11.3-20.7	20.7	20.6		
Current at peak torque ④	I_{PK}	A _{RMS}	28.4-42.4-85.2	39.2-78.0	45.2-83.6	45.2-82.8	82.8	82.4		
Resistance (line-to-line)	R_C	ohms	2.1-0.9-0.2	1.1-0.3	0.97-0.29	1.06-0.32	0.35	0.41		
Inductance (line-to-line)	L	mH	20.0-8.8-2.2	12.5-3.1	20.0-5.90	24.0-7.0	8.2	10.4		
Typical Rated Speed @ 240 VAC, 320 VDC bus	W_R	rpm	900-1,650-3,450	1,150-2,450	N/A-1,750	N/A-1,450	1,250	950		
Typical Rated Torque @ 240 VAC, 320 VDC bus	T_{CR}	N-m (lb-in)	16.0 (142)-15.2 (134.5) 3.1 (115.9)	20.5 (181.4)-18.4 (162.9)	N/A-24.5 (216.8)	N/A-31.0 (274)	37.0 (327)	48.5 (429)		

Note: All values at 25°C unless otherwise noted.

① Motor operated at rated winding temperature rise of $\Delta t = 100^\circ\text{C}$ above ambient at 25°C ambient. Ratings result of average rating between free air and cold plate mounting. Equivalent to mounting to a $10'' \times 10'' \times 1/4''$ aluminum heat sink. ② All tests performed with sinusoidal commutation. ③ Theoretical motor maximum. ④ Caution: For peak torques or peak currents greater than 4x the continuous rating, consult the factory for thermal considerations. ⑤ Add parking brake, if applicable, for total inertia from product selection data. See CD-ROM. ⑥ Motor with resolver feedback.

PC800 DRIVES

Pacific Scientific PMA & PC800/PCE800 Systems



PC800 SERIES PERFORMANCE FEATURES

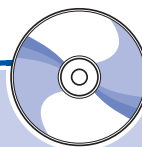
- 240 VAC nominal input power
- 2.7, 3.6 and 7.1 A_{RMS} continuous
- 5.3, 10.6 and 21.2 A_{RMS} peak output current
- Standard analog and digital interfaces
 - Step/Direction Digital interface-position or velocity control
 - Preset moves using an internal profile generator
 - ±10 V Analog interface-velocity or torque control
 - Quadrature encoder digital interface-electronic gearing follower
- All digital DSP-based RS-232/485 serial interface allows programming with an IBM-compatible PC
- Simple ASCII Protocol (SAP) compatible with many operator interfaces
- SERCOS interface™ connectivity offers communications via fiber optic network at up to 16 MHz
- Windows®-based 800Tools configuration software simplifies set-up:
 - Digital oscilloscope feature quickly shows drive function graphically
 - Intuitive parameter configuration-up and running in minutes
 - Advanced digital tuning for reduced settling time
 - All system and application parameters are set and saved
 - Automated diagnostic routine reduces troubleshooting time
- Rugged, PLC-like digital and analog I/O maximize application flexibility:
 - Six optically-isolated inputs
 - Three optically-isolated outputs
 - One relay output, 30 VDC @ 1A
 - Differential ±10 V analog input
 - Single-end analog input, ±5 VDC
 - Two analog outputs, ±5 VDC
 - Encoder quadrature output-up to 16,384 ppr
 - Encoder quadrature input (Step/Direction)
 - Enable input
 - +5 VDC @ 200 mA user output
 - +24 VDC @ 100 mA power supply for optically-isolated inputs
- Single resolver feedback survives hostile environments
- Hall/Encoder feedback allows application flexibility, making it suitable for use with many popular linear motors
- All connections on front-easy access to clearly marked connectors
- Optional Terminal Block Adapter speeds connections even further
- Separate logic supply input keeps logic power working when bus power is disconnected
- Extensive protection circuits and diagnostics to ease set-up
- 400 Hz velocity loop bandwidth
- Inaudible, high frequency, Digital PWM sine wave current control
- IGBT Power stage- more efficient, less audible noise

AGENCY APPROVAL

- UL recognized
 - 508C (Type R)
 - file #E137798
- cUL approved
- Meets IEC Vibration Standard, #68-2-6
- Models CE Compliant: EMC standard EN61800-3 and safety standard EN50178

AMPLIFIER RATINGS

	PC8x2		PC8x3		PC8x4	
Input Voltage						
Control logic voltage	90 - 264 VAC, 47 - 63 Hz, single phase					
Bus voltage	90 - 264 VAC, 1 or 3-phase					
Input Current						
Control logic current	500 mA maximum @120 VAC, 250 mA maximum @240 VAC					
	PC8x2		PC8x3		PC8x4	
	A _{RMS}	Equivalent A _{0-PEAK}	A _{RMS}	Equivalent A _{0-PEAK}	A _{RMS}	Equivalent A _{0-PEAK}
Bus Current (A)	4.5	6.4	9.0	12.7	18.0	25.5
Peak Output Current (A)						
5 seconds	5.3	7.5	10.6	15	21.2	30.0
Continuous Output Current						
25 - 40°C convection cooling (A)	2.7	0.8	3.6	5.0	7.1	10.0
25 - 40°C forced air cooling (A)	N/A	N/A	5.3	7.5	10.6	15.0
Peak Output Power @240 VAC						
1 second (kW)	2.25		4.5		9.0	
Continuous Output Power						
@240 VAC three phase						
25 - 40°C convection cooling (kW)	1.1		1.5		3.0	
25 - 40°C forced air cooling (kW)	N/A		2.2		4.5	
@240 VAC single phase						
25 - 40°C convection cooling (kW)	1.1		1.1		2.0	
25 - 40°C forced air cooling (kW)	N/A		1.6		2.0	
Power Stage Efficiency @ P _{CONT} (%)	98		98		98	
Shunt Regulator Power						
Peak power (300 msec) (kW)	12.8		12.8		12.8	
Continuous power						
25°C convection cooling (W)	200		200		200	
Maximum external regen duty cycle (%)	6		6		6	
Bus capacitance energy absorption						
from 320 V nominal bus (240 VAC) (joules)	20		30		40	



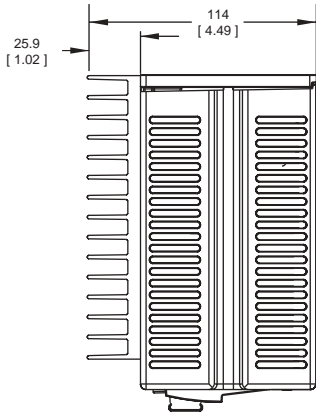
MOTIONEERING® CD-ROM

For more detailed product and selection information, see the **MOTIONEERING** CD-ROM inside the back cover of this catalog or visit our website at www.DanaherMotion.com.

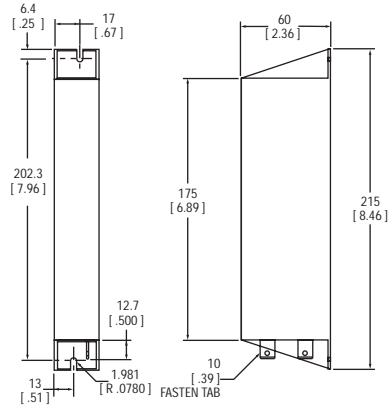
PC800 DRIVES

Pacific Scientific PMA & PC800/PCE800 Systems

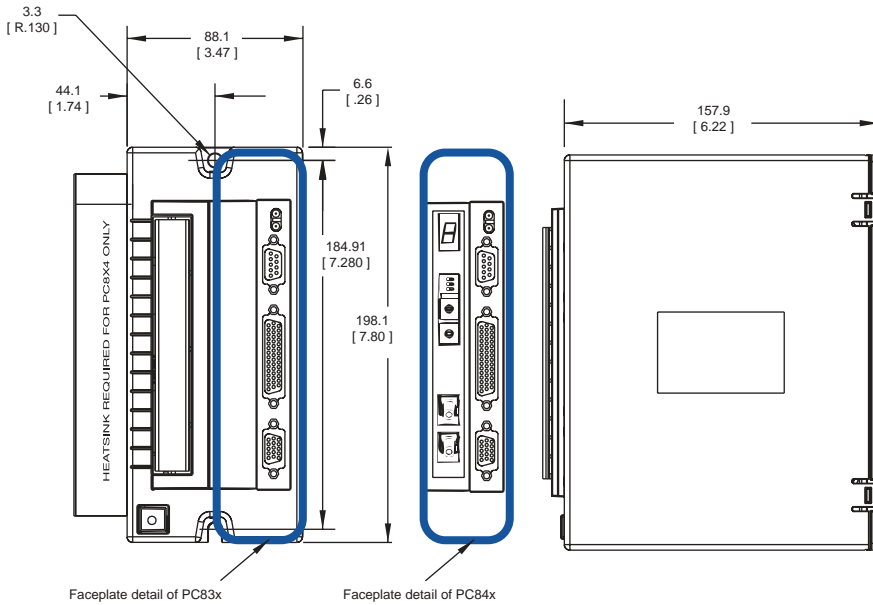
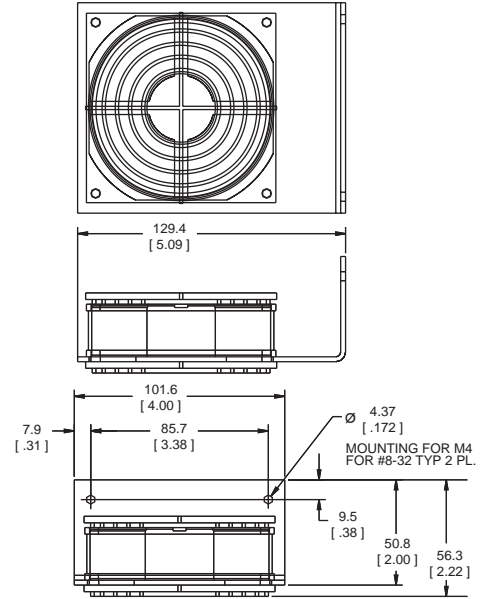
PC800 SERIES mm [in]



REGENERATION RESISTOR

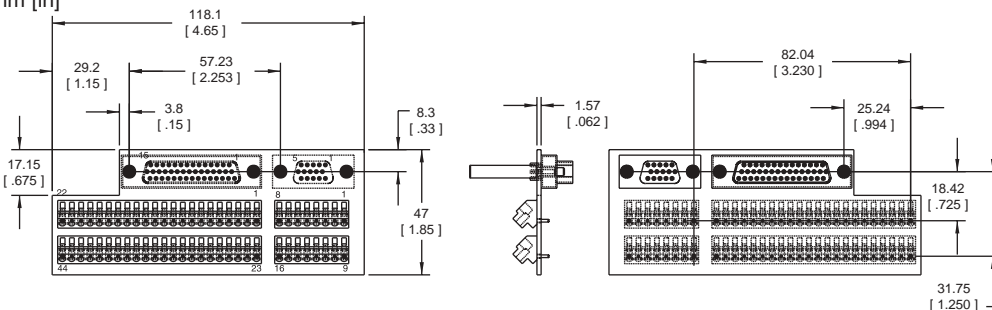


FAN KIT OPTION shown without electrical connection cable.



TERMINAL BLOCK ADAPTOR

mm [in]



PCE800 DRIVES

Pacific Scientific PMA & PC800/PCE800 Systems



PCE800 SERIES PERFORMANCE FEATURES

- 480 VAC nominal input power
- 3.75 A_{RMS} and 7.5 A_{RMS} continuous
- 7.5 A_{RMS} and 22.5 A_{RMS} peak output power
- Standard analog and digital interfaces
 - Step/Direction Digital interface-position or velocity control
 - Preset moves using an internal profile generator
 - ±10 V Analog interface-velocity or torque control
 - Quadrature encoder digital interface-electronic gearing follower
- All digital DSP-based
- RS-232/485 serial interface allows programming with an IBM-compatible PC
- Simple ASCII Protocol (SAP) compatible with many operator interfaces
- SERCOS interface™ connectivity offers communications via fiber optic network at up to 16 MHz
- Windows®-based 800Tools configuration software simplifies set-up:
 - Digital oscilloscope feature quickly shows drive function graphically
 - Intuitive parameter configuration- up and running in minutes
 - Advanced digital tuning for reduced settling time
 - All system and application parameters are set and saved
 - Automated diagnostic routine reduces troubleshooting time
- Rugged, PLC-like digital and analog I/O maximize application flexibility:
 - Six optically-isolated inputs
 - Three optically-isolated outputs
 - One relay output, 30 VDC @ 1 A
 - Differential ±10 V analog input
 - Single-end analog input, ±5 VDC
 - Two analog outputs, ±5 VDC
 - Encoder quadrature output- up to 16,384 ppr
 - Encoder quadrature input (Step/Direction)
 - Enable input
 - +5 VDC @ 200 mA user output
 - +24 VDC @ 100 mA power supply for optically-isolated inputs
- Single resolver feedback survives hostile environments
- Hall/Encoder feedback allows application flexibility making it suitable for use with many popular linear motors
- All connections on front-easy access to clearly marked connectors
- Optional Terminal Block Adapter speeds connections even further
- Separate logic supply input keeps logic power working when bus power is disconnected
- Extensive protection circuits and diagnostics to ease set-up
- 400 Hz velocity loop bandwidth
- Inaudible, high frequency, Digital PWM sine wave current control
- IGBT Power stage – more efficient, less audible noise

AGENCY APPROVAL

- UL, cUL and CE approvals pending as of publication date

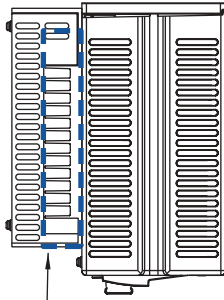
AMPLIFIER RATINGS

	PCE8x3		PCE8x5	
Input Voltage				
Control logic voltage	90 - 264 VAC, 47 - 63 Hz, single phase			
Bus voltage	180 - 528 VAC, 3-phase			
Input Current				
Control logic current	500 mA maximum @120 VAC, 250 mA maximum @240 VAC			
	PCE8x3		PCE8x5	
	A _{RMS}	Equivalent A _{0-PEAK}	A _{RMS}	Equivalent A _{0-PEAK}
Bus Current (A)	5.0	7.1	15.0	21.2
Peak Output Current				
3 seconds (A)	7.5	10.6	22.5	31.8
Continuous Output Current (RMS)²				
Convection (0 to 40°C Ambient) ³ (A)	3.75	5.3	7.5	10.6
Forced Air (0 to 40°C Ambient) ³ (A)	N/A	N/A	11.25	15.9
Peak Output Power @ 400 VAC				
1 second (kW)	5.3		16.0	
Peak Output Power @ 480 VAC				
1 second (kW)	6.4		19.2	
Continuous Output Power				
@400 VAC three phase				
25°C convection cooling (kW)	2.1		4.6	
50°C forced air cooling (kW)	N/A		6.3	
@480 VAC three phase				
25°C convection cooling (kW)	2.6		5.6	
50°C forced air cooling (kW)	N/A		4.9	
Power Stage Efficiency @ P_{CONT} (%)	97		97	
Shunt Regulator Power				
Peak power (300 msec) (kW)	10		20	
Continuous power				
Standard internal resistor (W)	200		100	
External regen (W)	N/A		400	
Maximum external regen duty cycle (%)	6		N/A	
Minimum motor inductance I-L (mH)	5		1.7	
Bus capacitance energy absorption				
from 640 V nominal bus (480 VAC) (joules)	35		70	

PCE800 DRIVES

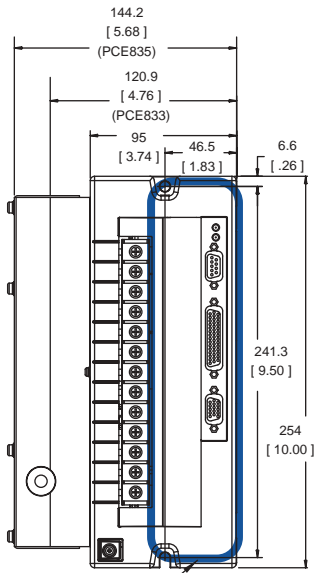
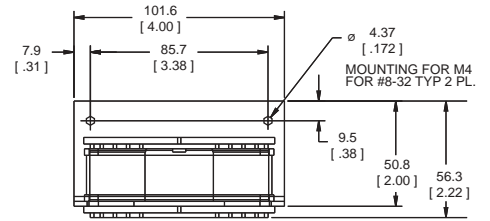
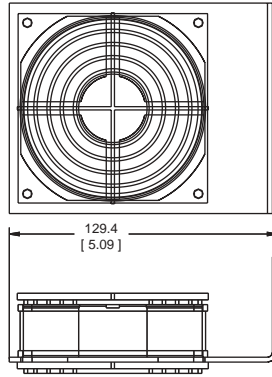
Pacific Scientific PMA & PC800/PCE800 Systems

PCE830/840 DIMENSIONS mm [in]

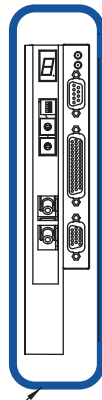


Dashed line shows PCE8x3 heat sink profile. PCE8x5 shown.

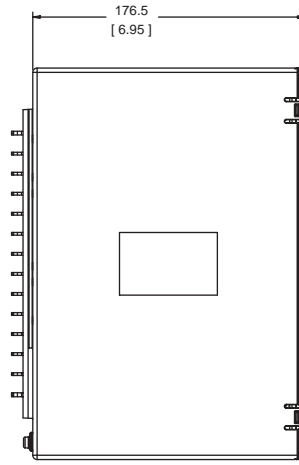
FAN KIT OPTION shown without electrical connection cable.



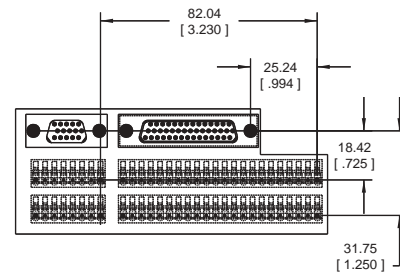
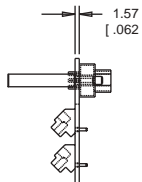
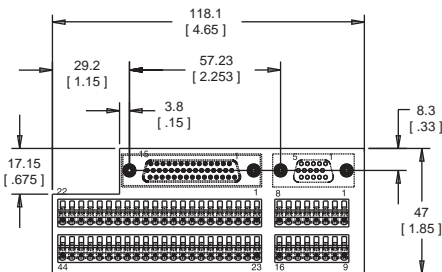
Faceplate detail of PCE83x



Faceplate detail of PCE84x

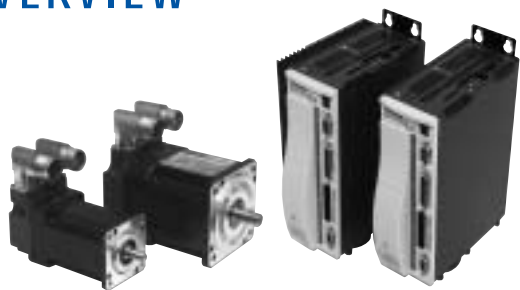


TERMINAL BLOCK ADAPTER mm [in]



SYSTEM OVERVIEW

Kollmorgen GOLDLINE® XT & SERVOSTAR® CD/600 Systems



Kollmorgen GOLDLINE® XT SEE PAGE 24

XT series servomotors provide high performance, cost-effective solutions in compact, rugged packages.

Kollmorgen's patented magnetic design allows high torque-to-inertia for rapid acceleration, while providing extremely low cogging and torque ripple for smooth operation.

The proprietary stator assembly provides more efficient heat transfer for high torque density (compact size), and at the same time increases thermal time constants to allow longer overloads on machines.

The XT series models are designed for use with the SERVOSTAR family of drives for optimum performance. These motors come equipped with an integral resolver or incremental encoder, and rugged CE compliant swivel connectors. Optional sine encoder feedback for extremely high accuracy is also available.

- Four frame sizes from 60 to 174 mm (2.35 to 6.85 in)
- 0.44 to 50.6 N-m (0.32 to 37.3 lb-ft) Continuous
- Up to 152 N-m (112 lb-ft) Peak
- Speeds to 6000 rpm
- Resolver, optical encoder, or sine encoder feedback
- IP65 sealing (IP67 optional)
- Optional integral electrically-released brake (24 or 90 VDC)
- Wide range swivel connectors
- UL Recognized, CE compliant

When combined with the SERVOSTAR digital amplifier series (using Kollmorgen's patented phase angle advance algorithms), the system performance provides the most peak torque and speed in the industry. All motors and drives are UL recognized.

SERVOSTAR® CD SEE PAGE 28

The SERVOSTAR CD amplifier is a compact, fully digital amplifier designed to simplify installation and system set-up. Three control algorithms and self-tuning (to the load) functionality allows high performance operation to be achieved quickly and easily.

Since not one control algorithm is best for all machines, SERVOSTAR CD contains Pole Placement, PI, and PDFF control algorithms. SERVOSTAR CD utilizes PC-based MOTIONLINK® for Windows® which automatically takes you through the key steps of installation and start up.

- 115 to 230 volt single phase or three phase AC input power
- Resolver, encoder, or sine encoder feedback
- Integrated power supply
- Fully digital control



SERVOSTAR 600

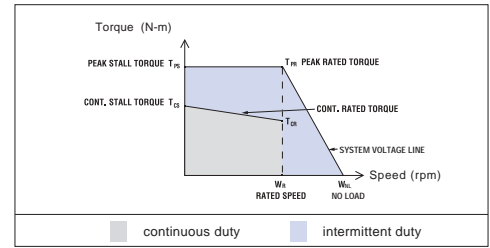
SERVOSTAR® 600 SEE PAGE 34

The SERVOSTAR 600 is a high performance, high power drive accepting 208-480 VAC and producing from 3-70 A_{RMS} continuous. In combination with Kollmorgen GOLDLINE series motors (BH, XT, DDR) and Kollmorgen PLATINUM® DDL series motors, it offers the highest power, most advanced features, and broadest connectivity in the global marketplace. The integrated power supply makes it ideal for single and multi-axis applications.

- Fully protected
- Meets CE and UL requirements
- Built-in features minimize total machine cost by eliminating the need for external hardware
- Small footprint - CE Filters in 3-20 A units (standard) and option cards are contained inside the drive
- Digital position and velocity control
- Position generator supports trapezoidal and sinusoidal acceleration
- Motion Tasking support tied to I/O
- Interface through analog command, digital I/O, pulse direction or encoder follower, and fieldbuses
- Built-in CANOpen support

SYSTEM OVERVIEW

Kollmorgen GOLDLINE® XT & SERVOSTAR® CD/600 Systems



RECOMMENDED MOTOR/DRIVE SYSTEMS, 230 VAC

Servo Motor Model	Servo Drive Model	Peak Stall Torque T_{PS} N-m (lb-in)	Peak Rated Torque T_{PR} N-m (lb-in)	Cont. Stall Torque T_{CS} N-m (lb-in)	Cont. Rated Torque T_{CR} ^① N-m (lb-in)	Rated Speed W_R rpm	No-Load Speed W_{NL} rpm	Cont. Stall Current I_{CS} A_{RMS}	Current at Peak Torque I_{PS} A_{RMS}	Inertia J kgm ² (lb-in-S ²)	Inductance Line-Line L mH
XT Series Motors with SERVOSTAR CD Drives											
MT1502A1 ②	Cx03	1.24 (11.0)	0.93 (8.2)	0.44 (3.9)	0.37 (3.3)	6000	n/a	2.20	7.2	0.0000127 (0.001126)	13.2
MT1504A1 ②	Cx03	2.03 (18.0)	1.66 (14.7)	0.74 (6.5)	0.60 (5.3)	6000	n/a	2.90	9.0	0.0000195 (0.001728)	9.3
MT1506A1 ②	Cx03	3.80 (33.6)	2.30 (20.4)	1.35 (11.9)	1.07 (9.5)	6000	n/a	2.89	9.0	0.0000317 (0.002808)	14.9
MT1506B1 ②	Cx06	3.90 (34.5)	3.15 (27.9)	1.38 (12.2)	1.03 (9.1)	6000	n/a	5.86	18.0	0.0000317 (0.002808)	3.7
MT302A1 ②	Cx03	2.92 (25.8)	1.97 (17.4)	1.21 (10.7)	1.17 (10.4)	4500	n/a	2.44	9.0	0.0000465 (0.000412)	35.0
MT302B1 ②	Cx06	2.98 (26.4)	2.36 (20.9)	1.19 (10.5)	1.07 (9.5)	6000	n/a	4.44	16.5	0.0000465 (0.000412)	11.5
MT304A1 ②	Cx03	6.12 (54.2)	3.35 (29.7)	2.44 (21.6)	2.18 (19.3)	3000	n/a	2.59	9.0	0.0000808 (0.000715)	58.0
MT304B1 ②	Cx06	6.10 (54.0)	3.95 (35.0)	2.37 (21.0)	2.01 (17.8)	6000	n/a	5.26	18.0	0.0000808 (0.000715)	14.0
MT306A1 ②	Cx03	8.60 (76.1)	4.59 (40.6)	3.30 (29.2)	3.05 (27.0)	2500	n/a	2.73	9.0	0.000111 (0.00098)	60.0
MT306B1 ②	Cx06	8.25 (73.0)	5.10 (45.1)	3.24 (28.7)	2.98 (26.4)	4600	n/a	5.35	18.0	0.000111 (0.00098)	17.0
MT308A1 ②	Cx03	11.80 (104.4)	7.00 (62.0)	4.71 (41.7)	4.22 (37.4)	1500	n/a	2.58	9.0	0.000175 (0.00155)	80.0
MT308B1 ②	Cx06	11.80 (104.4)	9.00 (79.7)	4.71 (41.7)	4.01 (35.5)	3000	n/a	5.16	18.0	0.000175 (0.00155)	22.0
MT504B1 ③	Cx10	21.7 (192.0)	11.2 (99.22)	6.6 (58.8)	5.2 (46.02)	3300	n/a	8.6	20.0	0.00093 (0.00828)	10.5
MT504B2 ③	Cx10	21.7 (192.0)	11.2 (99.22)	6.6 (58.8)	5.2 (46.02)	3300	n/a	8.6	20.0	0.00093 (0.00828)	10.5
MT506A1 ③	Cx10	45.1 (398.4)	19.2 (170.2)	10.9 (96.0)	9.5 (84.08)	2200	n/a	8	20.0	0.00181 (0.01608)	14.6
MT506A2 ③	Cx10	45.1 (398.4)	19.2 (170.2)	10.9 (96.0)	9.5 (84.08)	2200	n/a	8	20.0	0.00345 (0.03048)	14.6

RECOMMENDED MOTOR/DRIVE SYSTEMS, 480 VAC

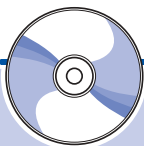
XT Series Motors with SERVOSTAR 600 Drives											
Servo Motor Model	Servo Drive Model	Peak Stall Torque T_{PS} N-m (lb-in)	Peak Rated Torque T_{PR} N-m (lb-in)	Cont. Stall Torque T_{CS} N-m (lb-in)	Cont. Rated Torque T_{CR} ^① N-m (lb-in)	Rated Speed W_R rpm	No-Load Speed W_{NL} rpm	Cont. Stall Current I_{CS} A_{RMS}	Current at Peak Torque I_{PS} A_{RMS}	Inertia J kgm ² (lb-in-S ²)	Inductance Line-Line L mH
MT322A1 ②	S603	2.65 (23.5)	2.56 (22.7)	1.21 (10.7)	1.08 (9.6)	6000	n/a	2.01	6	0.0000465 (0.000412)	50.4
MT324A1 ②	S606	6.28 (55.6)	5.56 (49.2)	2.31 (20.4)	1.97 (17.4)	6000	n/a	3.01	12	0.0000808 (0.000715)	38
MT328B1 ②	S606	12.1 (107.1)	9.68 (85.7)	4.41 (39.0)	2.26 (20.0)	5000	n/a	3.65	12	0.000175 (0.00155)	35
MT522B1 ③	S606	8.3 (73.5)	7.15 (63.3)	3.3 (29.2)	2.9 (25.7)	4000	n/a	2.98	12	0.00051 (0.00451)	57
MT522B2 ③	S606	8.3 (73.5)	7.15 (63.3)	3.3 (29.2)	2.9 (25.7)	4000	n/a	2.98	12	0.00108 (0.00956)	57
MT524C1 ③	S610	17.1 (151.3)	15.20 (134.5)	6.3 (55.8)	5.24 (46.4)	4000	n/a	5.4	20	0.00093 (0.00823)	28
MT524C2 ③	S610	17.1 (151.3)	15.20 (134.5)	6.3 (55.8)	5.24 (46.4)	4000	n/a	5.4	20	0.00208 (0.0184)	28
MT526B1 ③	S610	29.2 (258.4)	24.00 (212.4)	10.7 (94.7)	7.80 (69.0)	3600	n/a	5.88	20	0.00181 (0.0160)	30
MT526B2 ③	S610	29.2 (258.4)	24.00 (212.4)	10.7 (94.7)	7.80 (69.0)	3600	n/a	5.88	20	0.00345 (0.0305)	30
MT722B1 ④	S614	49 (433.7)	40.8 (361.1)	22.1 (195.6)	13.3 (117.7)	3000	n/a	10.7	28	0.0054 (0.0478)	26
MT722B2 ④	S614	49 (433.7)	40.8 (361.1)	22.1 (195.6)	13.3 (117.7)	3000	n/a	10.7	28	0.013 (0.115)	26
MT722C1 ④	S614	40.5 (358.5)	29.0 (256.7)	22.1 (195.6)	12.3 (108.9)	3400	n/a	14.0	28	0.0054 (0.0478)	16
MT722C2 ④	S614	40.5 (358.5)	29.0 (256.7)	22.1 (195.6)	12.3 (108.9)	3400	n/a	14.0	28	0.013 (0.115)	16
MT724A1 ④	S620	79.5 (703.6)	65.0 (575.3)	31.6 (279.7)	22 (194.7)	2250	n/a	13.0	40	0.0078 (0.0690)	21
MT724A2 ④	S620	79.5 (703.6)	65.0 (575.3)	31.6 (279.7)	22 (194.7)	2250	n/a	13.0	40	0.019 (0.168)	21
MT724B1 ④	S620	59.5 (526.6)	25.0 (221.3)	31.3 (277.0)	16 (141.6)	3400	n/a	19.2	40	0.0078 (0.0690)	9.7
MT724B2 ④	S620	59.5 (526.6)	25.0 (221.3)	31.3 (277.0)	16 (141.6)	3400	n/a	19.2	40	0.019 (0.168)	9.7
MT726B1 ④	S620	103 (911.6)	89.0 (787.7)	47.7 (422.2)	28.6 (253.1)	2300	n/a	17.3	40	0.0126 (0.112)	18.5
MT726B2 ④	S620	103 (911.6)	89.0 (787.7)	47.7 (422.2)	28.6 (253.1)	2300	n/a	17.3	40	0.039 (0.345)	18.5
MT726C1 ④	S640	115.5 (1022)	92.5 (818.7)	50.6 (447.8)	24.9 (220)	3400	n/a	31.6	80	0.0126 (0.112)	6.4
MT726C2 ④	S640	115.5 (1022)	92.5 (818.7)	50.6 (447.8)	24.9 (220)	3400	n/a	31.6	80	0.0239 (0.212)	6.4

① Ambient temperature at 40°C (or less).

② Continuous duty is with motor mounted to a 96 in² x 3/8" Aluminum faceplate.

③ Continuous duty is with motor mounted to a 300 in² x 3/4" Aluminum faceplate.

④ Continuous duty is with motor mounted to a 400 in² x 1" Aluminum faceplate.



MOTIONEERING® CD-ROM

For more detailed product and selection information, see the MOTIONEERING CD-ROM inside the back cover of this catalog or visit our website at www.DanaherMotion.com.

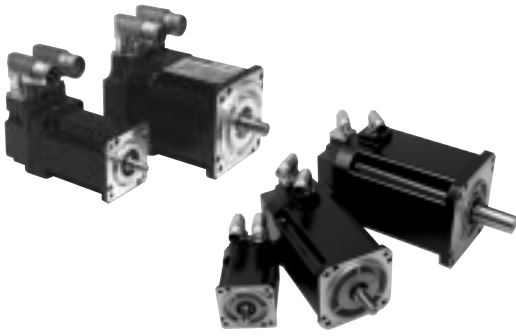
XT SERIES MOTORS

Kollmorgen GOLDLINE® XT & SERVOSTAR® CD Systems

XT150 SERIES MOTORS

RATINGS AND CHARACTERISTICS

Motor parameters and winding data. See system data beginning on page 23 for typical torque/speed performance.



Features

XT Series Motors

Benefits

Multiple frame sizes and stack lengths	Wide range of ratings and sizes to match envelope
Low and medium inertia versions	Obtain maximum acceleration or optimize for compliant loads
Short overall motor lengths	Easier to fit into limited spaces
Optimized torque-to-inertia ratios	High acceleration
Low cogging and torque ripple	Extremely smooth low speed operation
Increased thermal time constant	Allows for longer overloads
English and Metric standard mounting	Versatile mounting
UL recognized, CE compliant	International applications
Optimized windings to match SERVOSTAR drives	Optimum performance and cost
Swivel connectors	Accommodate a variety of application environments
Resolver, incremental or sine encoder feedback	Optimize the application for lowest cost or maximum accuracy and resolution
Built-in thermostat	Over-temperature protection
IP65 sealing	Rugged industrial sealing

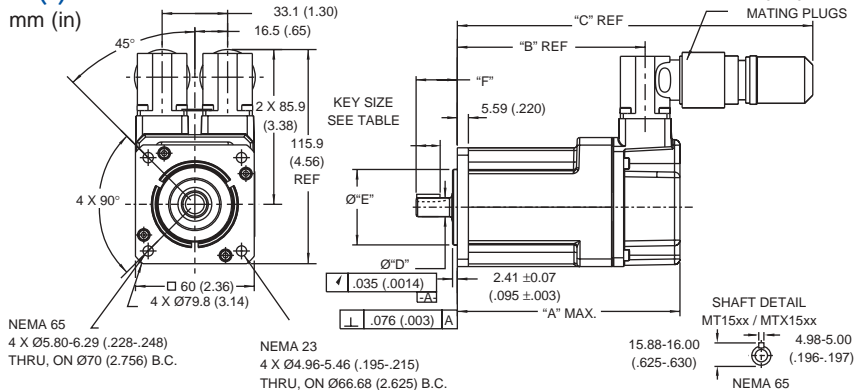
PARAMETER	SYMBOL	UNITS	MT1502A1	MT1504A1	MT1506A1	MT1506B1
Horsepower	HP _{RATED}	hp	0.31	0.50	0.90	0.87
Kilowatts	kW _{RATED}	kW	0.23	0.37	0.67	0.65
Speed at Rated Power	N _{RATED}	rpm	6000	6000	6000	6000
Max Operating Speed	N _{MAX}	rpm	6000	6000	6000	6000
Cont. Torque (Stall) at 40°C	T _{CS}	N-m (lb-ft)	0.438 (0.323)	0.742 (0.547)	1.353 (0.998)	1.384 (1.021)
Cont. Torque (Stall) at 25°C	T _{CS}	N-m (lb-ft)	0.466 (0.344)	0.790 (0.583)	1.441 (1.063)	1.474 (1.087)
Cont. Line Current	I _{CS}	A _{RMS}	2.21	2.93	2.89	5.86
Peak Torque	T _{PS}	N-m (lb-ft)	1.25 (0.92)	2.42 (1.78)	4.62 (3.41)	4.67 (3.44)
Peak Line Current	I _{PS}	A _{RMS}	7.2	11	11.4	22.7
Max Theoretical Acceleration	Z	rad/sec ²	98013	123864	145746	147062
Torque Sensitivity (Stall) ±10%	K _T	N-m (lb-ft) / A _{RMS}	0.202 (0.149)	0.258 (0.190)	0.476 (0.351)	0.240 (0.177)
Back EMF (Line to Line) ±10%	K _b	V _{RMS} / krpm	12.2	15.6	28.8	14.5
Max Line-to-Line volts	V _{MAX}	V _{RMS}	250	250	250	250
DC Res at 25°C (Line-to-Line) ±10%	R _m	ohms	6.85	3.77	5.33	1.34
Inductance (Line-to-Line) ±30%	L _m	mH	13.2	9.3	14.9	3.7
Rotor Inertia	J _m	kg-m ² (lb-ft-sec ²)	0.127 (0.0938)	0.195 (0.144)	0.317 (0.234)	0.317 (0.234)
Weight (without brake)	W _i	kg (lb)	1.1 (2.4)	1.3 (2.9)	1.9 (4.1)	1.9 (4.1)
Weight (with brake)	W _i	kg (lb)	1.5 (3.4)	1.8 (3.9)	2.3 (5.1)	2.3 (5.1)
Static Friction	T _f	N-m (lb-ft)	0.0072 (0.0053)	0.0130 (0.0096)	0.024 (0.018)	0.024 (0.018)
Thermal Time Constant	TCT	minutes	12	15	24	24
Viscous Damping Z Source	F _i	N-m (lb-ft) / krpm	0.0023 (0.0017)	0.0049 (0.0036)	0.0069 (0.0051)	0.0069 (0.0051)
Motor Constant at 25°C	K _m	N-m (lb-ft) / √ watts	0.068 (0.050)	0.120 (0.086)	0.18 (0.134)	0.18 (0.135)
Thermal Resistance at Stall	R _{th}	°C / watt	1.33	1.37	0.99	0.96
Number of Poles			8	8	8	8

Notes:

- For models with shaft seals, derate torque at all speeds by 0.059 lb-ft (0.08 N-m)
- Continuous duty operation is based on using 96 in² x 3/8" aluminum plate.

MT(x)150x

mm (in)



www.DanaherMotion.com • 815-226-2222

Model	"A" MAX.		"B" REF.		"C"		"D"		"E"		"F" ±.76 (±.03)		Key Length	
	with brake	without brake	with brake	without brake	with brake	without brake	NEMA 23	NEMA 65	NEMA 23	NEMA 65	NEMA 23	NEMA 65	NEMA 34	NEMA 100
MT(x)1502	158.70 (6.248)	113.4 (4.465)	140.33 (5.525)	95.31 (3.752)	230.38 (9.07)	185.42 (7.30)	9.513	13.997	38.05	49.99	20.83	30	no	20 (0.79)
MT(x)1504	174.24 (6.860)	128.94 (5.077)	155.88 (6.137)	110.85 (4.364)	245.87 (9.68)	200.91 (7.91)	9.525	14.006	38.15	50.01	(0.820)	(1.181)	keyway	20 (0.79)
MT(x)1506	205.23 (8.080)	160.03 (6.301)	186.97 (7.361)	141.94 (5.588)	277.11 (10.91)	231.90 (9.13)	(0.3745)	(0.5511)	(1.498)	(1.968)	(1.502)	(1.969)		20 (0.79)

MT150x = without brake
MTB150x = with 90 VDC brake
MTC150x = with 24 VDC brake

XT30/32 SERIES MOTORS

Kollmorgen GOLDLINE® XT & SERVOSTAR® CD/600 Systems

RATINGS AND CHARACTERISTICS

Motor parameters and winding data. See system data beginning on page 23 for typical torque/speed performance.

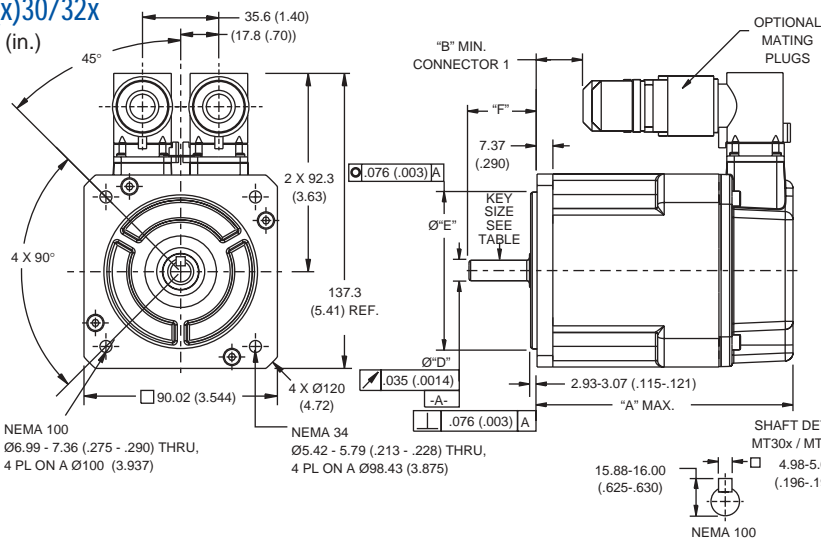
XT 30/32 SERIES MOTORS

PARAMETER	SYMBOL	UNITS	MT302A1	MT302B1	MT304A1	MT304B1	MT306A1	MT306B1	MT308A1	MT308B1	MT322A1	MT324A1	MT328B1
Horsepower	HP _{RATED}	hp	0.79	0.97	0.95	1.76	1.1	1.98	0.90	1.72	0.91	1.65	1.59
Kilowatts	kW _{RATED}	kW	0.59	0.72	0.70	1.31	0.82	1.47	0.67	1.28	0.68	1.22	1.18
Speed at Rated Power	N _{RATED}	rpm	4500	6000	3000	6000	2500	4600	1500	3000	6000/6000	6000/6000	4200/5000
Max Operating Speed	N _{MAX}	rpm	4500	6000	3000	6000	2500	4600	1500	3000	6000/6000	6000/6000	4200/5000
Cont. Torque (Stall) at 40°C	T _{ES}	N-m (lb-ft)	1.29 (0.95)	1.27 (0.94)	2.52 (1.86)	2.45 (1.81)	3.32 (2.49)	3.32 (2.45)	4.79 (3.53)	4.79 (3.53)	1.21 (0.89)	2.31 (1.70)	4.41 (3.25)
Cont. Torque (Stall) at 25°C	T _{ES}	N-m (lb-ft)	1.37 (1.01)	1.35 (1.00)	2.68 (1.98)	2.61 (1.93)	3.60 (2.65)	3.54 (2.61)	5.10 (3.76)	5.10 (3.76)	1.28 (0.95)	2.46 (1.81)	4.70 (3.46)
Cont. Line Current	I _{ES}	A _{RMS}	2.44	4.44	2.59	5.26	2.73	5.35	2.58	5.16	2.01	3.01	3.65
Peak Torque	T _{PS}	N-m (lb-ft)	3.23 (2.38)	3.22 (2.38)	7.40 (5.45)	7.41 (5.47)	11.24 (8.29)	11.29 (8.32)	18.76 (13.84)	18.73 (13.81)	3.24 (2.39)	7.41 (5.47)	18.68 (13.78)
Peak Line Current	I _{PS}	A _{RMS}	9.0	16.5	10.0	20.9	11.1	22.2	12.2	24.5	7.9	12.7	18.7
Max Theoretical Acceleration	Z	rad/sec ²	69364	69346	91524	91714	101243	101643	107278	107091	69573	91703	106831
Torque Sensitivity (Stall) ±10%	K _t	N-m (lb-ft) / A _{RMS}	0.540 (0.398)	0.294 (0.217)	0.985 (0.727)	0.473 (0.349)	1.255 (0.926)	0.630 (0.465)	1.898 (1.400)	0.947 (0.699)	0.617 (0.455)	0.779 (0.574)	1.238 (0.913)
Back EMF (Line to Line) ±10%	K _b	V _{RMS} / krpm	32.6	17.8	59.6	28.6	75.9	38.1	114.8	57.3	37.3	47.1	74.9
Max Line-to-Line volts	V _{MAX}	V _{RMS}	250	250	250	250	250	250	250	250	400/480	400/480	400/480
DC Res at 25°C (Line-to-Line) ±10%	R _m	ohms	7.77	2.24	7.93	1.79	7.75	1.94	8.45	2.11	11.19	5.45	4.22
Inductance (Line-to-Line) ±30%	L _m	mH	35	11.5	58	14	60	17	80	22	50.4	38	35
Rotor Inertia	J _m	kg-m ² (lb-ft-sec ²)	0.0000465 (0.0000343)	0.0000465 (0.0000343)	0.0000808 (0.0000596)	0.0000808 (0.0000596)	0.000111 (0.0000819)	0.000111 (0.0000819)	0.0001749 (0.0001290)	0.0001749 (0.0001290)	0.0000465 (0.0000434)	0.0000808 (0.0000596)	0.0001749 (0.000129)
Weight (without brake)	W _i	kg (lb)	2.5 (5.6)	2.5 (5.6)	3.3 (7.3)	3.3 (7.3)	3.8 (8.4)	3.8 (8.4)	5.1 (11.3)	5.1 (11.3)	2.5 (5.6)	3.3 (7.3)	5.1 (11.3)
Weight (with brake)	W _t	kg (lb)	3.6 (8.0)	3.6 (8.0)	4.3 (9.7)	4.3 (9.7)	4.8 (10.8)	4.8 (10.8)	6.1 (13.7)	6.1 (13.7)	3.6 (8.0)	4.3 (9.7)	6.1 (13.7)
Static Friction	T _f	N-m (lb-ft)	0.030 (0.022)	0.030 (0.022)	0.035 (0.026)	0.035 (0.026)	0.052 (0.038)	0.052 (0.038)	0.0781 (0.106)	0.0781 (0.106)	0.030 (0.00573)	0.035 (0.026)	0.106 (0.0781)
Thermal Time Constant	TCT	minutes	22	22	25	25	31	31	33	33	22	25	33
Viscous Damping Z Source	F _v	N-m (lb-ft)/krpm	0.0078 (0.0057)	0.0078 (0.0057)	0.0112 (0.0083)	0.0112 (0.0083)	0.023 (0.017)	0.023 (0.017)	0.025 (0.018)	0.025 (0.018)	0.00777 (0.00573)	0.01125 (0.00830)	0.02468 (0.01820)
Motor Constant at 25°C	K _m	N-m (lb-ft)/√watts	0.170 (0.125)	0.173 (0.127)	0.307 (0.226)	0.311 (0.229)	0.397 (0.292)	0.398 (0.293)	0.575 (0.422)	0.574 (0.422)	0.162 (0.119)	0.294 (0.216)	0.530 (0.390)
Thermal Resistance at Stall	R _{th}	°C / watt	0.955	1.001	0.828	0.891	0.765	0.795	0.788	0.786	0.979	0.895	0.788
Number of Poles			8	8	8	8	8	8	8	8	8	8	8

Notes:

- For models with shaft seals, derate torque at all speeds by 0.059 lb-ft (0.08 N-m)
- Continuous duty operation is based on using 96 in² x 3/8" aluminum plate.

MT(x)30/32x mm (in.)



Notes:

- Dimensions in mm (inches)
- Tolerances, unless otherwise specified:
 - XX decimal places ± 0.38 (0.015);
 - XXX decimal places ± 0.127 (0.005)
- Connectors rotate for models MT302/322. DIM B is too small for cable bend radius. Rotate connector a minimum of 35°

Model	"A" MAX.		"B" MIN.		"D"		"E"		"F" ±.76 (±.03)		Key Length	
	with brake	without brake	with brake	without brake	NEMA 34	NEMA 100	NEMA 34	NEMA 100	NEMA 34	NEMA 100	NEMA 34	NEMA 100
MT(x)302	165.6 (6.520)	120.1 (4.730)	65.14 (2.565)	19.93 (0.785)	9.512-9.525	14.01	73.05	80.03			no	20 (0.79)
MT(x)304	183.1 (7.210)	137.7 (5.420)	82.67 (3.255)	37.46 (1.475)	(0.3745-0.3750)	13.99	73.00	79.99	31.75	30	keyway	20 (0.79)
MT(x)306	198.6 (7.820)	153.2 (6.030)	98.16 (3.865)	52.95 (2.085)	12.69-12.70	(0.5515)	(2.876)	(3.151)	(1.250)	(1.181)	19 (0.75)	20 (0.79)
MT(x)308	231.7 (9.120)	186.2 (7.330)	131.2 (5.165)	85.97 (3.385)	(0.4995-0.5000)	(0.5511)	(2.874)	(3.149)			19 (0.75)	20 (0.79)

MT30/32x = without brake
 MTB30/32x = with 90 VDC brake
 MTC30/32x = with 24 VDC brake

XT50/52 SERIES MOTORS

Kollmorgen GOLDLINE® XT & SERVOSTAR® CD/600 Systems

RATINGS AND CHARACTERISTICS

Motor parameters and winding data. See system data beginning on page 23 for typical torque/speed performance.

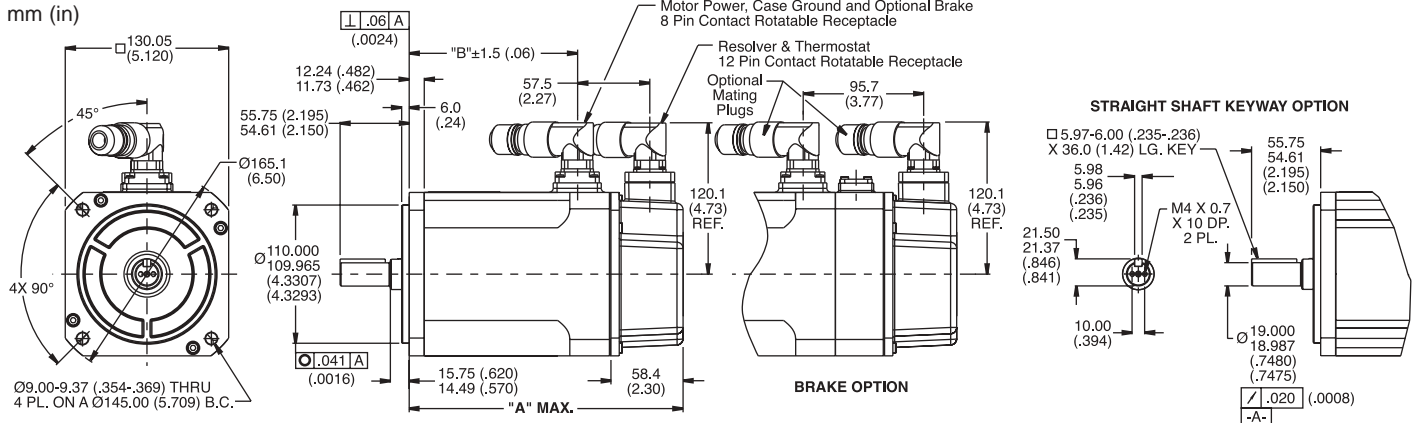
PARAMETER	SYMBOL	UNITS	MT504B1	MT504B2	MT506A1	MT506A2	MT522B1	MT522B2	MT524C1	MT524C2	MT526B1	MT526B2
Horsepower	HP _{rated}	hp	3.2	3.2	3	3	1.6	1.6	2.9	2.9	4.0	4.0
Kilowatts	kW _{rated}	kW	2.4	2.4	2.2	2.2	1.2	1.2	2.2	2.2	3.0	3.0
Speed at Rated Power	N _{rated}	rpm	4000	4000	2300	2300	4000/4000	4000/4000	4000/4000	4000/4000	3000/3600	3000/3600
Max Operating Speed	N _{max}	rpm	4000	4000	2300	2300	4000/4000	4000/4000	4000/4000	4000/4000	3000/3600	3000/3600
Cont. Torque (Stall) at 40°C	T _{cs}	N-m (lb-ft)	6.6 (4.9)	6.6 (4.9)	10.9 (8.0)	10.9 (8.0)	3.3 (2.4)	3.3 (2.4)	6.3 (4.63)	6.3 (4.63)	10.7 (7.91)	10.7 (7.91)
Cont. Torque (Stall) at 25°C	T _{cs}	N-m (lb-ft)	7.03 (5.22)	7.0 (5.2)	11.6 (8.5)	11.6 (8.5)	3.5 (2.6)	3.5 (2.6)	6.7 (4.9)	6.7 (4.9)	11.4 (8.4)	11.4 (8.4)
Cont. Line Current	I _{cs}	A _{RMS}	8.6	8.6	8.0	8.0	2.98	2.98	5.4	5.4	5.88	5.88
Peak Torque	T _{ps}	N-m (lb-ft)	21.7 (16.0)	21.7 (16)	45.1 (33.2)	45.1 (33.2)	10.2 (7.5)	10.2 (7.5)	21.7 (16.0)	21.7 (16.0)	45.4 (33.5)	45.4 (33.5)
Peak Line Current	I _{ps}	A _{RMS}	34.7	34.7	37.2	37.2	12.1	12.1	23.2	23.2	40.1	40.1
Max Theoretical Acceleration	Z	rad/sec ²	23279	10444	24869	13063	20087	9462	23279	10444	25063	13165
Torque Sensitivity (Stall) ±10%	K _t	N-m (lb-ft) / A _{RMS}	0.775 (0.572)	0.775 (0.572)	1.37 (1.01)	1.37 (1.01)	1.11 (0.816)	1.11 (0.816)	1.163 (0.858)	1.163 (0.858)	1.83 (1.35)	1.83 (1.35)
Back EMF (Line to Line) ±10%	K _b	V _{RMS} / krpm	46.9	46.9	82.9	82.9	66.9	66.9	70.4	70.4	110.4	110.4
Max Line-to-Line volts	V _{max}	V _{RMS}	250	250	250	250	400/480	400/480	400/480	400/480	400/480	400/480
DC Res at 25°C (Line-to-Line) ±10%	R _m	ohms	1.18	1.18	1.46	1.46	8.66	8.66	2.97	2.97	2.65	2.65
Inductance (Line-to-Line) ±30%	L _m	mH	10.5	10.5	14.6	14.6	57	57	28	28	13.1	13.1
Rotor Inertia	J _m	kg-m ² (lb-ft-sec ²)	0.00093 (0.00069)	0.00208 (0.00154)	0.00181 (0.00134)	0.00181 (0.00134)	0.00051 (0.00037)	0.00108 (0.00079)	0.00093 (0.00069)	0.00208 (0.00154)	0.00181 (0.00134)	0.00345 (0.00254)
Weight (without brake)	W _i	kg (lb)	8.0 (17.6)	9.1 (20.1)	11.0 (24.2)	11.0 (24.2)	5.9 (12.9)	6.7 (14.8)	8.0 (17.6)	9.1 (20.1)	11.0 (24.2)	13.1 (28.9)
Weight (with brake)	W _t	kg (lb)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Static Friction	T _f	N-m (lb-ft)	0.115 (0.085)	0.115 (0.085)	0.27 (0.2)	0.27 (0.2)	0.080 (0.059)	0.080 (0.059)	0.115 (0.085)	0.115 (0.085)	0.27 (0.20)	0.27 (0.20)
Thermal Time Constant	TCT	minutes	40	40	47	47	34	34	40	40	47	47
Viscous Damping Z Source	F _v	N-m (lb-ft)/krpm	0.050 (0.037)	0.050 (0.037)	0.107 (0.079)	0.107 (0.079)	0.047 (0.0350)	0.047 (0.035)	0.050 (0.037)	0.050 (0.037)	0.107 (0.079)	0.107 (0.079)
Motor Constant at 25°C	K _m	N-m (lb-ft) / √watts	0.619 (0.455)	0.619 (0.455)	0.983 (0.723)	0.983 (0.723)	0.325 (0.239)	0.325 (0.239)	0.585 (0.43)	0.585 (0.43)	0.968 (0.712)	0.968 (0.712)
Thermal Resistance at Stall	R _{th}	°C / watt	0.549	0.549	0.515	0.515	0.619	0.619	0.55	0.55	0.568	0.568
Number of Poles			8	8	8	8	8	8	8	8	8	8

Notes:

1. Continuous duty operation is with motor mounted to a 300 in² x 3/4" aluminum faceplate.

MT(x)50x/52x

mm (in)



Model	"A" MAX. with brake-without brake	"B"
MT(x)502	218.8 (8.615)-180.6 (7.110)	98 (3.84)
MT(x)504	255.3 (10.05)-217.1 (8.547)	134 (5.28)
MT(x)506	300.5 (11.83)-262.3 (10.327)	179 (7.06)

Notes:

Dimensions in mm (inches) Motor designed in English, Metric provided for reference only. Tolerances, unless otherwise specified: metric: X decimal place ± 0.4, XX decimal places ± 0.13 inches: XX decimal places ± 0.015, XXX decimal places ± 0.005

MT50/52x = without brake
 MTB50/52x = with 90 VDC brake
 MTC50/52x = with 24 VDC brake

XT72 SERIES MOTORS

Kollmorgen GOLDLINE® XT & SERVOSTAR® CD/600 Systems

RATINGS AND CHARACTERISTICS

Motor parameters and winding data. See system data beginning on page 23 for typical torque/speed performance.

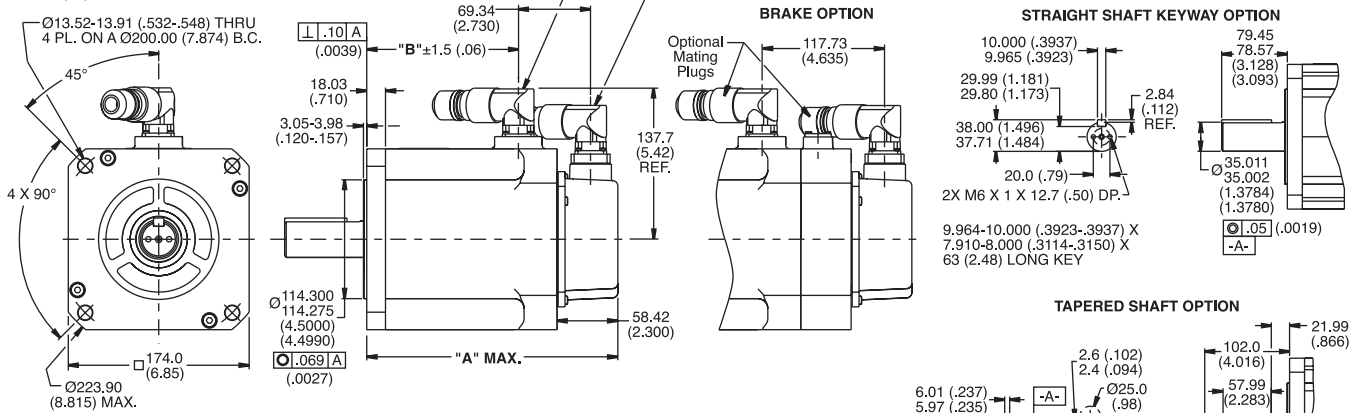
XT70/72 SERIES MOTORS

PARAMETER	SYMBOL	UNITS	MT722B1	MT722B2	MT722C1	MT722C2	MT724A1	MT724A2	MT724B1	MT724B2	MT726B1	MT726B2	MT726C1	MT726C2
Horsepower	HP _{rated}	hp	5.6	5.6	5.5	5.5	6.95	6.95	7.63	7.63	13.21	13.21	11.9	11.9
Kilowatts	kW _{rated}	kW	4.2	4.2	4.1	4.1	5.2	5.2	5.7	5.7	9.8	9.8	8.8	8.8
Speed at Rated Power	N _{rated}	rpm	2500/3000	2500/3000	3200/3400	3200/3400	2000/2250	2000/2250	3150/3400	3150/3400	2000/2300	2000/2300	3200/3400	3200/3400
Max Operating Speed	N _{max}	rpm	2500/3000	2500/3000	3200/3400	3200/3400	2000/2250	2000/2250	3150/3400	3150/3400	2000/2300	2000/2300	3200/3400	3200/3400
Cont. Torque (Stall) at 40°C	T _{cs}	N-m (lb-ft)	22.1 (16.3)	22.1 (16.3)	22.4 (16.5)	22.4 (16.5)	31.6 (23.3)	31.6 (23.3)	31.3 (23.1)	31.3 (23.1)	50.4 (37.2)	50.4 (37.2)	50.6 (37.3)	50.6 (37.3)
Cont. Torque (Stall) at 25°C	T _{cs}	N-m (lb-ft)	23.5 (17.4)	23.5 (17.4)	23.9 (17.6)	23.9 (17.6)	33.7 (24.8)	33.7 (24.8)	33.3 (24.6)	33.3 (24.6)	53.7 (39.6)	53.7 (39.6)	53.9 (39.7)	53.9 (39.7)
Cont. Line Current	I _{cs}	A _{RMS}	10.7	10.7	14.0	14.0	13.0	13.0	19.2	19.2	18.3	18.3	31.6	31.6
Peak Torque	T _{ps}	N-m (lb-ft)	62.2 (45.9)	62.2 (45.9)	62.2 (45.9)	62.2 (45.9)	90.6 (66.8)	90.6 (66.8)	90.6 (66.8)	90.6 (66.8)	152.3 (112.3)	152.3 (112.3)	152.3 (112.3)	152.3 (112.3)
Peak Line Current	I _{ps}	A _{RMS}	36.7	36.7	47.0	47.0	45.6	45.6	67.1	67.1	64.7	64.7	110.0	110.0
Max Theoretical Acceleration	Z	rad/sec ²	8459	4779	8462	4780	11623	4774	11624	4774	12079	6383	12074	6380
Torque Sensitivity (Stall) ±10%	K _t	N-m (lb-ft) / A _{RMS}	2.07 (1.53)	2.07 (1.53)	1.62 (1.20)	1.62 (1.20)	2.43 (1.79)	2.43 (1.79)	1.65 (1.22)	1.65 (1.22)	2.75 (2.03)	2.75 (2.03)	1.62 (1.19)	1.62 (1.19)
Back EMF (Line to Line) ±10%	K _b	V _{RMS} / krpm	125.4	125.4	98	98	147.1	147.1	100	100	166.5	166.5	97.9	97.9
Max Line-to-Line volts	V _{max}	V _{RMS}	400/480	400/480	400/480	400/480	400/480	400/480	400/480	400/480	400/480	400/480	400/480	400/480
DC Res at 25°C (Line-to-Line) ±10%	R _{th}	ohms	1.205	1.205	0.718	0.718	0.887	0.887	0.416	0.416	0.553	0.553	0.189	0.189
Inductance (Line-to-Line) ±30%	L _m	mH	26	26	16	16	21	21	9.7	9.7	18.5	18.5	6.4	6.4
Rotor Inertia	J _m	kg-m ² (lb-ft-sec ²)	0.0054 (0.004)	0.013 (0.0096)	0.0054 (0.004)	0.013 (0.0096)	0.0078 (0.0058)	0.019 (0.014)	0.0078 (0.0058)	0.019 (0.014)	0.0126 (0.0093)	0.0239 (0.0176)	0.019 (0.014)	0.0126 (0.0093)
Weight (without brake)	W _i	kg (lb)	22.5 (49.6)	24.2 (53.4)	22.5 (49.6)	24.2 (53.4)	30.0 (66.1)	36.0 (79.3)	30.0 (66.1)	36.0 (79.3)	36.0 (79.3)	42.0 (92.5)	36.0 (79.3)	42.0 (92.5)
Weight (with brake)	W _f	kg (lb)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Static Friction	T _f	N-m (lb-ft)	0.237 (0.175)	0.237 (0.175)	0.237 (0.175)	0.237 (0.175)	0.353 (0.260)	0.353 (0.260)	0.353 (0.260)	0.353 (0.260)	0.584 (0.431)	0.584 (0.431)	0.584 (0.431)	0.584 (0.431)
Thermal Time Constant	TCT	minutes	45	45	45	45	60	60	60	60	72	72	72	72
Viscous Damping Z Source	F _i	N-m (lb-ft)/krpm	0.114 (0.084)	0.114 (0.084)	0.114 (0.084)	0.114 (0.084)	0.168 (0.124)	0.168 (0.124)	0.168 (0.124)	0.168 (0.124)	0.281 (0.207)	0.281 (0.207)	0.281 (0.207)	0.281 (0.207)
Motor Constant at 25°C	K _m	N-m (lb-ft)/watts	1.673 (1.23)	1.673 (1.23)	1.686 (1.24)	1.686 (1.24)	2.283 (1.679)	2.283 (1.679)	2.267 (1.667)	2.267 (1.667)	3.274 (2.407)	3.274 (2.407)	3.293 (2.421)	3.293 (2.421)
Thermal Resistance at Stall	R _{th}	°C / watt	0.335	0.335	0.328	0.328	0.307	0.307	0.301	0.301	0.248	0.248	0.243	0.243
Number of Poles			8	8	8	8	8	8	8	8	8	8	8	8

Notes:
1. Continuous duty operation is with motor mounted to a 400 in² x 1" aluminum faceplate.

MT(x)72x

mm (in)



Model	"A" MAX. with brake-without brake	"B"
MT(x)702	350 (13.78)-308 (12.1)	205 (8.071)
MT(x)704	411 (16.18)-369 (14.53)	265.89 (10.468)
MT(x)706	300.5 (11.83)-262.3 (10.327)	179 (7.06)

Notes:
Dimensions in mm (inches) Motor designed in English, Metric provided for reference only.
Tolerances, unless otherwise specified: metric: X decimal place ± 0.4, XX decimal places ± 0.13 inches: XX decimal places ± 0.015, XXX decimal places ± 0.005

MT72x = without brake
MTB72x = with 90 VDC brake
MTC72x = with 24 VDC brake

SERVOSTAR® CD DRIVES

Kollmorgen GOLDLINE® XT & SERVOSTAR® CD System



SERVOSTAR® CD FEATURES

Servo Control

- Advanced patented sinewave commutation technology provides smooth, precise low-speed control and high-speed performance
- Accurate torque control due to precision balanced current loops with closed loop sensors
- Velocity loop bandwidths to 400 Hz
- Self-tuning to the load
- S-curve acceleration feature for reducing acceleration "jerk" and machine wear
- Patented torque angle control enhances motor performance
- Fully digital control loops
- Compact and attractive rugged metal package for space-saving, modern appearance - metal package minimizes electrical noise emission and susceptibility
- Pole Placement, PI, and PDFF control options
- Low Pass or Notch Filters for compliant & resonant machines
- Command modes: Torque (analog or serial); Velocity (analog or serial); Position (analog, serial, stored or pulse)
- Three current ratings: 3/9, 6/18 & 10/20 amp RMS/phase continuous/peak current
- 3 to 1 peak/continuous current rating (2 to 1 on 10 amp product)

Analog Command:

- 14 Bit analog conversion
- Simple absolute & incremental moves thru internal profile generator

Easy Connectivity

- Built in encoder equivalent output can eliminate the need for an additional position feedback device
- RS232 or RS485 Communication
- Unique multi-drop configuration allows a PC or PLC to communicate to multiple SERVOSTAR CD amplifiers via single RS-232 connection
- SERVOSTAR CD's versatile communication capabilities make it easy to integrate machine control data directly from the factory floor to your information system
- Analog ± 10 V, pulse/direction, master encoder, serial port, command options
- SERCOS interface™

Robust Design

- Protection against miswired connection on 24 volt I/O
- ESD rugged circuit design and fully metallic enclosure
- Self-protecting intelligent power modules
- Full protection against short circuit, overvoltage, undervoltage, heatsink overtemperature, motor overtemperature, overspeed, overcurrent, and feedback loss
- UL , cUL listed, and CE
- Flash memory

Windows® Start-up Environment – MOTIONLINK®

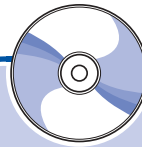
- Advanced motion "wizard" automatically walks you through set-up
- Auto configuration function checks for correct wiring of motor and feedback
- PC "Oscilloscope" for measuring real-time motion performance

Motion Indexing

- Stores up to 4 motion profiles in memory
- Start motion through serial command or digital I/O
- Homing functions

Configurable I/O

- 3 digital inputs, 1 digital output, & 1 analog output can be configured to a variety of functions to customize the SERVOSTAR CD to individual machines



MOTIONEERING® CD-ROM

For more detailed product and selection information, see the **MOTIONEERING** CD-ROM inside the back cover of this catalog or visit our website at www.DanaherMotion.com.

SERVOSTAR® CD DRIVES

Kollmorgen GOLDLINE® XT & SERVOSTAR® CD System

AMPLIFIER SPECIFICATIONS

Electrical characteristics

- Closed loop velocity bandwidth up to 400 Hz
- Motor current ripple frequency (16-32 kHz)
- Long term speed regulation (0.01%)
- Position loop update rate 500 µs (2 kHz)
- Velocity loop update rate 250 µs (4 kHz)
- Commutation update rate 62.5 µs (16 kHz)
- Current loop update rate 62.5 µs (16 kHz)

Fault protection

- Output phase to phase short circuit protection
- Overvoltage
- Undervoltage
- Overtemperature (motor and amplifier)
- Overspeed
- Overcurrent
- Feedback loss
- Foldback
- Supply loss
- Excessive position error

Environmental

- Operation range
 - Ambient 5 to 45°C
 - Storage -20°C to 70°C
- Humidity (non-condensing) 10% to 90%

Velocity Loop Compensation

- Vel: PI, PDFF or Pole Placement selectable algorithms
- Factory preset or field tunable
- **MOTIONLINK** software provides tuning programming via RS-232 or RS-485 serial interface
- Adjustable filters

Position Loop Compensation

- PID

Operational modes

- Torque control — from analog or serial command
- Velocity control — from analog or serial command
- Pulse following/Up-Down count
- Gearing from quad encoder input
- Position control

Inputs

- Analog command: ±10 V
- Remote enable: 24 V
- Three multi-purpose 24 V inputs configurable to: CW limit switch, CCW limit switch, gear enable, start motion, second current limit, change velocity to torque mode, home switch, search for home, move to home registration capture, active disable, control fault relay, hold position plus using two inputs, up to four stored indexes or speeds can be executed
- Pulse command: up/down, pulse/direction, pulse or quadrature encoder format into RS-485 receivers or opto isolators

Communications

- RS-232 or RS-48S serial interface 9600 or 19.2 kb
- Drive-to-Drive multidrop
- SERCOS interface™

Outputs

- Fault: contact closure rated for 1 amp, 24 volt
- One multi-purpose 24 V output configurable to: speed exceeded, current exceeded, amplifier in foldback, brake enable, motion complete, in position, zero speed detect, encoder INIT complete
- ±10 V, 12-bit analog output, configurable, for monitoring of various parameters

Diagnostics

- Seven segment LED display
- Error history log
- Internal variable monitoring
- PC scope

Motor Feedback

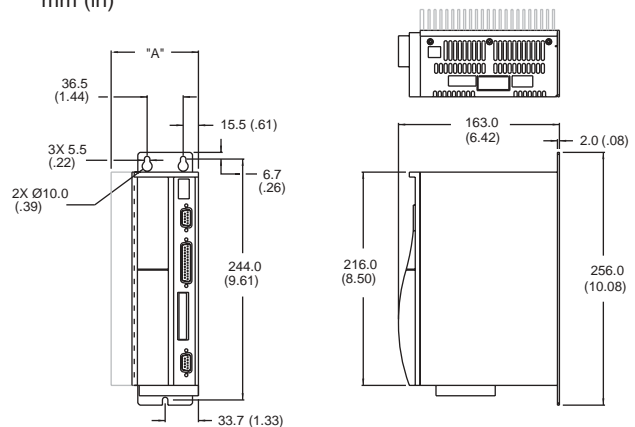
- Resolver, Incremental Encoder, Sine Encoder (including HEIDENHAIN EnDat™ support) or halls-only operation
- Auxiliary encoder feedback, used for Dual Loop or Master/Slave Operation.
- Commutation initialization with minimal motion

AMPLIFIER RATINGS

Model	Cx03	Cx06	Cx10
Output Continuous Current Per Phase (RMS/phase)	3	6	10
Output Peak Current Per Phase (1/2 sec)	9	18	20
Rated Output Continuous Power (kW)	1.1	2.2	3.5
Internal Power Dissipation (watts)	60	80	132
PWM Switching Frequency (kHz)	16	8	8
AC Input Line Voltage (V) (1 phase)	115-230	115-230	230, 3 phase
Rated Input Power (kW)	1.7	2.8	4.6

SERVOSTAR CD Cx03/06/10

mm (in)



MODEL	SIZE (amp)	DIM. "A"
Cx03	3	67.4 (2.65)
Cx06	6	88.4 (3.48)
Cx10	10	99.1 (3.90)

SYSTEM OVERVIEW

Kollmorgen GOLDLINE® BH & SERVOSTAR® 600 Systems

**Kollmorgen GOLDLINE® BH** SEE PAGE 32

Kollmorgen **GOLDLINE** BH servomotors build on the tradition of high performance servomotors from Kollmorgen. Designed around the classic industry-standard Kollmorgen **GOLDLINE** series, the BH motors incorporate the highest energy rare earth neodymium-iron-boron magnets and excellent thermal design to provide exceptional continuous torque and peak torque performance in a compact package.

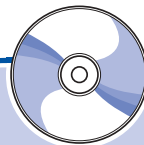
- 0.52 to 91.67 lb-ft (0.7 to 124.3 N-m) continuous torque
- 70.0 to 190 mm (2.76 to 7.5 inches) square frame
- 400/480 VAC, 565/680 VDC bus rated
- Compact (high torque/volume ratio)
- Speeds to 7500 rpm standard
- Rugged resolver feedback
- IPM (Interior Permanent Magnet) design for low cogging
- CE compliant, UL recognized
- Built-in thermostat
- Rear shaft extension for mounting additional feedback devices
- Class H insulation system
- Rotating CE connectors standard on 12x, 22x, 42x
- Terminal box standard on 62x and 82x frames
- MH Medium inertia series for high inertia load applications

SERVOSTAR® 600 SEE PAGE 34

The **SERVOSTAR** 600 is a high performance, high power drive accepting 208-480 VAC and producing from 3-70 A_{RMS} continuous. In combination with Kollmorgen **GOLDLINE** series motors (BH, XT, DDR) and Kollmorgen **PLATINUM**® DDL-series motors, it offers the highest power, most advanced features, and broadest connectivity in the global marketplace. The integrated power supply makes it ideal for single and multi-axis applications.

Features

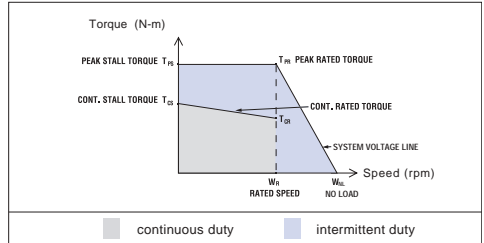
- Fully protected
- Meets CE and UL requirements
- Built-in features minimizes total machine cost by eliminating the need for external hardware
- Small footprint - CE Filters in 3-20 A (standard) units and option cards are contained inside the drive
- Digital position and velocity control
- Position generator supports trapezoidal and sinusoidal acceleration
- Motion Tasking support tied to I/O
- Interface through analog command, digital I/O, pulse direction or encoder follower, and fieldbuses
- Built-in CANOpen support

**MOTIONEERING® CD-ROM**

For more detailed product and selection information, see the **MOTIONEERING** CD-ROM inside the back cover of this catalog or visit our website at www.DanaherMotion.com.

SYSTEM OVERVIEW

Kollmorgen GOLDLINE® BH & SERVOSTAR® 600 Systems



RECOMMENDED MOTOR/DRIVE SYSTEMS, 400 VAC

Servo Motor Model	Servo Drive Model	Peak Stall Torque T_{PS} N-m (lb-in)	Peak Rated Torque T_{PR} N-m (lb-in)	Cont. Stall Torque T_{CS} N-m (lb-in)	Cont. Rated Torque T_{CR} ^① N-m (lb-in)	Rated Speed W_R rpm	No-Load Speed W_{NL} rpm	Cont. Stall Current I_{CS} A_{RMS}	Current at Peak Torque I_{PS} A_{RMS}	Inertia ^④ J kgm ² (lb-in-S ²)	Inductance Line-Line L mH
BH Series motors with SERVOSTAR 600 Drives											
BH-122-A ②	S603	2.4 (21.2)	1.90 (16.8)	0.70 (6.2)	0.56 (4.9)	6,000	n/a	1.0	3.6	0.000309 (0.000273)	120
BH-124-B ②	S603	4.2 (37.2)	3.98 (35.2)	1.3 (11.5)	1.11 (9.8)	6,000	n/a	1.8	6	0.000461 (0.000408)	58
BH-126-B ②	S603	4.2 (37.2)	3.98 (35.2)	1.9 (16.8)	1.56 (13.8)	6,000	n/a	2.6	6	0.000765 (0.000677)	37.6
BH-222-E ②	S603	4.8 (42.5)	4.05 (35.8)	2.1 (18.6)	1.80 (15.9)	5,300	n/a	2.5	6	0.000997 (0.000882)	74
BH-224-G ②	S603	7.3 (64.6)	5.98 (52.9)	3.8 (33.6)	3.33 (29.5)	3,600	n/a	2.9	6	0.00251 (0.002222)	90
BH-226-C ②	S606	14.2 (126)	13.2 (117)	5.6 (49.6)	4.54 (40.2)	4,000	n/a	4.46	12	0.00251 (0.002222)	44
BH-226-E ②	S603	10.5 (92.9)	8.91 (78.9)	5.6 (49.6)	5.13 (45.4)	2,500	n/a	3.0	6	0.00251 (0.002222)	92
BH-422-D ③	S606	16.5 (146)	13.5 (119)	5.8 (51.3)	4.63 (41)	3,600	n/a	4.0	12	0.00323 (0.002859)	89
BH-424-D ③	S606	20 (177)	18.8 (166)	10.5 (92.9)	8.90 (78.8)	3,000	n/a	6.3	12	0.00656 (0.005806)	60
BH-426-B ③	S610	37.1 (328)	37.1 (328)	15.8 (140)	13.3 (118)	2,500	n/a	8.1	20	0.00929 (0.008222)	48
BH-426-C ③	S614	33.2 (294)	29.3 (259)	15.5 (137)	12.7 (112)	4,200	n/a	12.4	28	0.00929 (0.008222)	19.2
BH-622-A ③	S606	40.0 (354)	30.5 (270)	14.6 (129)	12.4 (110)	1,600	n/a	4.17	12	0.0103 (0.009116)	128
BH-622-B ③	S610	33.5 (297)	33.5 (297)	14.9 (132)	11.6 (103)	3,000	n/a	8.43	20	0.0103 (0.009116)	32
BH-624-C ③	S620	56.2 (497)	52.1 (461)	25.2 (223)	18.8 (166)	3,750	n/a	17	40	0.0203 (0.017967)	11.7
BH-624-D ③	S614	54.8 (485)	49.5 (438)	25.6 (227)	21.0 (186)	2,750	n/a	12.4	28	0.0203 (0.017967)	23
BH-624-E ③	S614	46.9 (415)	41.2 (365)	25.6 (227)	21.1 (187)	3,200	n/a	14.5	28	0.0203 (0.017967)	17
BH-624-G ③	S610	46.8 (414)	44.1 (390)	24.7 (219)	19.8 (175)	2,100	n/a	10.5	20	0.0203 (0.017967)	32
BH-626-C ③	S610	82.9 (734)	78.2 (692)	36.6 (324)	31.2 (276)	1,250	n/a	8.4	20	0.0304 (0.026906)	61
BH-626-E ③	S620	68 (602)	67 (593)	35.4 (313)	30.1 (266)	3,000	n/a	19.7	40	0.0304 (0.026906)	10.7
BH-822-C ③	S610	81.6 (722)	64.2 (568)	34.8 (308)	29.3 (259)	1,300	n/a	8.1	20	0.0488 (0.043192)	110
BH-822-D ③	S620	72.7 (643)	46.4 (411)	34.7 (307)	29.2 (258)	2,500	n/a	18.1	40	0.0488 (0.043192)	20.8
BH-824-B ③	S620	95.0 (841)	69 (611)	50 (443)	44.5 (394)	1,650	n/a	20	40	0.08406 (0.074399)	29.3
BH-824-D ③	S640	158.0 (1398)	51.5 (456)	66.3 (587)	41.0 (363)	2,700	n/a	31.9	80	0.08406 (0.074399)	11
BH-826-A ③	S620	163 (1443)	147 (1301)	93.5 (828)	81.4 (720)	1,250	n/a	21.8	40	0.126 (0.111519)	30
BH-826-C ③	S640	178 (1575)	100 (885)	92.9 (822)	45 (398)	2,500	n/a	39.7	80	0.126 (0.111519)	9
BH-828-B ③	S670	300 (2655)	150 (1328)	124.3 (1100)	78 (690)	2,500	n/a	53	140	0.168 (0.148693)	4.7
BH-828-E ③	S640	230.5 (2040)	183 (1620)	122.8 (1087)	89.5 (792)	3,200	n/a	39.1	80	0.168 (0.148693)	8.05

RECOMMENDED MOTOR/DRIVE SYSTEMS, 480 VAC

Servo Motor Model	Servo Drive Model	Peak Stall Torque T_{PS} N-m (lb-in)	Peak Rated Torque T_{PR} N-m (lb-in)	Cont. Stall Torque T_{CS} N-m (lb-in)	Cont. Rated Torque T_{CR} ^① N-m (lb-in)	Rated Speed W_R rpm	No-Load Speed W_{NL} rpm	Cont. Stall Current I_{CS} A_{RMS}	Current at Peak Torque I_{PS} A_{RMS}	Inertia ^④ J kgm ² (lb-in-S ²)	Inductance Line-Line L mH
BH Series motors with SERVOSTAR 600 Drives											
BH-122-A ②	S603	2.4 (21.2)	2.16 (19.1)	0.70 (6.2)	0.52 (4.6)	7,500	n/a	1.0	3.6	0.000309 (0.000273)	120
BH-124-B ②	S603	4.2 (37.2)	3.78 (33.5)	1.3 (11.5)	1.06 (9.4)	7,500	n/a	1.8	6	0.000461 (0.000408)	58
BH-126-B ②	S603	4.2 (37.2)	4.07 (36)	1.9 (16.8)	1.47 (13.0)	7,500	n/a	2.6	6	0.000765 (0.000677)	37.6
BH-222-E ②	S603	4.8 (42.5)	4.27 (37.8)	2.1 (18.6)	1.7 (15)	7,000	n/a	2.5	6	0.000997 (0.000882)	74
BH-224-G ②	S603	7.3 (64.6)	6.57 (58.1)	3.8 (33.6)	3.2 (28.3)	4,600	n/a	2.9	6	0.00251 (0.002222)	90
BH-226-C ②	S606	14.2 (126)	14.0 (124)	5.6 (49.6)	4.3 (38.1)	4,900	n/a	4.46	12	0.00251 (0.002222)	44
BH-226-E ②	S603	10.5 (92.9)	9.45 (83.6)	5.6 (49.6)	5.0 (44.3)	3,200	n/a	3.0	6	0.00251 (0.002222)	92
BH-422-D ③	S606	16.5 (146)	14.8 (131)	5.8 (51.3)	4.3 (38.1)	4,600	n/a	4.0	12	0.00323 (0.002859)	89
BH-424-D ③	S606	20 (177)	18.0 (159)	10.5 (92.9)	8.5 (75.2)	3,700	n/a	6.3	12	0.00656 (0.005806)	60
BH-426-B ③	S610	37.1 (328)	37 (327)	15.8 (140)	12.6 (112)	3,200	n/a	8.1	20	0.00929 (0.008222)	48
BH-426-C ③	S614	33.2 (294)	29.8 (264)	15.5 (137)	11.2 (99.1)	5,000	n/a	12.4	28	0.00929 (0.008222)	19.2
BH-622-A ③	S606	40.0 (354)	36 (319)	14.6 (129)	11.8 (104)	2,000	n/a	4.17	12	0.0103 (0.009116)	128
BH-622-B ③	S610	33.5 (297)	30.1 (266)	14.9 (132)	10.5 (92.9)	4,000	n/a	8.43	20	0.0103 (0.009116)	32
BH-624-C ③	S620	56.2 (497)	50.6 (448)	25.2 (223)	15.1 (134)	4,500	n/a	17	40	0.0203 (0.017967)	11.7
BH-624-D ③	S614	54.8 (485)	49.3 (436)	25.6 (227)	18.0 (159)	3,300	n/a	12.4	28	0.0203 (0.017967)	23
BH-624-E ③	S614	46.9 (415)	46.9 (415)	25.6 (227)	18.0 (159)	3,850	n/a	14.5	28	0.0203 (0.017967)	17
BH-624-G ③	S610	46.8 (414)	42.1 (373)	24.7 (219)	18.4 (163)	2,600	n/a	10.5	20	0.0203 (0.017967)	32
BH-626-C ③	S610	82.9 (734)	74.6 (660)	36.6 (324)	29.9 (265)	1,550	n/a	8.4	20	0.0304 (0.026906)	61
BH-626-E ③	S620	68 (602)	68 (602)	35.4 (313)	27.1 (240)	3,700	n/a	19.7	40	0.0304 (0.026906)	10.7
BH-822-C ③	S610	81.6 (722)	73.4 (650)	34.8 (308)	28.0 (248)	1,600	n/a	8.1	20	0.0488 (0.043192)	110
BH-822-D ③	S620	72.7 (643)	65.4 (579)	34.7 (307)	27 (239)	3,000	n/a	18.1	40	0.0488 (0.043192)	20.8
BH-824-B ③	S620	95.0 (841)	89 (788)	50 (443)	39.0 (345)	2,000	n/a	20	40	0.08406 (0.074399)	29.3
BH-824-D ③	S640	158.0 (1398)	66 (584)	66.3 (587)	38.0 (336)	3,000	n/a	31.9	80	0.08406 (0.074399)	11
BH-826-A ③	S620	163 (1443)	146 (1292)	93.5 (828)	72.6 (643)	1,500	n/a	21.8	40	0.126 (0.111519)	30
BH-826-C ③	S640	178 (1575)	100 (885)	92.9 (822)	38.4 (340)	3,000	n/a	39.7	80	0.126 (0.111519)	9
BH-828-B ③	S670	300 (2655)	150 (1328)	124.3 (1100)	67.8 (600)	3,000	n/a	53	140	0.168 (0.148693)	4.7
BH-828-E ③	S640	230.5 (2040)	183 (1620)	122.8 (1087)	89.5 (792)	3,200	n/a	39.1	80	0.168 (0.148693)	8.05

① Ambient temperature at 40°C (or less).
 ② Continuous duty ratings are for motor mounted to a 1/4" thick aluminum faceplate of 96 square inches.

③ Continuous duty ratings are for motors mounted to a 1" thick aluminum faceplate of 452 square inches.
 ④ Inertia includes feedback inertia.

BH SERIES MOTORS

Kollmorgen GOLDLINE® BH & SERVOSTAR® 600 System



Kollmorgen GOLDLINE® BH

The BH series motors incorporate the patented IPM (Interior Permanent Magnet) design technology which results in superior torque-to-inertia and torque-to-volume ratios.

The BH line of servomotors is available in 5 frame sizes and 3 stack lengths per frame. With multiple windings per stack, the BH Series meets the needs of a wide range of applications.

The BH Series provides extremely low inertia rotors, allowing optimum performance in applications requiring rapid acceleration and deceleration. The IPM magnetic design provides for very high torque density and torque-to-inertia ratios. When used with the SERVOSTAR 600 family of amplifiers, the resulting speed/torque is the widest range in the industry. MH Series medium inertia models also available, for better performance in systems having compliant loads or high inertia mismatches.

Features

BH Series Motors

0.52 to 91.4 lb-ft (0.7 to 124 N-m) continuous torque	Maximum application flexibility
70.0 to 190 mm (2.76 to 7.5 inches) square frame	Best space utilization
400/480 VAC, 565/680 VDC bus rated	Global high voltage capability
Compact (high torque/volume ratio)	Maximum Torque in minimum space
Speeds to 7500 rpm standard	Maximum application flexibility
IPM (Interior Permanent Magnet) design	Low cogging
CE compliant, UL recognition	Global acceptance
Rugged resolver feedback	Reliable precise operation
Built-in thermostat	Protection
Rear shaft extension	Allows mounting of additional feedback devices
Class H insulation system	High temperature reliability

Benefits

Model	"A" MAX. without brake-with brake	"B"	"C"	"D"	"E"
BH-122	204.0 (8.03)-243.8 (9.59)	159.0 (6.26)	18.0 (0.71)	23.0 (0.90)	10.997-11.0008 (0.4330-0.4334)
BH-124	234.5 (9.23)-273.8 (9.59)	189.5 (7.46)	20.0 (0.79)	30.0 (1.18)	13.997-14.0008 (0.5511-0.5515)
BH-126	265.0 (10.43)-303.7 (11.96)	220.0 (8.66)	20.0 (0.79)	30.0 (1.18)	13.997-14.0008 (0.5511-0.5515)
MH-123	241.0 (9.49)-279.6 (11.01)	196.0 (7.72)	20.0 (0.79)	30.0 (1.18)	13.997-14.0008 (0.5511-0.5515)
MH-125	283.1 (11.15)-321.7 (12.67)	238.1 (9.37)	20.0 (0.79)	30.0 (1.18)	13.997-14.0008 (0.5511-0.5515)
MH-127	283.1 (11.15)-321.7 (12.67)	238.1 (9.37)	20.0 (0.79)	30.0 (1.18)	13.997-14.0008 (0.5511-0.5515)
BH-222	236.2 (9.30)-276.5 (10.89)	179.0 (7.08)			
BH-224	275.8 (10.86)-316.8 (9.59)	189.5 (7.46)			
BH-226	315.4 (12.42)-355.1 (14.00)	258.9 (10.19)			
MH-223	275.8 (10.86)-316.0 (12.44)	219.3 (8.63)			
MH-225	315.4 (12.42)-355.7 (14.00)	258.9 (10.19)			
MH-227	373.2 (14.69)-413.4 (16.28)	316.7 (12.47)			
BH-422	265.5 (10.45)-313.9 (12.36)	212.6 (8.37)			
BH-424	318.8 (12.55)-367.3 (14.46)	265.9 (10.47)			
BH-426	372.1 (14.65)-420.6 (16.56)	319.2 (12.57)			
MH-423	318.8 (12.55)-367.3 (14.46)	265.9 (10.47)			
MH-425	372.1 (14.65)-420.6 (16.56)	319.2 (12.57)			
MH-427	444.9 (17.52)-493.4 (19.43)	392.0 (15.43)			
BH-622	299.2 (11.79)-355.6 (14.00)	96.8 (3.81)			
BH-624	367.8 (14.48)-424.2 (16.70)	165.4 (6.51)			
BH-626	436.4 (17.18)-492.8 (19.40)	234.0 (9.21)			
MH-623	367.8 (14.48)-424.2 (16.70)	165.4 (6.51)			
MH-625	436.4 (17.18)-492.8 (19.40)	234.0 (9.21)			
MH-627	531.5 (20.93)-588.0 (23.15)	329.1 (12.96)			
BH-822	360.4 (14.19)-416.9 (16.41)	158.3 (6.23)	39.0 (1.535)	58.0 (2.283)	32.002-32.018 (1.2600-1.2606)
MH-823	449.9 (17.71)-506.4 (19.94)	247.8 (9.76)	54.0 (2.126)	82.0 (3.228)	48.002-48.018 (1.8898-1.8905)
BH-824	449.9 (17.71)-506.4 (19.94)	247.8 (9.76)			
MH-825	539.4 (21.24)-595.9 (23.46)	337.3 (13.28)			
BH-826	539.4 (21.24)-595.9 (23.46)	337.3 (13.28)	54.0 (2.126)	82.0 (3.228)	48.002-48.018 (1.8898-1.8905)
MH-827	648.7 (25.54)-686.0 (27.01)	446.6 (17.58)	54.0 (2.126)	82.0 (3.228)	48.002-48.018 (1.8898-1.8905)
BH-828	628.9 (24.76)-685.4 (26.98)	426.8 (16.80)			

STANDARD FEATURES

- Rotatable CE connectors standard on 12x, 22x, 42x
- Terminal box standard on 62x, 82x frames
- IP65 sealing
- Metric mountings

OPTIONS

- IP67 sealing
- Fail-safe brake, 24 and 90 VDC
- NEMA mountings
- Standard SERVOSTAR 600 UL/CE cable assemblies available in 3 meter increments.

Model	Standard Options	
	Mating Plugs	Shaft Seal
-41	No	Yes
-43	No	No
-51	Yes	Yes
-53	Yes	No
-61	No	Yes
-63	No	No
-71	Yes	Yes
-73	Yes	No

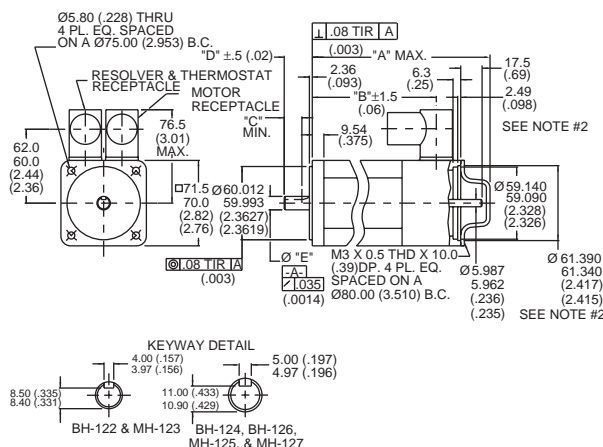
Notes:

1. Motor can be mounted in any position.
2. Counterbore for o-ring seal.
3. -61 and -71 models have been certified to meet IP65 sealing. -S model has been certified to meet IP67 sealing and has viton shaft seal and viton o-rings.
4. -63 and -73 models meet sealing specs except for mounting face.
5. Kollmorgen approved mating plugs with filler plugs must be installed before motor meets sealing specs.
6. Customer shaft key supplied with motor.
7. Dimensions in parentheses () are in English and are for reference only.
8. Tolerances unless otherwise specified:
Metric: X decimal place ± 0.4
English: XX decimal places ± 0.015
XX decimal places ± 0.13
XXX decimal places ± 0.005

Detailed motor selection information on both BH series and medium-inertia MH series motors is available on the MOTIONEERING® CD-ROM inside the back cover of this catalog, or visit our website at www.DanaherMotion.com.

BH/MH-12x

mm (in)



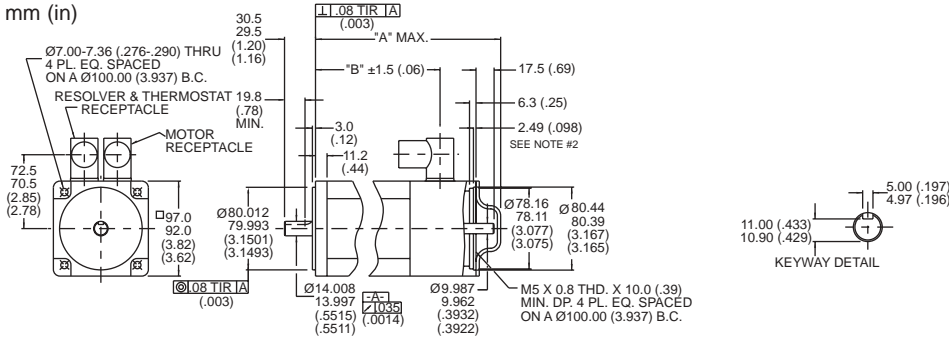
BH SERIES MOTORS

Kollmorgen GOLDLINE® BH & SERVOSTAR® 600 System

SEE SYSTEM INFORMATION ON PAGE 31.

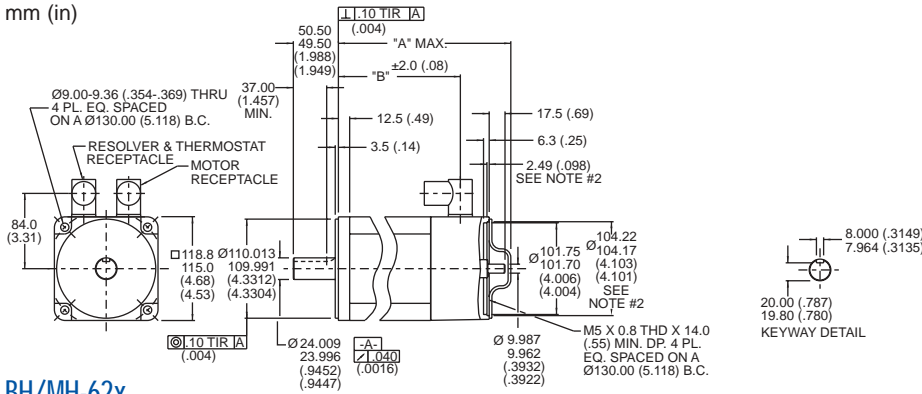
BH/MH-22x

mm (in)



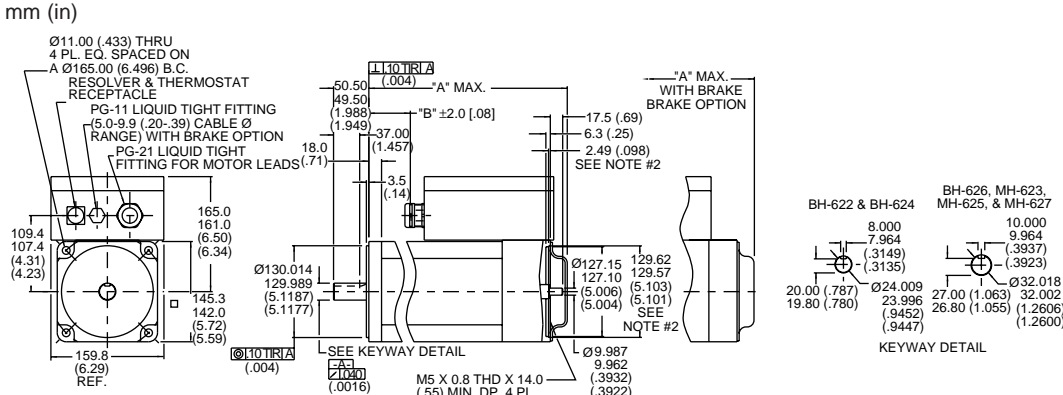
BH/MH-42x

mm (in)



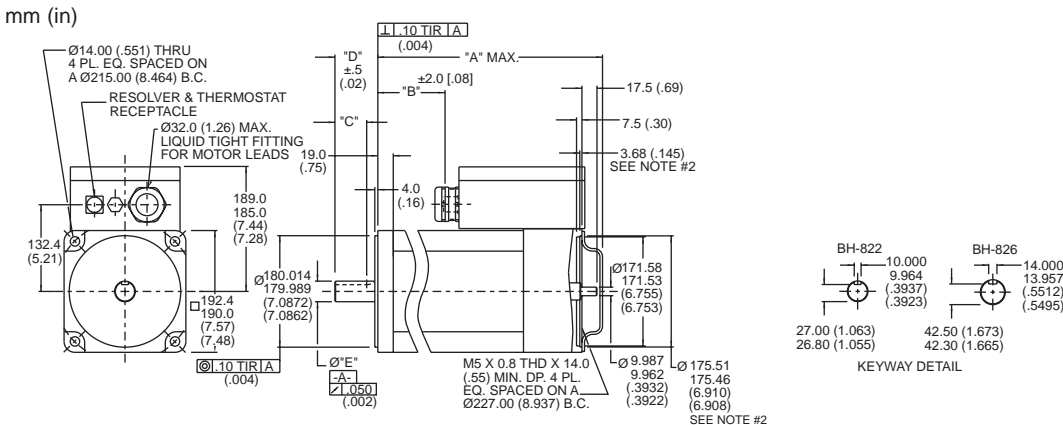
BH/MH-62x

mm (in)



BH/MH-82x

mm (in)



www.DanaherMotion.com • 815-226-2222

SERVOSTAR® 600 DRIVES



SERVOSTAR® 600 FEATURES

Servo Control

- Easy to tune servo loops
- Advanced sinewave commutation technology provides smooth, precise low-speed control and high speed performance
- Velocity loop bandwidths to 400 Hz
- DQ Current control increases high speed peak torque performance for faster cycle rates
- Space Vector Modulation reduces normal power stage switching losses
- Torque angle control enhances motor performance
- Fully digital control loops
- Compact and attractive rugged metal package for space-saving, modern appearance - metal package minimizes electrical noise emission & susceptibility
- Command modes: Torque, Velocity, Position, Electronic Gearing Pulse Following, and Motion Task
- Seven current ratings: 3, 6, 10, 14, 20, 40 and 70 amp RMS/phase continuous
- 2 to 1 peak/continuous current rating (5 second at peak) (S610-30 has 3:1 peak/cont.)

Easy Connectivity

- PROFIBUS-DP communication option card
- DeviceNet communication option card
- Built in encoder equivalent output can eliminate the need for an additional position feedback device
- RS-232 Communication
- Unique multi-drop configuration allows a PC or PLC to communicate to multiple SERVOSTAR 600 amplifiers via single RS-232 connection
- SERVOSTAR 600's versatile communication capabilities make it easy to integrate machine control data directly from the factory floor to your information system
- Analog ± 10 V, pulse/direction, master encoder, and serial port, I/O command options

Robust Design

- ESD rugged circuit design and fully metallic enclosure
- Full protection against short circuit, overvoltage, undervoltage, heatsink overtemperature, motor overtemperature, overspeed, overcurrent, and feedback loss
- UL , cUL listed, and CE
- Built-in line filter for CE (models up to 20 amp)
- Flash memory

Windows Start-up Environment

- Graphical environment simplifies set up
- PC "Oscilloscope" for measuring real-time motion performance
- Graphical Motion tasking: fully graphical programming environment provides single-axis control capability
- On-board Dynamic Signal Analyzer (DSA) generates Bode plots to improve servo tuning.

Configurable I/O

- 2 separate analog inputs (14 and 12 bit resolution) configurable to 6 different command modes

- 2 analog outputs
- 4 digital inputs
- 2 digital outputs
- I/O can be configured to a variety of functions to customize the SERVOSTAR 600 to individual machines

I/O Option Card

- Adds 14 additional digital inputs and 8 digital outputs
- All I/O are optically isolated
- Simple plug in to top face of amplifier

Regenerative Power Sharing

- Patented circuitry allows the DC bus from two or more amplifiers to be connected together allowing regen power to be shared among multiple drives

Optional Built-in Safety Relay

- Switches off the power stage to ensure personnel safety and prevents an unintended restart of the drive, even in the event of a fault
- Allows DC bus to remain on

Motion Capabilities

The SERVOSTAR 600 can be configured to perform motion control that normally requires a fully programmable drive with a motion language. With the SERVOSTAR 600 there is no programming language to learn; the user only "fill in the blanks" to create common motion tasks

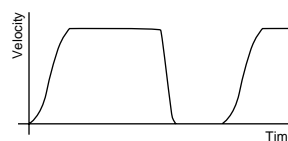
- Fully graphical programming environment
- Make decisions in real time
- Set parameters in real time
- Up to 180 motion tasks can be stored in permanent memory
- Motion Tasks can be linked together.
- Linking of motion tasks (sequencing)
- 10 types of homing
- Speed profile/registration control
- Adjustable S curve acceleration
- Absolute and relative (index) moves
- Adjustable Following-Error window
- Adjustable window for the In Position signal

Linked motion tasks are started:

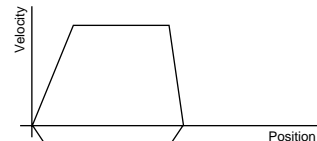
- Immediately upon reaching a targeted position
- From a Digital Input upon reaching the targeted position
- At Preset Time Delay after the targeted position is reached

MOTION EXAMPLES

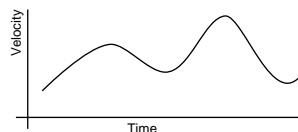
INCREMENTAL MOVE



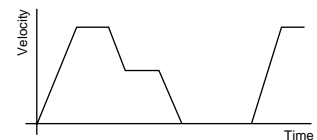
ABSOLUTE MOVE



ELECTRONIC GEARING 5:1 (MASTER/SLAVE)



BLENDED MOVE



APPLICATION EXAMPLES

- Material handling
- Bottle making
- Packaging
- Soft positioning
- Robot
- Conveyor belt controlling
- Fast positioning
- Special cleaning process
- Part selection
- Glass processing
- Wirepuller
- Textile industry
- Printing
- Electronics
- Web converting
- Cut to length

SERVOSTAR® 600 DRIVES

Kollmorgen GOLDLINE® BH & SERVOSTAR® 600 Systems

AMPLIFIER SPECIFICATIONS

Electrical characteristics

- Closed loop velocity bandwidth up to 400 Hz
- Motor current ripple frequency 16 kHz
- Switching frequency: 8 kHz
- Long term speed regulation (0.01%)
- Position loop update rate 250 μs (4 kHz)
- Velocity loop update rate 62.5 μs (16 kHz)
- Commutation update rate 62.5 μs (16 kHz)
- SVM Current loop update rate 62.5 μs (16 kHz)

Fault protection

- Output phase to phase and phase to ground short circuit protection
- Overvoltage
- Undervoltage
- Overtemperature (motor and amplifier)
- Overspeed
- Overcurrent
- Feedback loss
- Foldback
- Supply loss
- Excessive position error

Environmental

- Operation range
 - Ambient 0 to 45°C (derated above ambient up to 55°C)
 - Storage -25°C to 55°C
- Humidity (non-condensing) max. 85%

Velocity Loop Compensation

- PI Plus controller (PDDF Format) or PI controller
- Field tunable and digital repeatability

Position Loop Compensation

- Proportional loop with Feed Forward

Analog I/O

- 2 Configurable Inputs: ±10 V, 12 and 14 bit resolution
- 2 Configurable Outputs: ±10 V, 10 bit resolution

Digital I/O

- 4 Configurable Inputs: 24 volts, PLC-compatible
- 2 Configurable Outputs: 24 volts (open collector), PLC-compatible
- Remote enable Input: 24 V, PLC-compatible Drive Status Relay (BTB/RTO)
- Contact closure rated for 0.5 amps, 24 volt

Pulse or Master/Slave Input

- Pulse command: pulse/direction or quadrature encoder format
- RS-485 receivers
- Up to 16 slave amplifiers can be connected together
- Input ratio is configurable

Position Feedback For User (Encoder Equivalent Output Port)

- Configurable to Encoder Equivalent (ROD) or SSI format
- Encoder Equivalent (ROD): A Quad B with Marker (zero) pulse, RS-485 driver
- SSI (serial synchronous interface): max clock frequency is 1.5 Mhz, RS-485 driver
- Programmable resolution

I/O Extension Card (Option)

- Field Installable
- 14 Digital Inputs 24 V, PLC-compatible
- 8 Digital Outputs 24 V, PLC-compatible
- 24 V PLC Interface

Communications

- RS-232 Interface

Motor Feedback

- Resolver, Sine Encoder

Power Regeneration Options

- Internal
- External - using BAR housed resistors
- Bus Sharing - Distributes regen power among multiple amplifiers

Built-in Parameter Unit

- Displays drive status information
- Parameters: drive address, baud rate, velocity loop tuning, motor type, position output information format, brake, regen type

Motor Brake Control

- 24 V optional holding brake in the motor can be controlled directly by the SERVOSTAR 600

Power Inputs

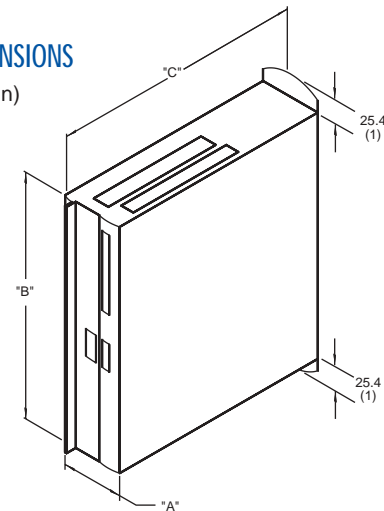
- 208-480 VAC 3 phase, 50 or 60 Hz, built in line filter for CE requirements (models up to 20 amps)
- 24 VDC @ 1 amp (3 amps with brake) For Logic

AMPLIFIER RATINGS

Model	S603	S606	S610	S610-30	S614	S620	S640	S670
Output Continuous Current Per Phase (RMS/phase)	3	6	10	10	14	20	40	70
Output Peak Current Per Phase (5 sec)	6	12	20	30	28	40	80	140
Rated Input Power (KVA) @ 480 V	2.3	4.6	8.1	16.6	11.6	16.6	30	50
Internal Power Dissipation Watts	40	60	90	90	160	200	400	700
AC Input Line Voltage (3 phase)	208-480	208-480	208-480	208-480	208-480	208-480	208-480	208-480
Continuous Regen Power Internal Watts	80	200	200	200	200	200	N/A	N/A
External Watts	500	1,500	1,500	1,500	1,500	1,500	6,000	6,000

DIMENSIONS

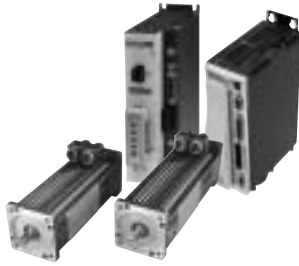
mm (in)



MODEL	SIZE (amp)	DIM "A"	DIM "B"	DIM "C" NO CONN. - WITH CONN
S603	3	70 (2.8)	275 (10.8)	265 (10.4)-273 (10.7)
S606	6	70 (2.8)	275 (10.8)	265 (10.4)-273 (10.7)
S610	10	70 (2.8)	275 (10.8)	265 (10.4)-273 (10.7)
S610-30	10	70 (2.8)	275 (10.8)	265 (10.4)-273 (10.7)
S614	14	100 (3.9)	275 (10.8)	265 (10.4)-273 (10.7)
S620	20	120 (4.7)	275 (10.8)	265 (10.4)-273 (10.7)
S640	40	250 (9.8)	495 (19.5)	300 (11.8)-325 (12.8)
S670	70	250 (9.8)	495 (19.5)	300 (11.8)-325 (12.8)

SYSTEM OVERVIEW

Kollmorgen GOLDLINE® B & SERVOSTAR® CD, S Systems

**Kollmorgen GOLDLINE® B SERIES MOTORS** SEE PAGE 38

Kollmorgen GOLDLINE series motors offer the widest range of solutions for servomotor applications. The interior permanent magnet design is the key to achieving high torque and power density while eliminating problems with magnets placed directly on the airgap. This magnetic structure allows low inertia designs making the Kollmorgen GOLDLINE series an industry standard for performance in high response, point-to-point move applications.

- Metric mounts
- 0.84 to 149 N-m continuous torque
- IP65 sealing
- Resolver feedback

Options:

- NEMA mountings
- IP67 sealing
- Multiple connector options
- Explosion proof designs
- Encoder feedback
- Gearmotors
- Electromechanical fail-safe brakes

When combined with the SERVOSTAR digital amplifier series (using Kollmorgen's patented phase angle advance algorithms), the system performance provides the most peak torque and speed in the industry. All motors and drives are UL recognized.

B-Series (Low-Inertia)

The B-Series provides extremely low inertia rotors allowing for optimum performance in applications requiring rapid acceleration and deceleration.

M-Series (Medium-Inertia)

The M-Series is an extension of the B-Series. With seven times higher inertia, this motor series offers the advantage of better performance for systems having compliant loads or larger inertia mismatches.

- 0.84 to 111 N-m (0.62 to 82 lb-ft) continuous torque
- 70.0 to 190.0 mm (2.76 to 7.48 inches) square frame
- Resolver feedback
- Maximum recommended speed 7500 rpm

EB-Series (Explosion-Proof)

Explosion-Proof Brushless servomotors are listed by UL for use in Class 1, Division 1, Groups C and D hazardous locations. This listing includes applications where vapors or gases form flammable or explosive environments.

The EB-Series has been tested and proven capable to withstand internal explosion without bursting or allowing ignition to reach outside the motor frame. Contact the Customer Support Group for more information.

- 0.84 to 111 N-m (0.62 to 82 lb-ft)
- 75.4 to 195.5 mm (2.97 to 7.70 inches) square frame
- Resolver feedback
- Maximum recommended speed 7500 rpm

Options

- Fail-safe brake
- NEMA mountings

BE-Series (Low-Inertia), ME-Series (Medium-Inertia)

The BE and ME Series provides the same inertia advantages as the B and M Series. A commutation encoder is incorporated in place of the resolver. The encoder provides Hall tracks as well as data channels A and A, B and B, I and I.

- 0.84 to 111 N-m (0.62 to 82 lb-ft)
- 70.0 to 190.0 mm (2.76 to 7.48 inches) square frame
- Encoder feedback
- Maximum recommended speed 6200 rpm
- 2048 LPR commutation encoder

Options

- Front mounted gearheads
- Fail-safe brake
- IP67 sealing
- NEMA mountings
- 1024 LPR commutation encoder

SERVOSTAR CD SERIES DRIVES SEE PAGE 28

The SERVOSTAR CD amplifier is a compact, fully digital amplifier designed to simplify installation and system set-up. Three control algorithms and self-tuning (to the load) functionality allows high performance operation to be achieved quickly and easily.

Since not one control algorithm is best for all machines, SERVOSTAR CD contains Pole Placement, PI, and PDFF control algorithms. SERVOSTAR CD utilizes the PC-based MOTIONLINK® for Windows® which automatically takes you through the key steps of installation and start up.

- 115 to 230 volt single phase or three phase AC input power
- Resolver Feedback Standard with Kollmorgen GOLDLINE Motors, encoder feedback supported for BE/ME Series Motors
- Integrate power supply
- Fully digital control

SERVOSTAR S SERIES DRIVES SEE PAGE 42

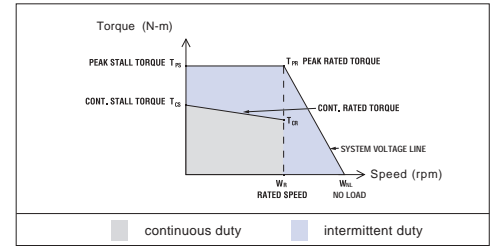
- 115 or 230 VAC Input Power (to PA Power Supply For Series)
- Resolver Feedback Standard with Kollmorgen GOLDLINE Motors, encoder feedback supported for BE/ME series motors
- Fully Digital Control

The SERVOSTAR amplifier is a compact, fully digital amplifier designed to simplify installation and system set-up. Three control algorithms and self-tuning (to the load) functionality allows high performance operation to be achieved quickly and easily.

Since not one control algorithm is best for all machines, SERVOSTAR contains Pole Placement, PI, and PDFF control algorithms. SERVOSTAR utilizes the PC-based MOTIONLINK for Windows® which automatically takes you through the key steps of installation and start up.

SYSTEM OVERVIEW

Kollmorgen GOLDLINE® B & SERVOSTAR® CD, S Systems



RECOMMENDED MOTOR/DRIVE SYSTEMS, 230 VAC

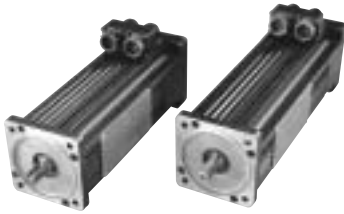
Servo Motor Model	Servo Drive Model	Peak Stall Torque T_{PS} N-m (lb-in)	Peak Rated Torque T_{PR} N-m (lb-in)	Cont. Stall Torque T_{CS} N-m (lb-in)	Cont. Rated Torque T_{CR} ^① N-m (lb-in)	Rated Speed W_R rpm	No-Load Speed W_{NL} rpm	Cont. Stall Current I_{CS} A_{RMS}	Current at Peak Torque I_{PS} A_{RMS}	Inertia ^④ J kgm ² (lb-in) ²	Inductance Line-Line L mH
B Series motors with SERVOSTAR® S, CD Drives											
B-102-A ②	CR03	2.41 (21.3)	1.15 (10.2)	0.84 (7.43)	0.69 (6.11)	7,500	n/a	2.4	7.2	0.000309 (0.00273)	30
B-104-A ②	CR03	4.38 (38.8)	1.89 (16.7)	1.55 (13.7)	1.51 (13.4)	5,600	n/a	3.0	9	0.000461 (0.000408)	28.1
B-104-B ②	CR06	4.45 (39.4)	2.40 (21.2)	1.57 (13.9)	1.42 (12.6)	7,500	n/a	4.2	12.6	0.000461 (0.000408)	14.4
B-106-A ②	CR03	6.10 (54.0)	3.50 (31.0)	2.20 (19.5)	2.00 (17.7)	4,200	n/a	3.0	9	0.000765 (0.000677)	37.5
B-106-B ②	CR06	6.35 (56.2)	2.00 (17.7)	2.22 (19.6)	1.89 (16.7)	7,500	n/a	6.0	18	0.000765 (0.000677)	9.4
B-202-A ②	CR03	7.45 (65.9)	2.70 (23.9)	2.25 (19.9)	2.25 (19.9)	2,500	n/a	1.7	6	0.000996 (0.000882)	185
B-202-B ②	CR03	6.93 (61.3)	3.00 (26.6)	2.44 (21.6)	2.35 (20.8)	3,800	n/a	3.0	9	0.000996 (0.000882)	68
B-202-C ②	CR03	7.65 (67.7)	3.10 (27.4)	2.44 (21.6)	2.29 (20.3)	6,200	n/a	5.0	9	0.000996 (0.000882)	25
B-204-A ②	CR03	13.7 (121)	6.75 (59.7)	4.47 (39.6)	3.96 (35.0)	1,900	n/a	2.7	8.7	0.000173 (0.00153)	133
B-204-B ②	CR06	13.8 (122)	7.00 (62.0)	4.47 (39.6)	4.06 (35.9)	3,600	n/a	5.3	17.2	0.000173 (0.00153)	38
B-204-C ②	CR10	9.49 (84.0)	5.49 (48.6)	4.79 (42.4)	4.37 (38.7)	6,200	n/a	9.8	20	0.000173 (0.00153)	12
B-206-A ②	CR03	18.4 (163)	8.60 (76.1)	6.51 (57.6)	6.51 (57.6)	1,400	n/a	3.0	9	0.000251 (0.00222)	130
B-206-B ②	CR06	18.4 (163)	8.75 (77.4)	6.24 (55.2)	6.20 (54.9)	2,800	n/a	5.8	18	0.000251 (0.00222)	32
B-206-C ②	CR10	12.6 (112)	8.54 (75.6)	6.44 (57)	5.52 (48.9)	4,900	n/a	10	20	0.000251 (0.00222)	11
B-402-A ③	CR03	19.2 (170)	6.10 (54.0)	6.80 (60.2)	6.10 (54.0)	1,500	n/a	3.0	9	0.000323 (0.00286)	220
B-402-B ③	CR06	19.0 (168)	9.00 (79.7)	6.78 (60.0)	6.50 (57.5)	3,000	n/a	6.4	18	0.000323 (0.00286)	50
B-402-C ③	CR10	12.5 (111)	8.20 (72.6)	6.50 (57.5)	5.40 (47.8)	5,000	n/a	9.8	20	0.000323 (0.00286)	21
B-404-A ③	CR06	35.9 (318)	18.3 (162)	13.0 (115)	13.0 (115)	1,500	n/a	6.0	16.4	0.000656 (0.00581)	102
B-404-B ③	CR10	25.6 (227)	20.3 (180)	13.3 (118)	12.8 (113)	2,500	n/a	9.9	20	0.000656 (0.00581)	33.5
B-404-C ③	SR20	24.1 (213)	16.7 (148)	13.1 (116)	10.4 (92)	5,000	n/a	19.8	40	0.000656 (0.00581)	8.4
B-404-D ③	SR20	33.4 (296)	23.3 (206)	13.1 (116)	11.5 (102)	3,700	n/a	15	40	0.000656 (0.00581)	15
B-406-A ③	CR10	36.3 (321)	28.7 (254)	17.6 (156)	16.3 (144)	1,700	n/a	9.5	20	0.000929 (0.00822)	42
B-406-B ③	SR20	37.2 (329)	26.4 (234)	18.6 (165)	15.5 (137)	3,200	n/a	19.1	40	0.000929 (0.00822)	12
B-406-C ③	SR30	37.0 (327)	25.5 (226)	17.0 (150)	13.8 (122)	5,000	n/a	27.2	60	0.000929 (0.00822)	4.8
B-602-A ③	CR10	31.9 (282)	23.7 (210)	17.6 (156)	15.7 (139)	2,000	n/a	10	20	0.00103 (0.00912)	32
B-602-B ③	SR20	29.6 (262)	20.3 (180)	17.4 (154)	13.7 (121)	4,000	n/a	20	40	0.00103 (0.00912)	9
B-602-C ③	SR20	40.0 (354)	26.2 (232)	17.4 (154)	14.5 (128)	3,000	n/a	15	40	0.00103 (0.00912)	14
B-604-A ③	SR20	60.2 (533)	44.7 (396)	30.1 (266)	26.5 (235)	2,150	n/a	19	40	0.00203 (0.0180)	13.3
B-604-B ③	SR30	59.3 (525)	42.3 (374)	30.1 (266)	23.6 (209)	3,150	n/a	27.7	60	0.00203 (0.0180)	6.3
B-604-C ③	SR55	71.2 (630)	39.6 (350)	31.2 (276)	19 (168)	4,300	n/a	39.4	110	0.00203 (0.0180)	3.3
B-604-D ③	SR20	78.6 (696)	62.4 (552)	30.9 (273)	28.1 (249)	1,600	n/a	15	40	0.00203 (0.0180)	22
B-606-A ③	SR20	86.2 (763)	70.5 (624)	44.8 (397)	40.4 (358)	1,500	n/a	20	40	0.00304 (0.0269)	15.6
B-606-B ③	SR55	107 (951)	73.5 (651)	44.8 (397)	35.0 (310)	3,050	n/a	40	110	0.00304 (0.0269)	3.8
B-606-C ③	SR55	84.1 (744)	51.5 (456)	44.8 (397)	24.4 (216)	4,150	n/a	54.8	110	0.00304 (0.0269)	2.1
B-606-D ③	SR30	82.7 (732)	63.0 (558)	42.0 (372)	33.9 (300)	2,300	n/a	28	60	0.00304 (0.0269)	7
B-606-F ③	SR20	122 (1080)	94.9 (840)	44.8 (397)	42.0 (372)	1,100	n/a	14	40	0.00304 (0.0269)	32.5
B-802-A ③	SR30	90.8 (804)	71.3 (631)	42.0 (372)	37.7 (334)	2,000	n/a	24.9	60	0.00488 (0.0432)	16.3
B-802-B ③	SR55	103.4 (915)	68.9 (610)	40.7 (360)	35.3 (312)	2,750	n/a	32.4	110	0.00488 (0.0432)	9.4
B-804-A ③	SR55	201 (1779)	155 (1372)	78.6 (696)	68.9 (610)	1,500	n/a	35	110	0.00840 (0.0743)	13
B-804-B ③	SR55	144 (1275)	119 (1053)	78.6 (696)	66.2 (586)	2,000	n/a	48	110	0.00840 (0.0743)	7.2
B-804-C ③	SR85	172 (1522)	130 (1151)	78.6 (696)	50.0 (443)	3,000	n/a	70	170	0.00840 (0.0743)	3.2
B-806-A ③	SR55	214 (1894)	180 (1593)	109 (960)	94.0 (832)	1,550	n/a	49.1	110	0.0126 (0.112)	8
B-806-B ③	SR85	191 (1690)	122 (1080)	100 (885)	51.5 (456)	3,000	n/a	94	170	0.0126 (0.112)	2.1
B-806-C ③	SR30	201 (1779)	182 (1611)	109 (960)	96.3 (852)	900	n/a	30	60	0.0126 (0.112)	20
B-808-C ③	SR55	312 (2761)	217 (1921)	149 (1319)	145 (1283)	1,000	n/a	47.4	110	0.0168 (0.149)	8.05

Note: System data available for M series motors, EB series motors and for all motors at 115 VAC—see the MOTIONEERING® CD bound into the back inside cover of this catalog.

- ① Ambient temperature at 40°C (or less).
- ② Continuous duty ratings are with motor mounted to a 96 in² x 1/4" Aluminum faceplate.
- ③ Continuous duty ratings are with motor mounted to a 300 in² x 3/4" Aluminum faceplate.
- ④ Inertia includes feedback inertia.

www.DanaherMotion.com • 815-226-2222

B/M MOTORS



Features

B / M Series
Low / Medium Inertia

- Compact (high torque/volume ratio)
- Speeds to 7500 rpm standard
- UL recognized
- Rugged resolver feedback
- Built-in thermostat
- Rear shaft extension
- Class H insulation

EB Series
Explosion Proof

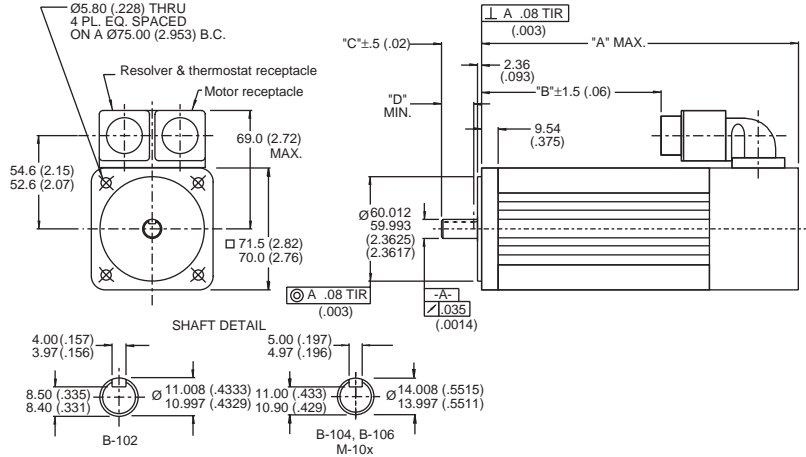
- Compact (high torque/volume ratio)
- Speeds to 7500 rpm standard
- UL recognized
- Rugged resolver feedback
- Built-in thermostat

Class H insulation

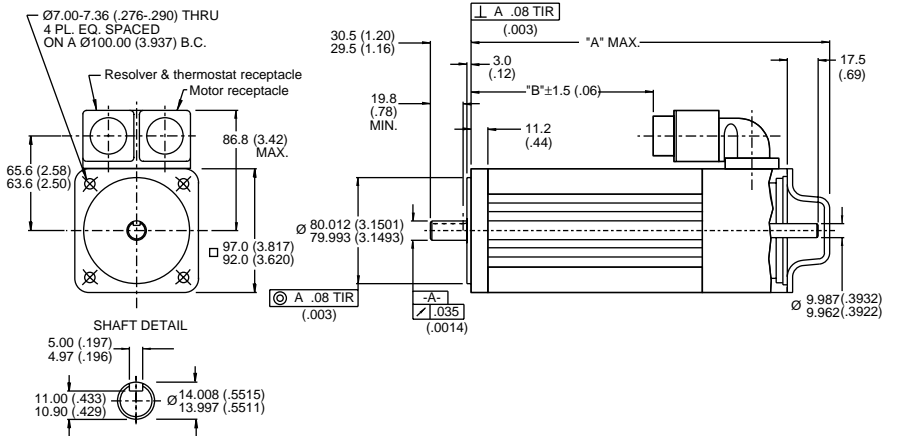
BE / ME Series
Low / Medium Inertia

- Compact (high torque/volume ratio)
- Speeds to 6000 rpm standard
- UL recognized
- Communication encoder feedback (2048 LPR)
- Built-in thermostat
- Class H insulation

B/M-10x-x-24 mm (in)



B/M-20x-x-23 mm (in)

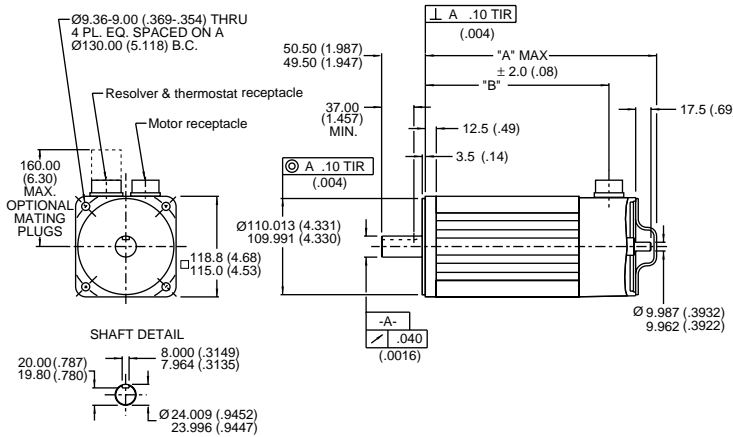


B/M MOTORS

Kollmorgen GOLDLINE® B & SERVOSTAR® CD, S System Data

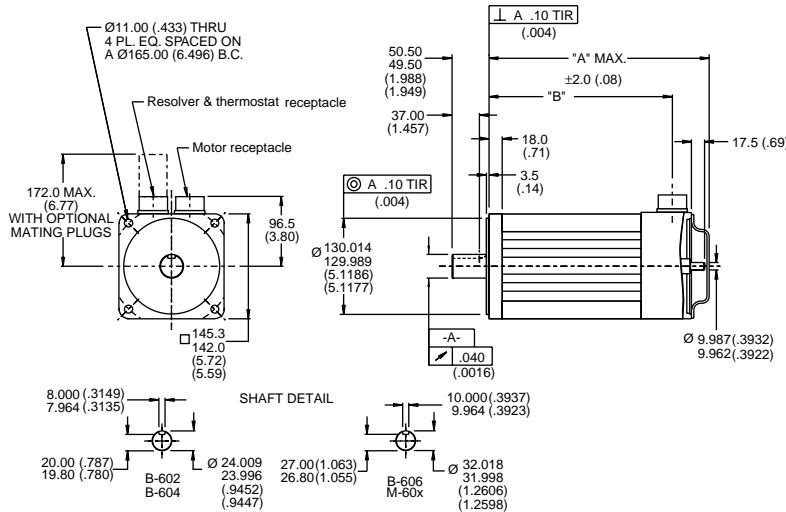
B/M-40x-x-A3

mm (in)



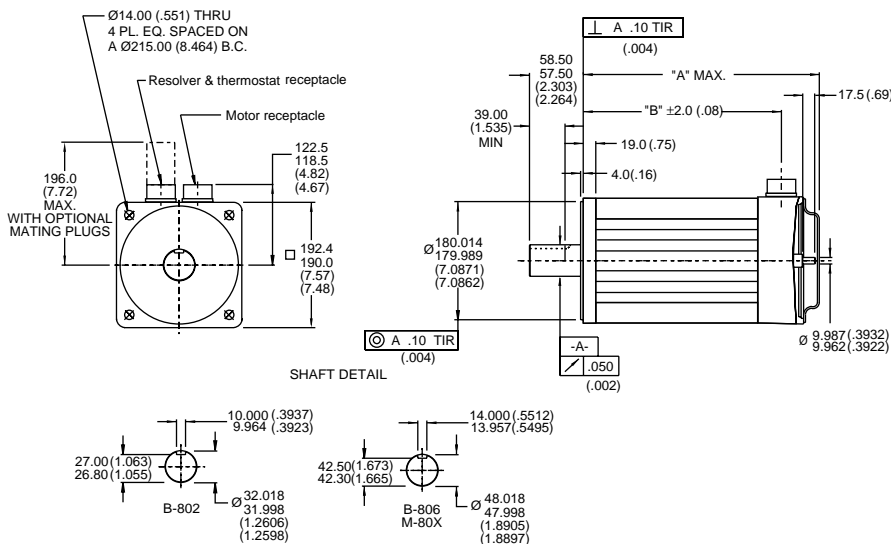
B/M-60Ax-x-A3

mm (in)



B/M-80x-x-A3

mm (in)



Model	A	B	C	D
B-102	183.2 (7.21)	103.2 (4.06)	23.0 (0.905)	18.0 (0.71)
B-104	213.7 (8.41)	133.7 (5.26)	30.0 (1.18)	20.0 (0.79)
B-106	244.2 (9.61)	164.2 (6.46)	30.0 (1.18)	20.0 (0.79)
M-103	220.0 (8.66)	140.0 (5.51)	30.0 (1.18)	20.0 (0.79)
M-105	262.1 (10.32)	182.1 (7.17)	30.0 (1.18)	20.0 (0.79)
M-107	314.5 (12.38)	234.5 (9.23)	30.0 (1.18)	20.0 (0.79)
B-202	236.2 (9.30)	123.9 (4.88)	N/A	N/A
B-204	275.8 (10.86)	163.5 (6.44)	N/A	N/A
B-206	315.4 (12.42)	203.1 (8.00)	N/A	N/A
M-203	275.8 (10.86)	163.5 (6.44)	N/A	N/A
M-205	315.4 (12.42)	203.1 (8.00)	N/A	N/A
M-207	373.2 (14.69)	260.5 (10.26)	N/A	N/A
B-402	265.5 (10.45)	213.6 (8.41)	N/A	N/A
B-404	318.8 (12.55)	266.9 (10.51)	N/A	N/A
B-406	372.1 (14.65)	320.2 (12.61)	N/A	N/A
M-403	318.8 (12.55)	266.9 (10.51)	N/A	N/A
M-405	372.1 (14.65)	320.2 (12.61)	N/A	N/A
M-407	444.9 (17.52)	393.0 (12.47)	N/A	N/A
B-602	299.2 (11.79)	248.0 (9.76)	N/A	N/A
B-604	367.8 (14.48)	316.6 (12.46)	N/A	N/A
B-606	436.4 (17.18)	385.2 (15.17)	N/A	N/A
M-603	367.8 (14.48)	316.6 (12.46)	N/A	N/A
M-605	436.4 (17.18)	385.2 (15.17)	N/A	N/A
M-607	531.5 (20.93)	480.3 (18.91)	N/A	N/A
B-802	360.4 (14.19)	300.5 (11.83)	N/A	N/A
B-804	449.9 (17.71)	390.0 (15.35)	N/A	N/A
B-806	539.4 (21.24)	479.5 (18.88)	N/A	N/A
B-808	628.9 (24.76)	569.0 (22.40)	N/A	N/A
M-803	449.9 (17.71)	390.0 (15.35)	N/A	N/A
M-805	539.4 (21.24)	479.5 (18.88)	N/A	N/A
M-807	648.7 (25.54)	588.8 (23.18)	N/A	N/A

Notes:

- EB, BE, and ME outline and dimension data and connector information is available by contacting the Customer Support Group.
- Dimensions in mm (inches)
Tolerances, unless otherwise specified:
metric: X decimal place ± 0.4, XX decimal places ± 0.13
inches: XX decimal places ± 0.015, XXX decimal places ± 0.005

B/M MOTORS

Kollmorgen GOLDLINE® B & SERVOSTAR® CD, S System Data

PARAMETER	SYMBOL	UNITS	B-102-A	B-104-A	B-104-B	B-106-A	B-106-B	B-202-A	B-202-B	B-202-C	B-204-A
			BE-102-A M-103-A ME-103-A EB-102-A	BE-104-A M-105-A ME-105-A EB-104-A	BE-104-B M-105-B ME-105-B EB-104-B	BE-106-A M-107-A ME-107-A EB-106-A	BE-106-B M-107-B ME-107-B EB-106-B	BE-202-A M-203-A ME-203-A EB-202-A	BE-202-B M-203-B ME-203-B EB-202-B	BE-202-C M-203-C ME-203-C EB-202-C	BE-204-A M-205-A ME-205-A EB-204-A
Horsepower	HP _{RATED}	hp	0.73	1.2	1.5	1.2	2.0	0.80	1.3	2.0	1.1
Kilowatts	KW _{RATED}	kW	0.54	0.90	1.1	0.90	1.5	0.60	1.0	1.5	0.82
Speed at Rated Power	N _{RATED}	rpm	7500	5600	7500	4200	7500	2500	3800	6200	1900
Max Operating Speed	N _{MAX}	rpm	7500	5600	7500	4200	7500	2500	3800	6200	1900
Cont. Torque (Stall) at 40°C	T _{CS}	N-m (lb-ft)	0.84 (0.62)	1.55 (1.14)	1.57 (1.16)	2.20 (1.62)	2.22 (1.64)	2.25 (1.66)	2.44 (1.80)	2.44 (1.80)	4.47 (3.30)
Cont. Torque (Stall) at 25°C	T _{CS}	N-m (lb-ft)	0.89 (0.66)	1.64 (1.21)	1.67 (1.23)	2.33 (1.72)	2.36 (1.74)	2.39 (1.76)	2.59 (1.91)	2.59 (1.91)	4.7 (3.5)
Cont. Line Current	I _{CS}	A _{RMS}	2.4	3	4.2	3.0	6.0	1.70	3.0	5.0	2.7
Peak Torque	T _{PS}	N-m (lb-ft)	2.41 (1.78)	4.38 (3.23)	4.45 (3.28)	6.18 (4.56)	6.35 (4.68)	7.45 (5.50)	7.38 (5.45)	7.65 (5.65)	13.7 (10.1)
Peak Line Current	I _{PS}	A _{RMS}	7.2	9	12.6	9	18	6	9.6	16.6	8.7
Max Theoretical Acceleration (B, BE, EB-10/20x) (M, ME-10/20x)	Z	rad/sec ²	78100 11400	95000 13000	96500 13200	80000 11400	83000 11700	74800 8910	74100 8330	76900 9160	79200 12000
Torque Sensitivity (Stall) ±10%	K _t	N-m (lb-ft)/A _{RMS}	0.35 (0.26)	0.51 (0.38)	0.37 (0.27)	0.72 (0.53)	0.37 (0.27)	1.32 (0.97)	0.81 (0.60)	0.49 (0.36)	1.66 (1.23)
Back EMF (Line to Line) ±10%	K _b	V _{RMS} / krpm	20.9	31	22.5	43.7	22.5	79.5	49	29.4	100.5
Max Line-to-Line volts	V _{MAX}	V _{RMS}	250	250	250	250	250	250	250	250	250
DC Res at 25°C (Line-to-Line) ±10%	R _m	ohms	6.8	5.30	2.72	6.50	1.60	17.7	6.98	2.34	9.46
Inductance (Line-to-Line) ±30%	L _m	mH	30	28.1	14.4	37.5	9.4	185.0	68	25	133
Rotor Inertia (B, BE, EB-10/20x) (M, ME-10/20x)	J _m	kg-m ² lb-ft-sec ²	0.000228-0.000031 0.000212-0.000156	0.000461-0.0000340 0.000338-0.000249	0.000461-0.0000340 0.000338-0.000249	0.000765-0.0000564 0.00054-0.00040	0.000765-0.0000564 0.00054-0.00040	0.000996-0.0000735 0.000836-0.000617	0.000996-0.0000735 0.000836-0.000617	0.000996-0.0000735 0.000836-0.000617	0.001729-0.001275 0.001143-0.000843
Weight (B, BE-10/20x) (M, ME-10/20x) (EB-10/20x)	W _t	kg (lb)	2.5 (5.5) 3.2 (7) 2.5 (5.5)	3.2 (7) 4.1 (9) 3.2 (7)	3.2 (7) 4.1 (9) 3.2 (7)	3.9 (8.5) 5 (11) 3.9 (8.5)	3.9 (8.5) 5 (11) 3.9 (8.5)	4.1 (9) 5 (11) 6.8 (15)	4.1 (9) 5 (11) 6.8 (15)	4.1 (9) 5 (11) 6.8 (15)	6.2 (13.6) 7.3 (16) 8.2 (18)
Static Friction	T _f	N-m (lb-ft)	0.04 (0.03)	0.05 (0.04)	0.05 (0.04)	0.07 (0.05)	0.07 (0.05)	0.08 (0.06)	0.08 (0.06)	0.08 (0.06)	0.10 (0.07)
Thermal Time Constant (B, BE, M, ME-10/20x)-(EB-10/20x)	TCT	minutes	10-2	11-3	11-3	12-4	12-4	18-18	18-18	18-18	20-20
Viscous Damping Z Source	F _v	N-m (lb-ft)/krpm	0.002 (0.0015)	0.003 (0.0020)	0.003 (0.0020)	0.004 (0.003)	0.004 (0.003)	0.007 (0.005)	0.007 (0.005)	0.007 (0.005)	0.009 (0.007)
Motor Constant at 25°C	K _m	N-m (lb-ft)/√watts	0.111 (0.082)	0.194 (0.143)	0.196 (0.145)	0.249 (0.184)	0.253 (0.187)	0.272 (0.201)	0.266 (0.196)	0.276 (0.204)	0.466 (0.344)
Thermal Resistance at Stall	R _{th}	°C/watt	1.30	1.07	1.07	0.87	0.89	1.0	0.81	0.87	0.74
Number of Poles			4	4	4	4	4	4	4	4	4

PARAMETER	SYMBOL	UNITS	B-204-B	B-204-C	B-206-A	B-206-B	B-206-C	B-206-D	B-402-A	B-402-B	B-402-C
			BE-204-B M-205-B ME-205-B EB-204-B	BE-204-C M-205-C ME-205-C EB-204-C	BE-206-A M-207-A ME-207-A EB-206-A	BE-206-B M-207-B ME-207-B EB-206-B	BE-206-C M-207-C ME-207-C EB-206-C	BE-206-D M-207-D ME-207-D EB-206-D	BE-402-A M-403-A ME-403-A EB-402-A	BE-402-B M-403-B ME-403-B EB-402-B	BE-402-C M-403-C ME-403-C EB-402-C
Horsepower	HP _{RATED}	hp	2.1	3.8	1.3	2.5	3.8	5.0	1.3	2.9	3.8
Kilowatts	KW _{RATED}	kW	1.6	2.8	.97	1.8	2.8	3.7	0.97	2.2	2.8
Speed at Rated Power	N _{RATED}	rpm	3600	6200	1400	2800	4900	7000	1500	3000	5000
Max Operating Speed	N _{MAX}	rpm	3600	6200	1400	2800	4900	7000	1500	3000	5000
Cont. Torque (Stall) at 40°C	T _{CS}	N-m (lb-ft)	4.47 (3.30)	4.79 (3.53)	6.51 (4.80)	6.24 (4.6)	6.44 (4.75)	6.51 (4.80)	6.8 (5.0)	6.8 (5.0)	6.5 (4.8)
Cont. Torque (Stall) at 25°C	T _{CS}	N-m (lb-ft)	4.7 (3.5)	5.1 (3.7)	6.9 (5.09)	6.62 (4.88)	6.83 (5.04)	6.90 (5.09)	7.2 (5.3)	7.4 (5.5)	6.9 (5.1)
Cont. Line Current	I _{CS}	A _{RMS}	5.3	9.8	3.0	5.8	10.0	15.0	3.0	6.4	9.8
Peak Torque	T _{PS}	N-m (lb-ft)	13.8 (10.2)	13.7 (10.1)	20.5 (15.1)	19.9 (14.7)	19.5 (14.4)	19.9 (14.7)	19.8 (14.6)	19.8 (14.6)	19.8 (14.6)
Peak Line Current	I _{PS}	A _{RMS}	17.2	29.5	10	19.5	33.0	48.5	9.3	18.8	31.3
Max Theoretical Acceleration (B, BE, EB-20/40x) (M, ME-20/40x)	Z	rad/sec ²	80000 12100	79200 12000	81500 11600	79300 11300	77700 11100	79300 11300	61300 7640	61300 7640	61300 7640
Torque Sensitivity (Stall) ±10%	K _t	N-m (lb-ft)/A _{RMS}	0.85 (0.63)	0.49 (.36)	2.15 (1.59)	1.08 (0.79)	0.62 (0.46)	0.43 (0.32)	2.51 (1.66)	1.11 (0.82)	0.66 (0.49)
Back EMF (Line to Line) ±10%	K _b	V _{RMS} / krpm	51.2	29.6	130	65.1	37.7	26.2	136.0	67.2	40.2
Max Line-to-Line volts	V _{MAX}	V _{RMS}	250	250	250	250	250	250	250	250	250
DC Res at 25°C (Line-to-Line) ±10%	R _m	ohms	2.48	0.786	8.82	2.32	0.82	0.38	10.5	2.6	0.97
Inductance (Line-to-Line) ±30%	L _m	mH	38	12	130	32	11	5.3	220	50	21
Rotor Inertia (B, BE, EB-20/40x) (M, ME-20/40x)	J _m	kg-m ² lb-ft-sec ²	0.0001729-0.00001275 0.001143-0.000843	0.0001729-0.00001275 0.001143-0.000843	0.0002512-0.0001853 0.0018-0.0013	0.0002512-0.0001853 0.0018-0.0013	0.0002512-0.0001853 0.0018-0.0013	0.0002512-0.0001853 0.0018-0.0013	0.0003236-0.000238 0.00259-0.001910	0.000323-0.0000238 0.00259-0.00191	0.000323-0.0000238 0.00259-0.00191
Weight (B, BE-20/40x) (M, ME-20/40x) (EB-20/40x)	W _t	kg (lb)	6.2 (13.6) 7.3 (16) 8.2 (18)	6.2 (13.6) 7.3 (16) 8.2 (18)	7.6 (16.7) 9.5 (21) 9.5 (21)	7.6 (16.7) 9.5 (21) 9.5 (21)	7.6 (16.7) 9.5 (21) 9.5 (21)	7.6 (16.7) 9.5 (21) 9.5 (21)	4.1 (9) 5 (11) 6.8 (15)	8.4 (18.5) 10.5 (23) 8.4 (18.5)	8.4 (18.5) 10.5 (23) 8.4 (18.5)
Static Friction	T _f	N-m (lb-ft)	0.10 (0.07)	0.10 (0.07)	0.08 (0.11)	0.08 (0.11)	0.08 (0.11)	0.08 (0.11)	0.08 (0.06)	0.24 (0.18)	0.24 (0.18)
Thermal Time Constant (B, BE, M, ME-20/40x)-(EB-20/40x)	TCT	minutes	20-20	20-20	22-22	22-22	22-22	22-22	22-6	22-6	22-6
Viscous Damping Z Source	F _v	N-m (lb-ft)/krpm	0.009 (0.007)	0.009 (0.007)	0.009 (0.012)	0.009 (0.012)	0.009 (0.012)	0.009 (0.012)	0.015 (0.011)	0.015 (0.011)	0.015 (0.011)
Motor Constant at 25°C	K _m	N-m (lb-ft)/√watts	0.464 (.342)	0.477 (0.352)	0.632 (0.466)	0.611 (0.451)	0.616 (0.454)	0.609 (0.449)	0.604 (0.446)	0.587 (0.433)	0.583 (0.430)
Thermal Resistance at Stall	R _{th}	°C/watt	0.73	0.68	0.64	0.65	0.62	0.60	0.54	0.48	0.55
Number of Poles			4	4	4	4	4	4	4	4	4

www.DanaherMotion.com • 815-226-2222

SERVOSTAR® S DRIVES



SERVOSTAR® S FEATURES

Servo Control

- Advanced sinewave commutation technology provides smooth, precise low-speed control and high-speed performance
- Accurate torque control due to precision balanced current loops with closed loop sensors
- Velocity loop bandwidths to 400 Hz
- Self-tuning to the load
- Patented torque angle control that enhances motor performance
- Fully digital control loops
- Compact and attractive rugged metal package for space-saving, modern appearance - metal package minimizes electrical noise emission and susceptibility
- Pole Placement, PI, and PDFF control options
- Command modes: Torque (analog or serial); Velocity (analog or serial); Position (analog, serial, stored or pulse)
- Seven current ratings: 3, 6, 10, 20, 30, 55, and 85 amps RMS/phase continuous
- 2 to 1 peak/continuous current rating
- Run time counter

Easy Connectivity

- Built in encoder equivalent output which can eliminate the need for an additional position feedback device
- RS-232 or RS-485 Communication
- Unique multi-drop configuration allows a PC or PLC to communicate to multiple SERVOSTAR amplifiers via single RS-232 connection
- SERVOSTAR's versatile communication capabilities make it easy to integrate machine control data directly from the factory floor to your information system
- Analog ± 10 V, pulse/direction, master encoder, serial port command options

Robust Design

- Excellent protection against miswired connection on 24 volt I/O
- ESD rugged circuit design and fully metallic enclosure
- Self-protecting intelligent power modules
- Full protection against short circuit, overvoltage, undervoltage, heatsink overtemperature, motor overtemperature, overspeed, overcurrent, and feedback loss
- UL and cUL listed, CE approval
- Flash memory

Windows® Start-up Environment – MOTIONLINK®

- Advanced motion “wizard” automatically walks you through set-up
- PC “Oscilloscope” for measuring real-time motion performance

PA Series Power Supply

- PTC resistive soft-start technology eliminates nuisance tripping of fuses or breakers
- Six power supply options for optimal configuration of single and multi-axis systems
- Up to four amplifier axis can be used with one PA power supply, up to six with PA-LM logic only power supply
- Separate inputs for logic and bus voltages allow communications to SERVOSTAR without the bus power applied (PA14, PA28, PA50, PA75 and PA85 models)

Note:

Information on the required PA Series power supply may be found on the MOTIONEERING® CD-ROM bound into the inside back cover of this catalog, or visit our website at www.DanaherMotion.com.

SERVOSTAR® S DRIVES

Kollmorgen GOLDLINE® B & SERVOSTAR® S System Data

AMPLIFIER SPECIFICATIONS

Electrical characteristics

- Closed loop velocity bandwidth up to 400 Hz
- Motor current ripple frequency:
 - 32 kHz (3/6/10 amp models)
 - 16 kHz (20/30/55/85 amp models)
- Analog command: 14 bit resolution
- Long term speed regulation (0.01%)
- Position loop update rate 500 µsec (2 kHz)
- Velocity loop update rate 250 µsec (4 kHz)
- Commutation update rate 62.5 µsec (16 kHz) (for smooth sinusoidal commutation)
- Current loop update rate 62.5 µs (16 kHz)

Fault protection

- Output phase to phase short circuit protection
- Overvoltage
- Undervoltage
- Overtemperature (motor and amplifier)
- Overspeed
- Overcurrent
- Feedback loss
- Foldback
- Supply loss
- Excessive position error

Environmental

- Operation range
 - Ambient 0 to 45°C (derated above ambient)
 - Storage -20°C to 70°C
- Humidity (non-condensing) 10% to 90%

Digital Compensation

- Velocity loop: PI, PDF or Pole Placement selectable algorithms
- Factory preset or field tunable
- MOTIONLINK software provides tuning programming via RS-232 or RS-485 serial interface
- Position loop gain adjustment
- Digital current loop
- Adjustable filters

Inputs

- Analog command: ±10 V bit resolution up to 16,000 to 1 dynamic speed range
- Remote enable: 24 V
- Three multi-purpose inputs: 24 V Configurable to: CW limit switch, CCW limit switch, gear enable, start motion, second current limit, change velocity to torque mode, home switch, search for home, move to home registration capture, active disable, control fault relay, hold position plus using two inputs, up to four stored indexes or speeds can be executed
- Pulse command: up/down, pulse/direction, pulse or quadrature encoder format into RS-485 receivers or opto isolators

Communications

- RS-232 or RS-485 serial interface up to 19.2 kb

Outputs

- Fault: contact closure rated for 1 amp, 24 volt
- One multi-purpose output 24 V configuration: speed exceeded, current exceeded, amplifier in foldback, brake enable, motion complete, in position, zero speed detect

Operational Modes

- Torque control – from analog or serial command
- Velocity control –from analog or serial command

- Pulse following
- Gearing from quad encoder input
- Position control from analog or serial command

Diagnostics

- Seven segment LED display
- Error history log
- Internal variable monitoring
- DC scope

Motor Feedback

- Resolver: sine/cosine 2 V peak to peak (SERVOSTAR provides 4.25 V peak to peak for resolver excitation)
- Encoder: 5 V quadrature with or without Halls, with or without marker
- Absolute Sine Encoder: HEIDENHAIN EnDat™ Format

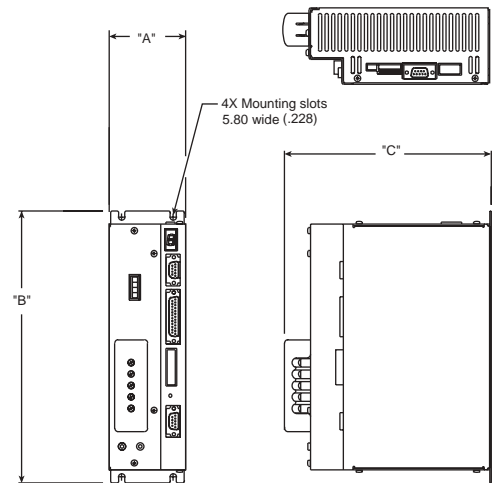
AMPLIFIER RATINGS

Model	Sx03	Sx06	Sx10	Sx20	Sx30	Sx55	Sx85
Output Continuous Current Per Phase (RMS/phase)	3	6	10	20	30	55	85
Output Peak Current Per Phase (RMS/phase) (2 sec.)	6	12	20	40	60	110	170
Output (kW) Continuous Power	1.1	2.2	3.6	7.2	11	20	33.8
Internal Power Dissipation (watts)	37	84	120	240	254	465	675
DC Bus Voltage Input (VDC) ①	110-360	110-360	110-360	260-360	260-360	260-360	260-360
PWM Switching Frequency (kHz)	16	16	16	8	8	8	8

Notes:
 ① DC input voltage is supplied by a separate PA series power supply. For information about models and ratings of these supplies, see the MOTIONEERING® CD-ROM bound into the inside back cover of this catalog, or visit our website at www.DanaherMotion.com.

Sx03/06/10/20/30/55/85 AMPLIFIER

mm (in)



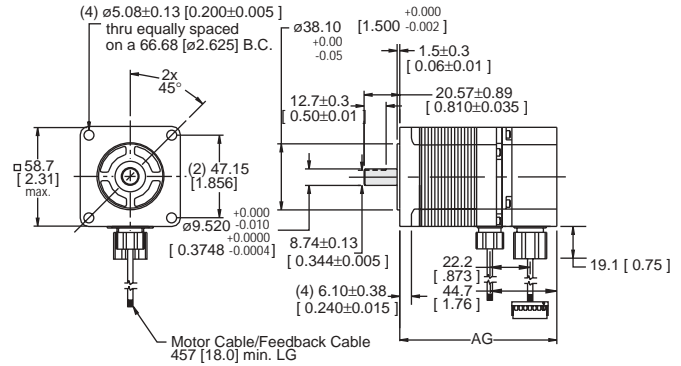
MODEL	DIM "A"	DIM "B"	DIM "C"
Sx03	75 (2.95)	264 (10.39)	202 (7.95)
Sx06	75 (2.95)	264 (10.39)	202 (7.95)
Sx10	90 (3.54)	264 (10.39)	202 (7.95)
Sx20	118.6 (4.67)	264 (10.39)	202 (7.95)
Sx30	142 (5.59)	264 (10.39)	210 (8.27)
Sx55	160 (6.3)	302 (11.89)	211 (8.30)
Sx85	184.7 (7.27)	302 (11.89)	218.8 (8.61)

PMB MOTORS

Pacific Scientific PMB Brushless Servo Motors



PMB2 SERIES MOTOR mm [in]



Features

PMB Series Motors

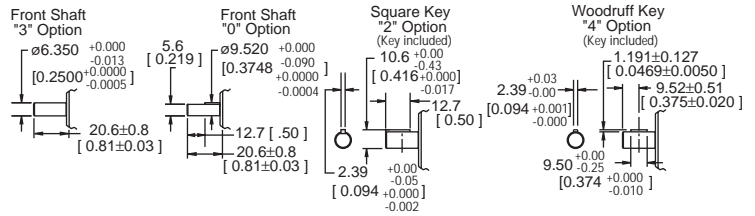
MS or AMP mini Mate-N-Lock® connector options

IP40 Construction

Benefits

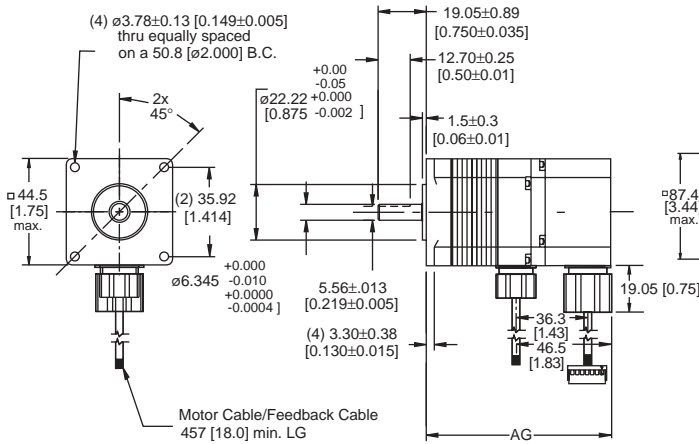
Improved application flexibility

Improved cost-effectiveness for higher volume applications



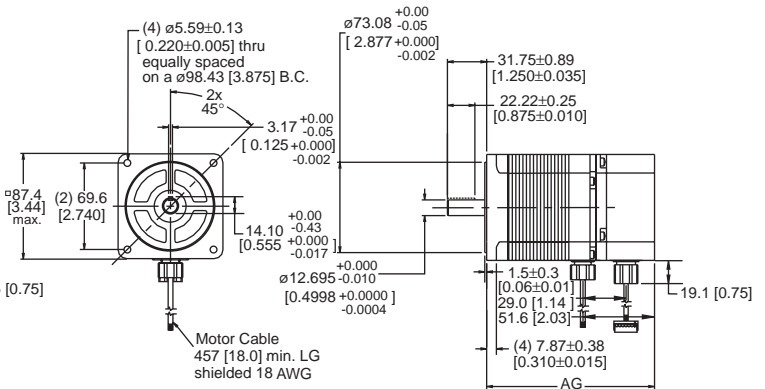
Motor	Length (AG)	Inertia - with resolver		Inertia - with encoder	
	mm (in)	kgm ² x10 ⁻³	lb-in-sec ² x10 ⁻³	kgm ² x10 ⁻³	lb-in-sec ² x10 ⁻³
PMB21	112.8 (4.44)	.023	.206	.023	.201
PMB22	142.0 (5.59)	.044	.390	.044	.385
PMB23	176.3 (6.94)	.065	.576	.065	.571

PMB1 SERIES MOTOR mm [in]

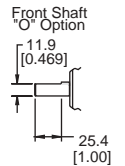


Motor	Length (AG)	Inertia - with resolver		Inertia - with encoder	
	mm (in)	kgm ² x10 ⁻³	lb-in-sec ² x10 ⁻³	kgm ² x10 ⁻³	lb-in-sec ² x10 ⁻³
PMB11	108.0 (4.25)	0.006	0.050	0.005	0.045
PMB12	133.4 (5.25)	0.009	0.084	0.009	0.079
PMB13	158.8 (6.25)	0.013	0.118	0.013	0.113

PMB3 SERIES MOTOR mm [in]



Motor	Length (AG)	Inertia - with resolver		Inertia - with encoder	
	mm (in)	kgm ² x10 ⁻³	lb-in-sec ² x10 ⁻³	kgm ² x10 ⁻³	lb-in-sec ² x10 ⁻³
PMB31	134.1 (5.28)	0.137	1.21	0.137	1.21
PMB32	172.2 (6.78)	0.270	2.39	0.270	2.39
PMB33	210.3 (8.28)	0.404	3.57	0.403	3.57



PMB MOTORS

Pacific Scientific PMB Brushless Servo Motors

RATINGS AND CHARACTERISTICS

Motor parameters and winding data. System pairings are available, see the Servo Selection Guide located on the MOTIONEERING® CD-ROM bound into the back inside cover of this catalog.

PMB1-2 SERIES MOTORS	PARAMETER	SYMBOL	UNITS	PMB11	PMB12	PMB13	PMB21	PMB22	PMB23
	Continuous stall torque ① ②	T _{CS}	N-m (lb-in)	0.22 (1.95)	0.40 (3.5)	0.55 (4.9)	0.59 (5.2)	1.11 (9.8)	1.53 (13.5)
	Peak torque ③ ④	T _{PK}	N-m (lb-in)	0.66 (5.8)	1.2 (10.6)	1.65 (14.6)	1.85 (16.4)	3.29 (29.1)	4.59 (40.6)
	Inertia ⑤ ⑥	J _M	kgm ² x10 ⁻³ (lb-in-sec ² x10 ⁻³)	0.0054 (0.048)	0.0093 (0.082)	0.0127 (0.112)	0.023 (0.204)	0.0438 (0.388)	0.065 (0.574)
	Static friction (max.)	T _f	N-m (lb-in)	0.008 (0.07)	0.011 (0.1)	0.015 (0.13)	0.034 (0.30)	0.068 (0.60)	0.102 (0.90)
	Viscous damping coefficient	K _{DV}	N-m/krpm (lb-in/krpm)	0.0023 (0.02)	0.0045 (0.04)	0.0068 (0.06)	0.0079 (0.07)	0.124 (0.11)	0.0181 (0.160)
	Thermal resistance	R _{TH}	deg. C/watt	2.4	2.4	2.0	1.45	1.3	1.2
	Thermal time constant	t _{TH}	min	12.0	14.0	16.0	22	24	26
	Weight (motor only)	W	kg (lbs)	0.6 (1.4)	0.7 (1.6)	1.3 (2.9)	1.2 (2.7)	2.1 (4.6)	2.9 (6.4)
	WINDING DATA			B-D	B-D	B-D	B-D	B-D	B-C
Torque constant (RMS)	K _T	N-m/A _{RMS} (lb-in/A _{RMS})	0.096 (0.85)-0.048 (0.42)	0.17 (1.48)-0.087 (0.77)	0.25 (2.2)-0.12 (1.05)	0.25 (2.24)-0.14 (1.21)	0.43 (3.8)-0.23 (2.01)	0.61 (5.39)-0.45 (4.0)	
Voltage constant (RMS) (I-I)	K _E	V _{RMS} /rad/sec (V _{RMS} /krpm)	0.061 (6.4)-0.031 (3.2)	0.106 (11.1)-0.055 (5.8)	0.159 (16.6)-0.075 (7.9)	0.16 (16.8)-0.09 (9.1)	0.27 (28.8)-0.14 (15.1)	0.39 (40.5)-0.29 (30.0)	
Continuous stall current ① ②	I _{CS}	A _{RMS}	2.3-4.6	2.4-4.6	2.2-4.6	2.4-4.3	2.6-4.9	2.5-3.4	
Current at peak torque ④	I _{PK}	A _{RMS}	6.9-13.8	7.2-13.8	6.6-13.8	7.5-13.5	7.8-14.7	7.5-10.2	
Resistance (line-to-line)	R _C	ohms	4.45-1.15	4.15-1.15	5.2-1.25	6.6-1.84	6.4-1.8	7.8-3.8	
Inductance (line-to-line)	L	mH	3.2-0.8	3.5-1.0	4.8-1.1	5.5-1.6	6.7-1.9	8.4-4.3	
Typical Rated Speed @ 36 VAC, 48 VDC bus	W _R	rpm	700-5,800	600-3,300	n/a-2,450	n/a-1,100	n/a-700	n/a-n/a	
Typical Rated Torque @ 36 VAC, 48 VDC bus	T _{CR}	N-m (lb-in)	0.22 (1.95)-0.20 (1.77)	0.40 (3.5)-0.38 (3.4)	n/a (n/a)-0.50 (4.4)	n/a (n/a)-0.59 (5.2)	n/a (n/a)-1.10 (9.7)	n/a (n/a)-n/a (n/a)	
Typical Rated Speed @ 240 VAC, 320 VDC bus	W _R	rpm	n/a	n/a	11,500-n/a	9500-n/a	6,000-n/a	4,100-6,350	
Typical Rated Torque @ 240 VAC, 320 VDC bus	T _{CR}	N-m (lb-in)	n/a (n/a)	n/a	0.37 (3.27)-n/a (n/a)	0.42 (3.7)-n/a (n/a)	0.9 (8.0)-n/a (n/a)	1.33 (11.8)-1.17 (10.4)	
PMB3 SERIES MOTORS	PARAMETER	SYMBOL	UNITS	PMB31	PMB32	PMB33			
	Continuous stall torque ① ②	T _{CS}	N-m (lb-in)	2.03 (18)	3.8 (33.6)	5.3 (46.9)			
	Peak torque ③ ④	T _{PK}	N-m (lb-in)	6.1 (53.9)	11.4 (101)	15.9 (141)			
	Inertia ⑤ ⑥	J _M	kgm ² x10 ⁻³ (lb-in-sec ² x10 ⁻³)	0.137 (1.21)	0.272 (2.41)	0.408 (3.61)			
	Static friction (max.)	T _f	N-m (lb-in)	0.09 (0.80)	0.12 (1.10)	0.169 (1.50)			
	Viscous damping coefficient	K _{DV}	N-m/krpm (lb-in/krpm)	0.0124 (0.110)	0.026 (0.23)	0.038 (0.34)			
	Thermal resistance	R _{TH}	deg. C/watt	1.1	0.9	0.78			
	Thermal time constant	τ _{TH}	min	28	30	32			
	Weight (motor only)	W	kg (lbs)	2.5 (5.5)	4.4 (9.7)	6.3 (13.8)			
	WINDING DATA			B-D	C-D-E	C-E-F			
	Torque constant (RMS)	K _T	N-m/A _{RMS} (lb-in/A _{RMS})	0.77 (6.83)-0.40 (3.51)	1.32 (11.7)-0.75 (6.62)-0.57 (5.06)	1.85 (16.4)-0.92 (8.2)-0.59 (5.3)			
	Voltage constant (RMS) (I-I)	K _E	V _{RMS} /rad/sec (V _{RMS} /krpm)	0.49 (51.3)-0.25 (26.4)	0.838 (87.7)-0.475 (49.7)-0.363 (38.0)	1.17 (123)-0.586 (61.4)-0.377 (39.5)			
	Continuous stall current ① ②	I _{CS}	A _{RMS}	2.64-5.1	2.88-5.1-6.7	2.9-5.8-9.0			
	Current at peak torque ④	I _{PK}	A _{RMS}	7.9-15.3	8.64-15.3-20.1	8.6-17.3-27.0			
	Resistance (line-to-line)	R _C	ohms	7.5-2.0	7.7-2.4-1.46	8.4-2.1-0.86			
Inductance (line-to-line)	L	mH	16-4.2	19.3-6.2-3.6	23.4-5.8-2.4				
Typical Rated Speed @ 240 VAC, 320 VDC bus	W _R	rpm	3,100-6,550	1,900-3,600-4,650	1,350-3,050-4,850				
Typical Rated Torque @ 240 VAC, 320 VDC bus	T _{CR}	N-m (lb-in)	1.94 (17.2)-1.53 (13.5)	3.6 (31.9)-3.4 (30.1)-3.1 (27.4)	4.9 (43.3)-4.6 (40.7)-3.75 (33.3)				

Note: All values at 25°C unless otherwise noted. All Inertias are shown with a Resolver.

① Motor operated at rated winding temperature rise of Δt = 100°C above ambient at 25°C ambient. Ratings result of average rating between free air and cold plate mounting. Equivalent to mounting to a 10" x 10" x 1/4" aluminum heat sink. | ② All tests performed with sinusoidal commutation. | ③ Theoretical motor maximum. | ④ Caution: For peak torques or peak currents greater than 4x the continuous rating, consult the factory for thermal considerations. | ⑤ Motor with resolver feedback.

SERVOSTAR® PD DRIVES

SERVOSTAR® PD Brushless Servo Drives



SERVOSTAR® PD SERIES PERFORMANCE FEATURES

Feedback

- Resolver, Incremental Encoder, Sine Encoder (including HEIDENHAIN EnDat™ support) or halls-only operation
- Auxiliary encoder feedback, used for Dual Loop or Master/Slave Operation.
- Commutation initialization with minimal motion

Servo Control

- Advanced patented sinewave commutation technology provides smooth, precise low-speed control and high-speed performance
- Accurate torque control due to precision balanced current loops with closed loop sensors
- Velocity loop bandwidths to 400 Hz
- Self-tuning to the load
- S-curve acceleration feature for reducing acceleration “jerk” and machine wear
- Patented torque angle control enhances motor performance
- Fully digital control loops
- Compact and attractive rugged metal package for space-saving, modern appearance - metal package minimizes electrical noise emission and susceptibility
- Pole Placement, PI, and PDF control options
- Low Pass or Notch Filters for compliant & resonance machines
- Command modes:
Torque (analog or serial); Velocity (analog or serial);
Position (analog, serial, SERCOS, stored or pulse)

Reference Command

- 14-bit Analog-to-Digital conversion for ± 10 VDC operation
- SERCOS operation, designed for use with the Kollmorgen SERVOSTAR MC, multi-axis motion controller
- Pulse following control, configured as an encoder follower, up/down counter or pulse/direction counter
- Serial command

Motion Options

- Point-to-point, incremental or absolute
- Store up to 4 motion indexing profiles in memory
- Homing functions

Configurable I/O

- Three digital inputs and 1 digital output;
can be configured to a variety of functions

Windows® Start-up Environment – MOTIONLINK®

- Advanced motion “wizard” automatically walks you through set-up
- Auto configuration function checks for correct wiring of motor and feedback
- PC “Oscilloscope” for measuring real-time motion performance

Robust Design

- Self-protecting intelligent power modules
- Full protection against short circuit, overvoltage, undervoltage, heatsink overtemperature, motor overtemperature, overspeed, overcurrent, and feedback loss
- Flexible current foldback protection

SERVOSTAR® PD DRIVES

SERVOSTAR® PD Brushless Servo Drives

AMPLIFIER SPECIFICATIONS

Electrical characteristics

- Closed loop velocity bandwidth up to 400 Hz
- Motor current ripple frequency (16-32 kHz)
- Long term speed regulation (0.01%)
- Position loop update rate 500 µs (2 kHz)
- Velocity loop update rate 250 µs (4 kHz)
- Commutation update rate 62.5 µs (16 kHz)
- Current loop update rate 62.5 µs (16 kHz)

Fault protection

- Output phase to phase short circuit protection
- Overvoltage
- Undervoltage
- Overtemperature (motor and amplifier)
- Overspeed
- Overcurrent
- Feedback loss
- Foldback
- Supply loss
- Excessive position error

Environmental

- Operation range
 - Ambient 5°C to 45°C
 - Storage 0°C to 70°C
- Humidity (non-condensing) 10% to 90%

Velocity Loop Compensation

- MOTIONLINK software provides tuning programming via RS-232 serial interface

Position Loop Compensation

- PID

Operational modes

- Torque control — from analog or serial command
- Velocity control — from analog or serial command
- Pulse following/Up-Down count
- Gearing from quad encoder input
- Position control

Inputs

- 15 bit resolution provides up to 32,000 to 1 dynamic speed range
- Remote enable: 24 V
- Three multi-purpose 24 V inputs Configurable to: CW limit switch, CCW limit switch, gear enable, start motion, second current limit, change velocity to torque mode, home switch, search for home, move to home registration capture, active disable, control fault relay, hold position plus using two inputs, up to four stored indexes or speeds can be executed
- Pulse command: up/down, pulse/direction, pulse or quadrature encoder format into RS-422 opto-isolated receivers

Communications

- RS-232 at 9600 or 19200 bps
- Daisy-chain capability
- SERCOS interface™

Outputs

- Fault: contact closure rated for 1 amp, 24 volt
- One multi-purpose 24 V output configurable to: speed exceeded, current exceeded, amplifier in foldback, brake enable, motion complete, in position, zero speed detect, encoder INIT complete

Diagnostics

- Seven segment LED display
- Error history log
- Internal variable monitoring
- PC scope

Motor Feedback

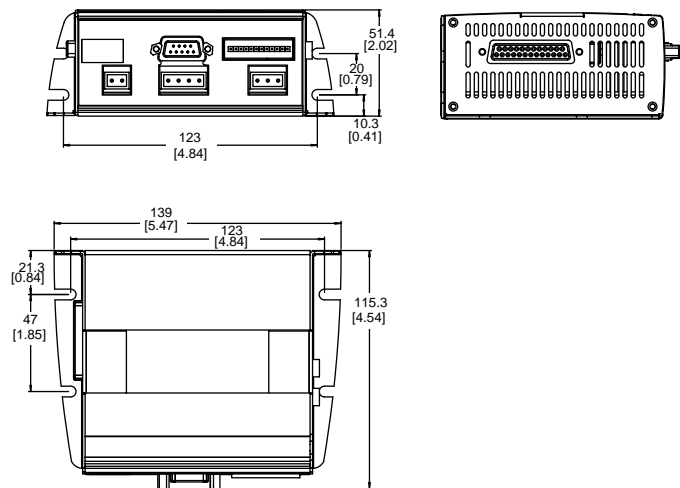
- Resolver, Incremental Encoder, Sine Encoder (including HEIDENHAIN EnDat™ support) or halls-only operation
- Auxiliary encoder feedback, used for Dual Loop or Master/Slave Operation
- Commutation initialization with minimal motion

AMPLIFIER RATINGS

Model	PE2 05	PE2 10	PE3 05
Output Continuous Current Per Phase (RMS/phase) @ 45°C	5 amps	10 amps	5 amps
Output Peak Current Per Phase (RMS/phase)	10 amps (0.5 sec)	20 amps (0.5 sec)	10 amps (0.5 sec)
DC Bus Input Voltage	16-56 VDC	16-56 VDC	40-100 VDC
Rated Input Power (W)	128	256	428
Rated Output Continuous Power (W)	120	240	400

SERVOSTAR® PD

mm [in]



INTRODUCTION BENEFITS OF USING DDR (DIRECT DRIVE ROTARY) TECHNOLOGY

Kollmorgen GOLDLINE® DDR SERIES MOTORS

Kollmorgen's 50 years of electromagnetic and electromechanical design expertise is packed into the DDR product line. We achieve very high torque density through both large diameter, short length, and high number of magnetic poles. Couple this with a very high resolution feedback device (up to 2,097,152 counts per revolution) and the DDR becomes a high performance, zero maintenance, servo solution.

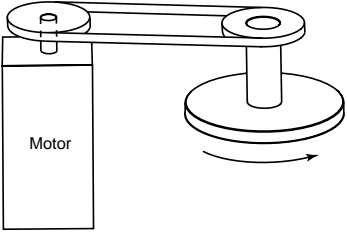
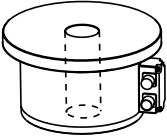
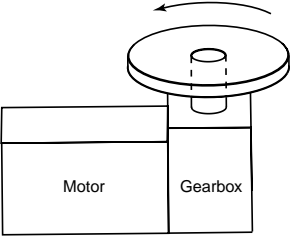
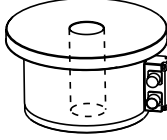
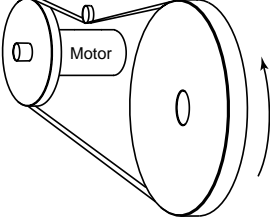
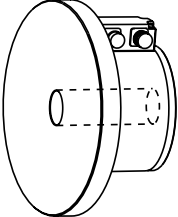
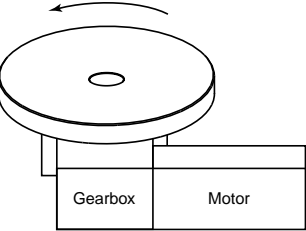
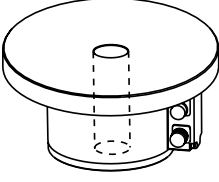
The DDR can be used as a flexible indexer, providing programmable, rapid, indexing far exceeding the throughput of conventional mechanical or variable reluctance technology indexers.

It can be used for replacing mechanical transmissions such as gearboxes, timing belts, and rack and pinion reducers. DDR combines the high torque of a Direct Drive Rotary design with the high speed of conventional servos. This opens up a wide range of applications not previously available to Direct Drive Rotary technology.

The DDR is the latest in a series of product innovations from the worldwide leader in Direct Drive Rotary motor products....Kollmorgen.

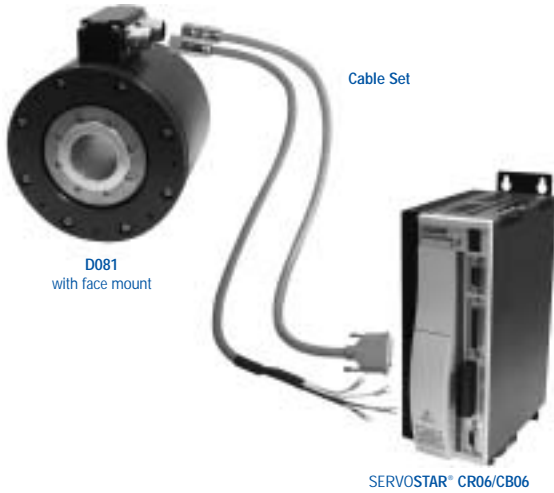
DIRECT DRIVE ROTARY

BENEFITS OF USING DDR (DIRECT DRIVE ROTARY) TECHNOLOGY

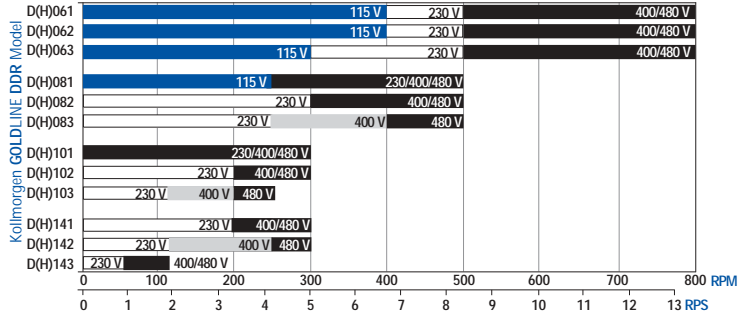
APPLICATION PROBLEM	SOLUTION	BENEFITS
 <p>Motor</p>	 <p>DDR</p>	<p>Belt/pulley</p> <ul style="list-style-type: none"> • Zero maintenance • No belt adjustment/replacement • No belt compliance • Better servo performance • Clean mechanical assembly • Flat profile • Quiet • Reduced number of parts • Hollow shaft
 <p>Motor Gearbox</p>	 <p>DDR</p>	<ul style="list-style-type: none"> • Zero maintenance • No gearbox lubrication • No gearbox backlash • Better servo performance • Flat Profile • Quiet • Hollow shaft
 <p>Motor</p>	 <p>DDR</p>	<p>Large Vertical Wheel</p> <ul style="list-style-type: none"> • Zero maintenance • No belt adjustment/replacement • No belt compliance • Better servo performance • Faster index times • Clean mechanical assembly • Quiet • Reduced number of parts • Hollow shaft
 <p>Gearbox Motor</p>	 <p>DDR</p>	<p>Rotary Indexer</p> <ul style="list-style-type: none"> • Zero maintenance • No gearbox lubrication • No gearbox backlash • Better servo performance • Quiet • Reduced number of parts • Hollow shaft

DDR SYSTEM

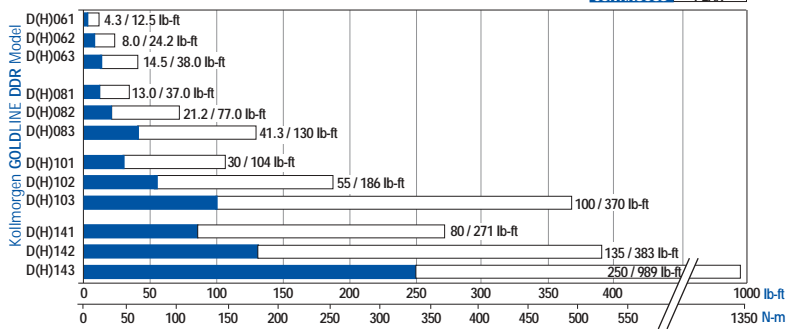
Kollmorgen GOLDLINE® DDR Series Motor Systems



MAXIMUM SPEED BY MODEL



PEAK AND CONTINUOUS TORQUE BY MODEL



Features

Kollmorgen GOLDLINE® DDR Series Motors

Elimination of gearbox

Elimination of belts

High torque density permanent magnet design provides more speed and torque vs variable reluctance motors

Large through bore

Speeds up to 800 rpm

High Position Resolution (up to 2,097,152 counts per revolution)

Wide range of size and torque

Peak torque up to 990 lb-ft

Axial loading up to 12,700 lbs

Moment loading up to 472 lb-ft

Mix/match motors/drives

Benefits

Zero maintenance, smoother velocity, higher bandwidth, quiet (reduced, audible noise)

Zero maintenance, higher bandwidth

Faster indexing, lower heat generation

Run process fluids, pneumatics, and electrical through center of motor

More than just an indexer, DDR can be used for continuous velocity applications

Repeatability down to ±0.62 arc.sec

Cover any DDR application

Rapid indexing of large inertia loads

Can carry heavy loads for indexing

Operate motor with significant offset loads

No serial number matching of motor/drive

RECOMMENDED MOTOR/DRIVE SYSTEMS

ServoDrive	Standard Motor Systems	Cable Set (Resolver)	Cable Set (Sine Encoder)
SERVOSTAR CD 6 amp	D061, D062, D063, D081, D082, D083, D101	CS-SS-RHAHE-xx	CS-SS-S3HA1HE-xx
SERVOSTAR CD 10 amp	D102, D103		
SERVOSTAR 600 10 amp	DH061, DH062, DH063, DH081, DH082, DH083, DH101, DH102	CS-SS-RHG1HE-xx	CS-SS-S3HG1HE-xx
SERVOSTAR 600 14 amp	D141, D142, DH103, DH141, DH142	CS-SS-RHG2HE-xx	CS-SS-S3HG2HE-xx
SERVOSTAR 600 20 amp	D143, DH143		

Note:
Refer to pages 28-29 for SERVOSTAR CD information.
Refer to pages 34-35 for SERVOSTAR 600 information.

RATINGS AND CHARACTERISTICS, 115 and 230 VAC

D06X & D08X SERIES MOTORS	PARAMETER		SYMBOL	UNITS	D061A/061M	D062A/062M	D063A/063M	D081A/081M	D082A/082M	D083A/083M
	Peak Torque		T _p	N-m (lb-ft)	16.9 (12.5)	32.8 (24.2)	51.5 (38)	43.4 (32)	92.2 (68)	160 (118)
	Continuous ^① Sine Encoder		T _c	N-m (lb-ft)	5.3 (3.9)	9.8 (7.2)	17.7 (13.1)	15.9 (11.7)	25.9 (19.1)	50.4 (37.2)
	Torque 40°C	Resolver	T _c	N-m (lb-ft)	5.8 (4.3)	10.8 (8.0)	19.7 (14.5)	17.6 (13.0)	28.7 (21.2)	56 (41.3)
	Max Operating Speed									
	230/115 V Single Phase ^②		N _{MAX}	rps-rpm	8.3/6.7-500/400	8.3/6.7-500/400	8.3/5.0-500/300	8.3/4.2-500/250	5.0/NA-300/NA	4.2/NA-250/NA
	Sine Encoder System	Resolution	-	counts/rev	2,097,152	2,097,152	2,097,152	2,097,152	2,097,152	2,097,152
		Repeatability	-	arc • sec	±0.62	±0.62	±0.62	±0.62	±0.62	±0.62
		Accuracy	-	arc • sec	±26	±26	±26	±26	±26	±26
	Resolver System	Resolution ^③	-	counts/rev	524,288	524,288	524,288	786,432	786,432	786,432
	Repeatability	-	arc • sec	±2.48	±2.48	±2.48	±1.65	±1.65	±1.65	
	Accuracy	-	arc • sec	±270	±270	±270	±140	±140	±140	
MECHANICAL DATA										
Weight		W _T	kg (lb)	9.4 (20.8)	11.3 (25.0)	13.8 (30.5)	17.9 (39.5)	21.5 (47.5)	28.8 (63.6)	
Rotor Inertia		J _M	kg-m ² (lb-ft-s ²)	0.0061 (0.0045)	0.0071 (0.0052)	0.0086 (0.0064)	0.0144 (0.0106)	0.0194 (0.0143)	0.0301 (0.0222)	
Static Friction										
adder for sealed units		T _F	N-m (lb-ft)	2.4 (1.8)	2.4 (1.8)	2.4 (1.8)	2.7 (2.0)	2.7 (2.0)	2.7 (2.0)	
Max. Dynamic Axial										
Compression Load		-	kg (lbf)	2,040 (4,500)	2,040 (4,500)	2,040 (4,500)	3,360 (7,400)	3,360 (7,400)	3,360 (7,400)	
D10X & D14X SERIES MOTORS	PARAMETER		SYMBOL	UNITS	D101A/101M	D102A/102M	D102A/102M	D141M	D142M	D143M
	Peak Torque		T _p	N-m (lb-ft)	129 (95)	210 (155)	305 (225)	367 (271)	519 (383)	1341 (989)
	Continuous ^① Sine Encoder		T _c	N-m (lb-ft)	34.6 (25.5)	63.4 (46.8)	115.3 (85)	108 (80)	183 (135)	339 (250)
	Torque 40°C	Resolver	T _c	N-m (lb-ft)	40.7 (30)	74.6 (55)	136 (100)	-	-	-
	Max Operating Speed									
	230 V Single Phase ^②		N _{MAX}	rps-rpm	5.0-300	3.3-200	2.0-120	3.3-200	2.0-120	1.0-60
	Sine Encoder System	Resolution	-	counts/rev	2,097,152	2,097,152	2,097,152	1,048,576	1,048,576	1,048,576
		Repeatability	-	arc • sec	±0.62	±0.62	±0.62	±1.24	±1.24	±1.24
		Accuracy	-	arc • sec	±26	±26	±26	±27	±27	±27
	Resolver System	Resolution ^③	-	counts/rev	1,048,576	1,048,576	1,048,576	-	-	-
	Repeatability	-	arc • sec	±1.24	±1.24	±1.24	-	-	-	
	Accuracy	-	arc • sec	±135	±135	±135	-	-	-	
MECHANICAL DATA										
Weight		W _T	kg (lb)	31.5 (69.5)	43.8 (96.5)	60.8 (134)	131-59.4	86.6 (191)	146 (323)	
Rotor Inertia		J _M	kg-m ² (lb-ft-s ²)	0.0693 (0.0511)	0.0992 (0.0732)	0.175 (0.129)	0.146 (0.108)	0.248 (0.183)	0.477 (0.352)	
Static Friction										
adder for sealed units		T _F	N-m (lb-ft)	3.5 (2.6)	3.5 (2.6)	3.5 (2.6)	3.5 (2.6)	3.5 (2.6)	3.5 (2.6)	
Max. Dynamic Axial										
Compression Load		-	kg (lbf)	5,300 (11,700)	5,300 (11,700)	5,300 (11,700)	5,760 (12,700)	5,760 (12,700)	5,760 (12,700)	

RATINGS AND CHARACTERISTICS, 400 and 480 VAC

DH06X & DH08X SERIES MOTORS	PARAMETER		SYMBOL	UNITS	DH061A/DH061M	DH062A/DH062M	DH063A/DH063M	DH081A/DH081M	DH082A/DH082M	DH083A/DH083M
	Peak Torque		T _p	N-m (lb-ft)	16.9 (12.5)	32.8 (24.2)	64.4 (47.5)	51.0 (37.6)	104 (77)	177 (130)
	Continuous ^① Sine Encoder		T _c	N-m (lb-ft)	5.3 (3.9)	9.8 (7.2)	17.7 (13.1)	15.9 (11.7)	25.9 (19.1)	50.4 (37.2)
	Torque 40°C	Resolver	T _c	N-m (lb-ft)	5.8 (4.3)	10.8 (8.0)	19.7 (14.5)	17.6 (13.0)	28.7 (21.2)	56 (41.3)
	Max Operating Speed									
	400/480 V Single Phase ^②		N _{MAX}	rps-rpm	13.3-800	13.3-800	13.3-800	8.3/8.3-500/500	8.3/8.3-500/500	8.3/6.7-500/400
	Sine Encoder System	Resolution	-	counts/rev	1,048,576	1,048,576	1,048,576	1,048,576	1,048,576	1,048,576
		Repeatability	-	arc • sec	±1.24	±1.24	±1.24	±1.24	±1.24	±1.24
		Accuracy	-	arc • sec	±27	±27	±27	±27	±27	±27
	Resolver System	Resolution ^③	-	counts/rev	131,072	131,072	131,072	196,608	196,608	196,608
	Repeatability	-	arc • sec	±10	±10	±10	±6.6	±6.6	±6.6	
	Accuracy	-	arc • sec	±270	±270	±270	±140	±140	±140	
MECHANICAL DATA										
Weight		W _T	kg (lb)	9.4 (20.8)	11.3 (25.0)	13.8 (30.5)	17.9 (39.5)	21.5 (47.5)	28.8 (63.6)	
Rotor Inertia		J _M	kg-m ² (lb-ft-s ²)	.0061 (0.0045)	0.0071 (0.0052)	0.0086 (0.0064)	0.0144 (0.0106)	0.0194 (0.0143)	0.0301 (0.0222)	
Static Friction										
adder for sealed units		T _F	N-m (lb-ft)	2.4 (1.8)	2.4 (1.8)	2.4 (1.8)	2.7 (2.0)	2.7 (2.0)	2.7 (2.0)	
Max. Dynamic Axial										
Compression Load		-	kg (lbf)	2,040 (4,500)	2,040 (4,500)	2,040 (4,500)	3,360-7,400	3,360-7,400	3,360-7,400	
DH10X & DH14X SERIES MOTORS	PARAMETER		SYMBOL	UNITS	DH101A/DH101M	DH102A/DH102M	DH103A/DH103M	DH141M	DH142M	DH143M
	Peak Torque		T _p	N-m (lb-ft)	141 (104)	252 (186)	501 (370)	367 (271)	519 (383)	1341 (989)
	Continuous ^① Sine Encoder		T _c	N-m (lb-ft)	34.6 (25.5)	63.4 (46.8)	115.3 (85)	108 (80)	183 (135)	339 (250)
	Torque 40°C	Resolver	T _c	N-m (lb-ft)	40.7 (30)	74.6 (55)	136 (100)	-	-	-
	Max Operating Speed									
	400/480 V Single Phase ^②		N _{MAX}	rps-rpm	5.0/5.0-300/300	5.0/5.0-300/300	4.2/3.3-250/200	5/5-300/300	5/4.2-300/250	2/2-120/120
	Sine Encoder System	Resolution	-	counts/rev	1,048,576	1,048,576	1,048,576	1,048,576	1,048,576	1,048,576
		Repeatability	-	arc • sec	±1.24	±1.24	±1.24	±1.24	±1.24	±1.24
		Accuracy	-	arc • sec	±27	±27	±27	±27	±27	±27
	Resolver System	Resolution ^③	-	counts/rev	262,144	262,144	262,144	-	-	-
	Repeatability	-	arc • sec	±5.0	±5.0	±5.0	-	-	-	
	Accuracy	-	arc • sec	±135	±135	±135	-	-	-	
MECHANICAL DATA										
Weight		W _T	kg (lb)	31.5 (69.5)	43.8 (96.5)	60.8 (134)	53.5 (118)	76.2 (168)	123 (272)	
Rotor Inertia		J _M	kg-m ² (lb-ft-s ²)	0.0693 (0.0511)	0.0992 (0.0732)	0.175 (0.129)	0.146 (0.108)	0.248 (0.183)	0.477 (0.352)	
Static Friction										
adder for sealed units		T _F	N-m (lb-ft)	3.5 (2.6)	3.5 (2.6)	3.5 (2.6)	3.5 (2.6)	3.5 (2.6)	3.5 (2.6)	
Max. Dynamic Axial										
Compression Load		-	kg (lbf)	5,300 (11,700)	5,300 (11,700)	5,300 (11,700)	5,760 (12,700)	5,760 (12,700)	5,760 (12,700)	

Note:

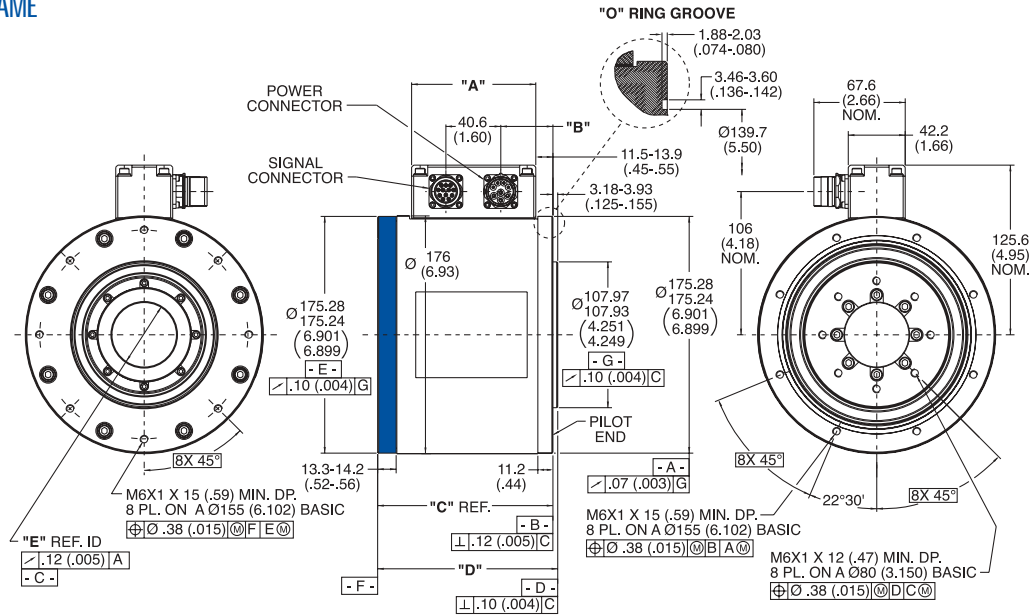
① For 25° ambient, multiply T_c by 1.06 | ② Curves for D101, 230 V applicable to single or three phase input power. Curves for D102 and D103, 230 V require three phase input power. | ③ Drive resolver-to-digital converter and encoder equivalent output limits max resolution to 1,048,576 counts per rev up to 93 rpm, and 262,144 counts per rev above 94 rpm. | ④ As with any Kollmorgen product, if there are any questions regarding this information or application of this product, please consult with Danaher Motion Customer Support and we will be glad to assist you.

DDR-D(H)06x FRAME

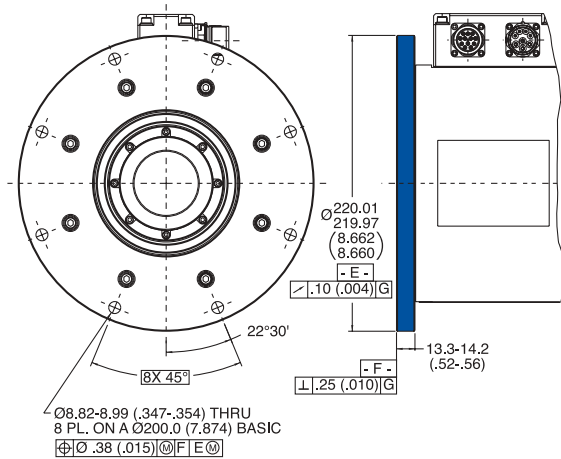
Kollmorgen GOLDLINE® DDR Series Motors

D(H)06x FRAME

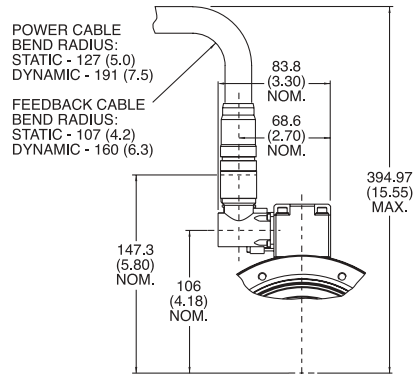
mm (in)



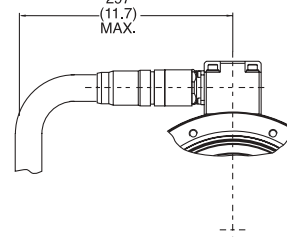
FLANGE OPTION



90° CONNECTOR OPTION



STRAIGHT CONNECTOR OPTION



Model	"A"	"B"	"C"	"D"	"E"	
					Resolver	Sine Encoder
D(H)061	91.9 (3.62)	37.1-40.1 (1.46-1.58)	129.42-130.171 (5.095-5.125)	32.59-134.11 (5.220-5.280)		
D(H)062	103.4 (4.07)	48.6-51.5 (1.91-2.03)	140.85-141.601 (5.545-5.575)	44.02-145.54 (5.670-5.730)	Ø47.71-47.80 (1.878-1.882)	Ø42.88-42.98 (1.688-1.692)
D(H)063	126.2 (4.97)	71.4-74.4 (2.81-2.93)	163.71-164.46 (6.445-6.475)	166.88-168.40 (6.570-6.630)		

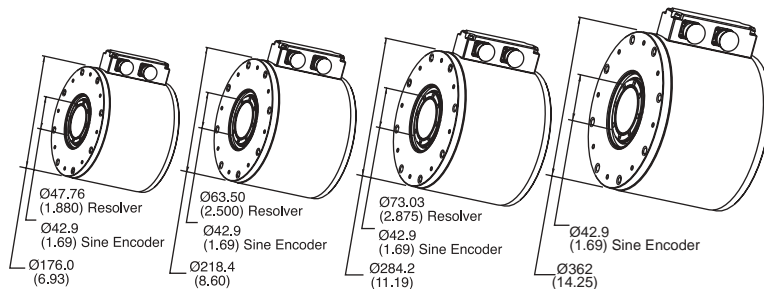
MOTOR OUTSIDE / INSIDE DIAMETERS BY MODEL

D(H)06x

D(H)08x

D(H)10x

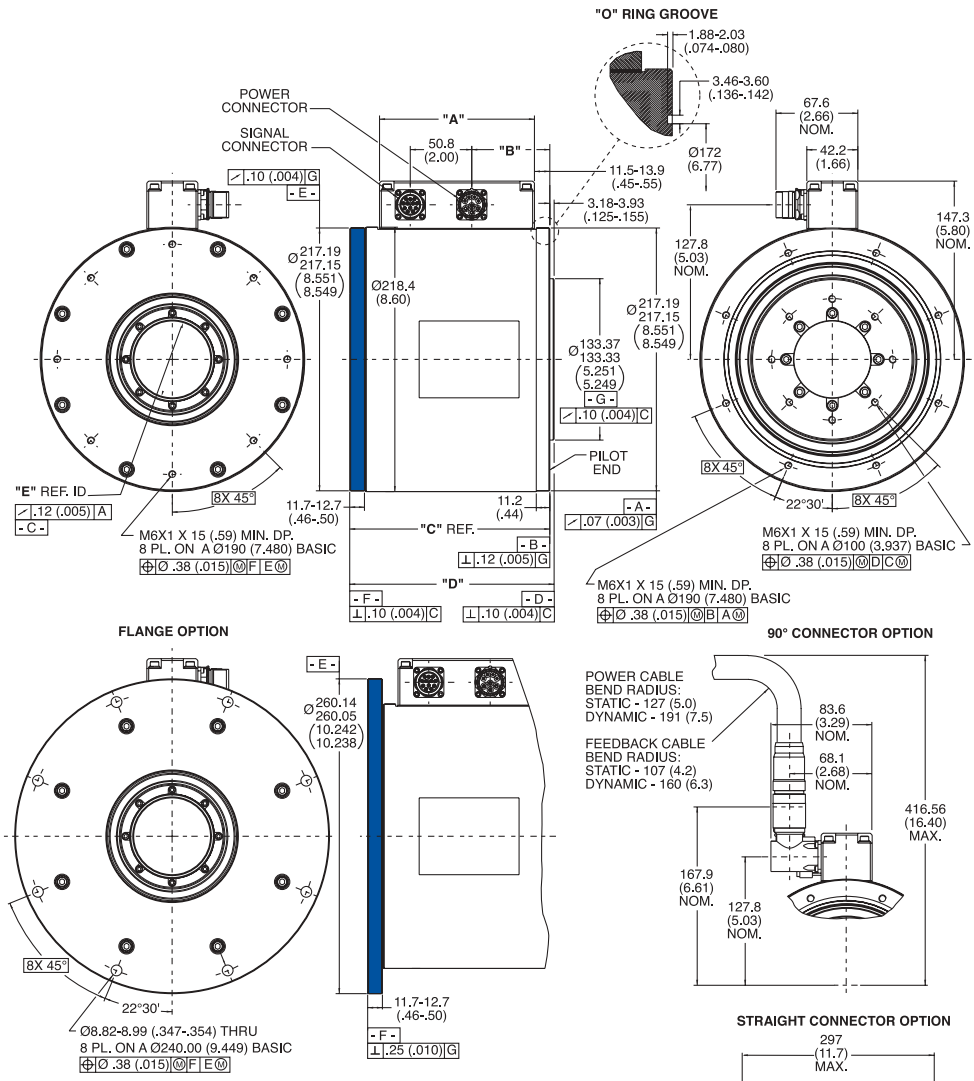
D(H)14x



DDR-D(H)08x FRAME

Kollmorgen GOLDLINE® DDR Series Motors

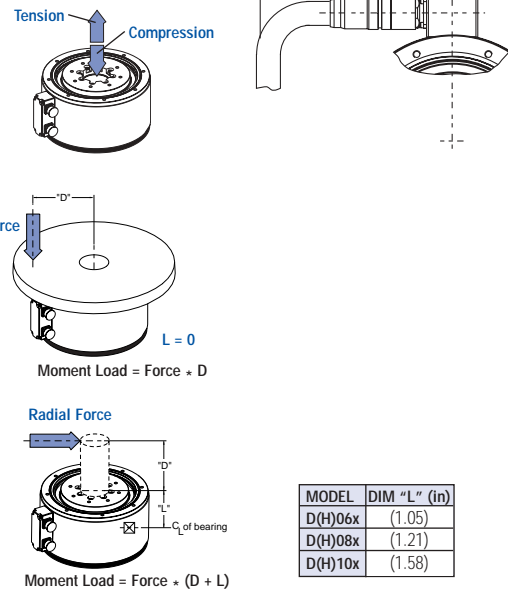
D(H)08x FRAME
mm (in)



Model	"A"	"B"	"C"	"D"	"E"	
					Resolver	Sine Encoder
D(H)081	107.7 (4.24)	42.7-45.7 (1.68-1.80)	144.66-145.41 (5.695-5.725)	147.83-149.35 (5.820-5.880)		
D(H)082	128.0 (5.04)	63-66 (2.48-2.60)	164.98-165.73 (6.495-6.525)	168.15-169.67 (6.620-6.680)	ø63.45-63.55 (2.498-2.502)	ø42.88-42.98 (1.688-1.6920)
D(H)083	168.7 (6.64)	103.7-106.6 (4.08-4.20)	205.62-206.37 (8.095-8.125)	208.79-210.31 (8.220-8.280)		

Model	Maximum Moment Load		Maximum Axial Load Ratings	
	Single Bearing N-m (lb-ft)	Dual Bearing N-m (lb-ft)	Compression	Tension
061	72.3 (53.3)	97.2 (71.7)	2040 (4500)	423 (932)
062	64.4 (47.5)	107.8 (79.5)		
063	58.9 (43.4)	118.2 (87.2)		
081	84.9 (62.6)	154.3 (113.8)	3360 (7400)	371 (819)
082	70.9 (52.3)	177.1 (130.6)		
083	53.3 (39.3)	236.4 (174.3)		
101	192.4 (141.9)	437.2 (322.4)	5300 (11,700)	637 (1,405)
102	146 (107.7)	377.6 (278.5)		
103	98.4 (72.6)	413.3 (304.8)		
141	317 (234)	640 (472)	5,760 (12,700)	812 (1,790)
142	182 (134)	555 (409)		
143	N/A (N/A)	530 (391)		

All numbers are based on L10 life rating.



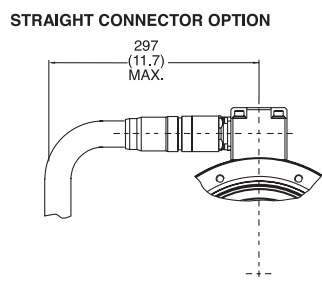
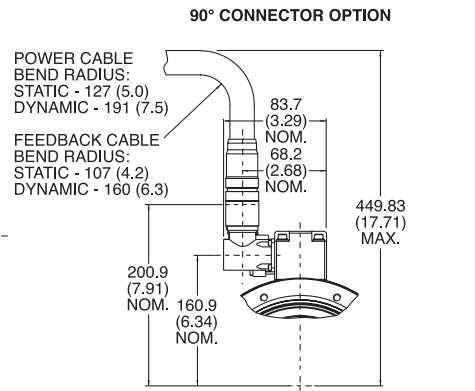
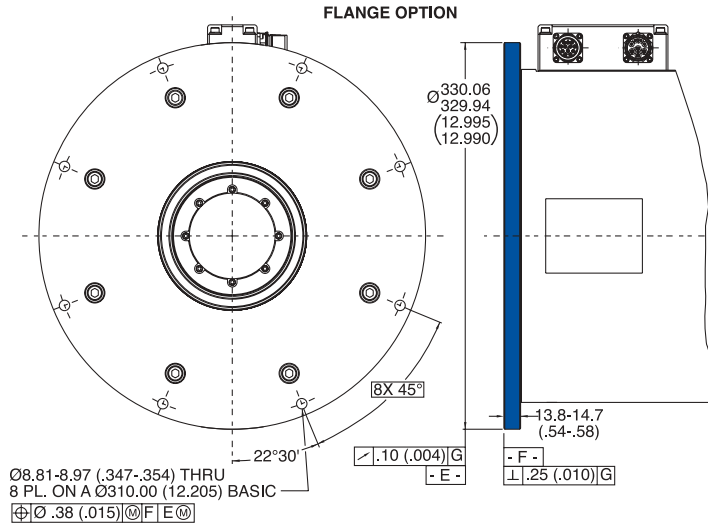
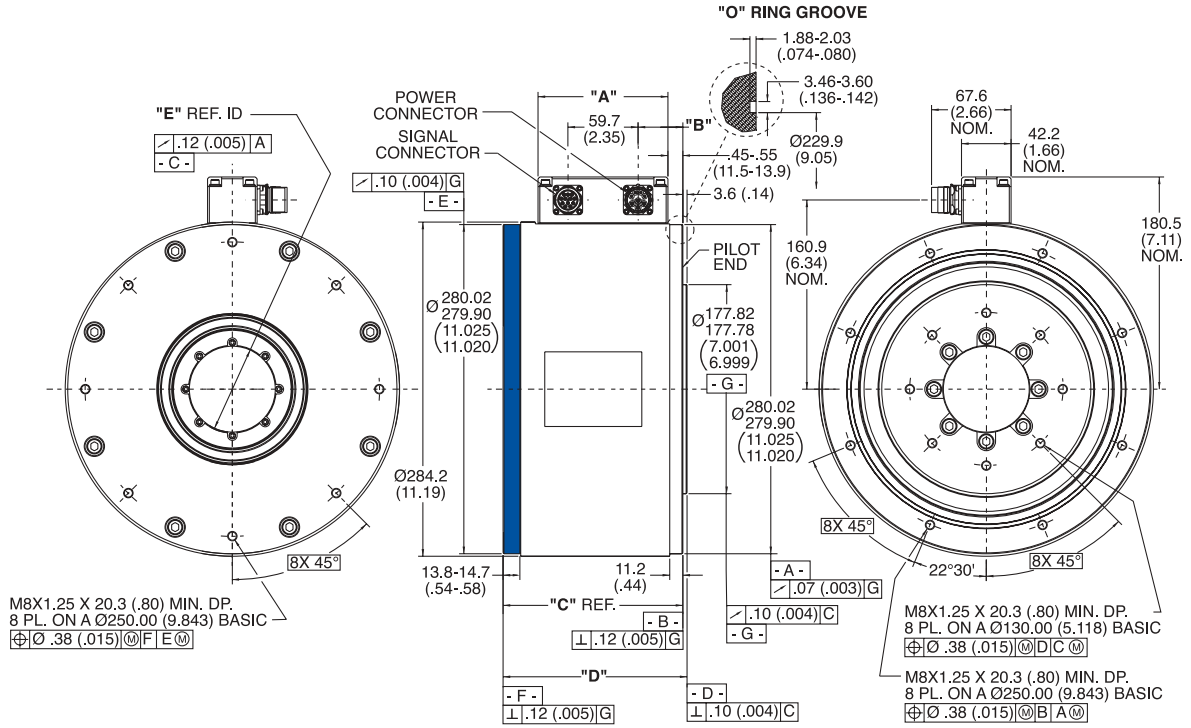
MODEL	DIM "L" (in)
D(H)06x	(1.05)
D(H)08x	(1.21)
D(H)10x	(1.58)

DDR-D(H)10x FRAME

Kollmorgen GOLDLINE® DDR Series Motors

D(H)10x FRAME

mm (in)



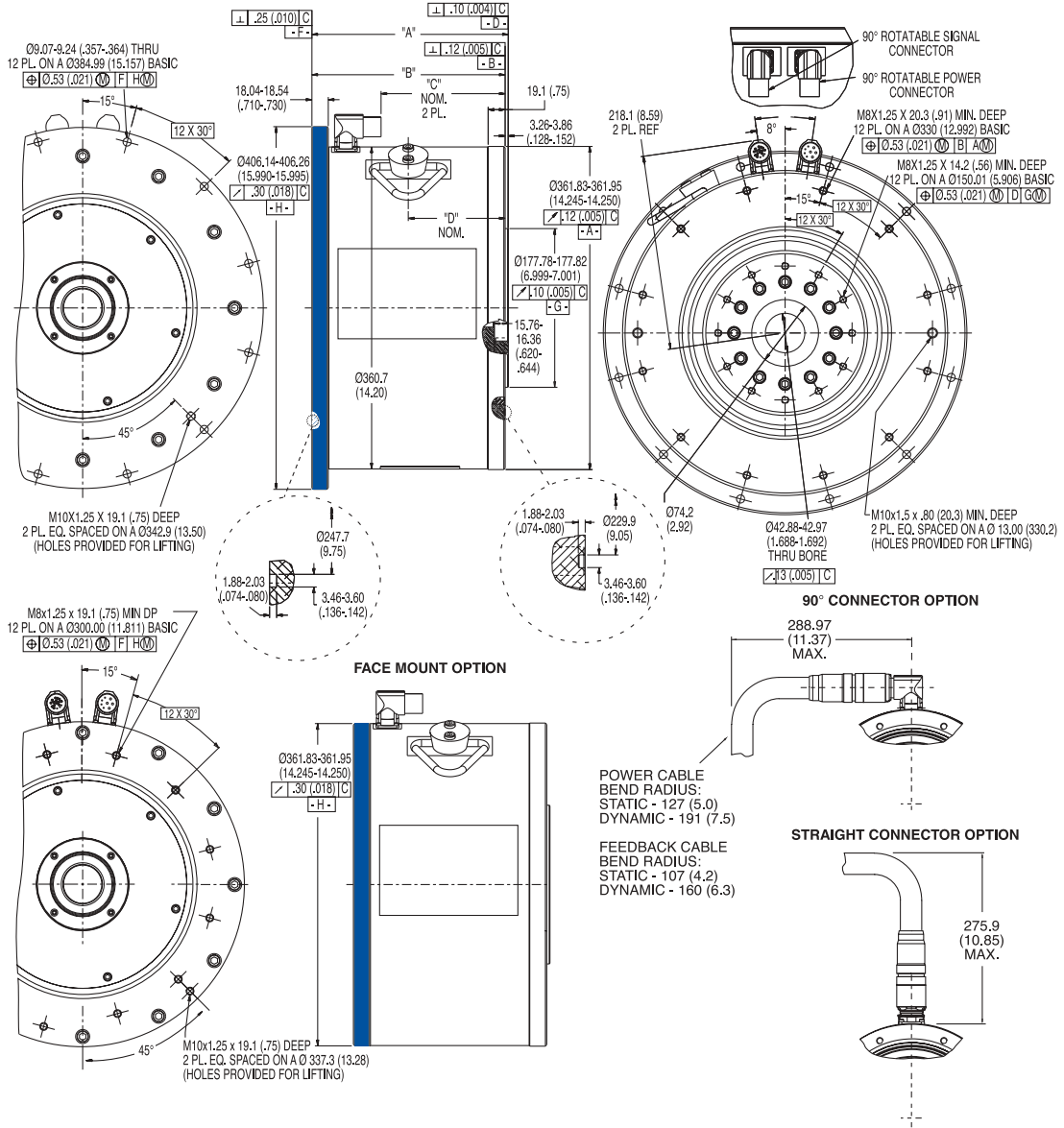
Model	"A"	"B"	"C"	"D"	"E"	
					Resolver	Sine Encoder
D(H)101	110.5 (4.35)	36.6-39.6 (1.44-1.56)	152.53-153.28 (6.005-6.035)	155.71-157.22 (6.130-6.190)		
D(H)102	142.2 (5.60)	68.4-71.3 (2.69-2.81)	184.28-185.03 (7.255-7.285)	187.46-188.97 (7.380-7.440)	Ø73.07-72.98 (2.877-2.873)	Ø42.88-42.98 (1.688-1.692)
D(H)103	205.7 (8.10)	131.9-134.8 (5.19-5.31)	247.78-248.53 (9.755-9.785)	250.96-252.47 (9.880-9.940)		

www.DanaherMotion.com • 815-226-2222

DDR-D(H)14x FRAME

Kollmorgen GOLDLINE® DDR Series Motors

D(H)14x FRAME
mm (in)



Model	"A"	"B"	"C"	"D"
D(H)141	155.92-157.02 (6.138-6.182)	152.66-153.16 (6.010-6.030)	75.5 (2.97)	76.7 (3.02)
D(H)142	219.42-220.52 (8.638-8.682)	216.16-216.66 (8.510-8.530)	138.9 (5.47)	108.5 (4.27)
D(H)143	346.42-347.52 (13.638-13.682)	343.16-343.66 (13.510-13.530)	266 (10.47)	172 (6.77)

INTRODUCTION BENEFITS OF USING DDL (DIRECT DRIVE LINEAR) TECHNOLOGY

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 disappear. This in turn eliminates backlash and compliance and other problems associated with these mechanisms.

Kollmorgen **PLATINUM** DDL motors have been reviewed, tested, and are in conformance with the following standards: EN 60034, EN 60204-1, IEC 34-1. Products have been reviewed per EN 60950, EN 60529, IEC 721-3, NEMA MG7, UL1004, UL547, and UL674.

These motors comply with the Low Voltage Directive 73/23/EEC for installation in a machine. Safety depends upon installing and configuring the 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.

PRODUCT OVERVIEW

PLATINUM® DDL SERIES MOTORS

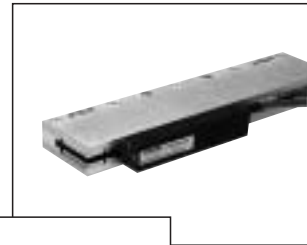


PLATINUM® DDL family with SERVOSTAR CD

PLATINUM® DDL & SERVOSTAR CD AND SERVOSTAR S

Combining the PLATINUM DDL motors with Kollmorgen SERVOSTAR digital drives completes the full linear motor servo system. The SERVOSTAR drive family covers the entire PLATINUM DDL linear motor product line, both ironless core and ironcore motors.

- SERVOSTAR CD: 3, 6, 10 amps continuous. SEE PAGES 28-29
- SERVOSTAR Sx: 3, 6, 10, 20, 30, 55, 85 amps continuous. SEE PAGES 42-43
- MOTIONLINK® set up/tuning software PC "Oscilloscope" for analysis
- Sine Encoder option



Ironless Motor



Ironcore Motor

STANDARD FEATURES:

Ironless:

- Peak force 60 to 1600 N (13.6 to 360 lb-ft)
- Continuous force 21 to 450 N (4.6 to 101 lb-ft)
- 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 lb-ft)
- Continuous force IC series: 73 to 12023 N (16 to 2703 lb-ft)
- Peak force ICD series: 170 to 1130 N (38 to 254 lb-ft)
- Continuous force ICD series: 57 to 315 N (13 to 71 lb-ft)
- Patented anti-cogging technique for reduced 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:

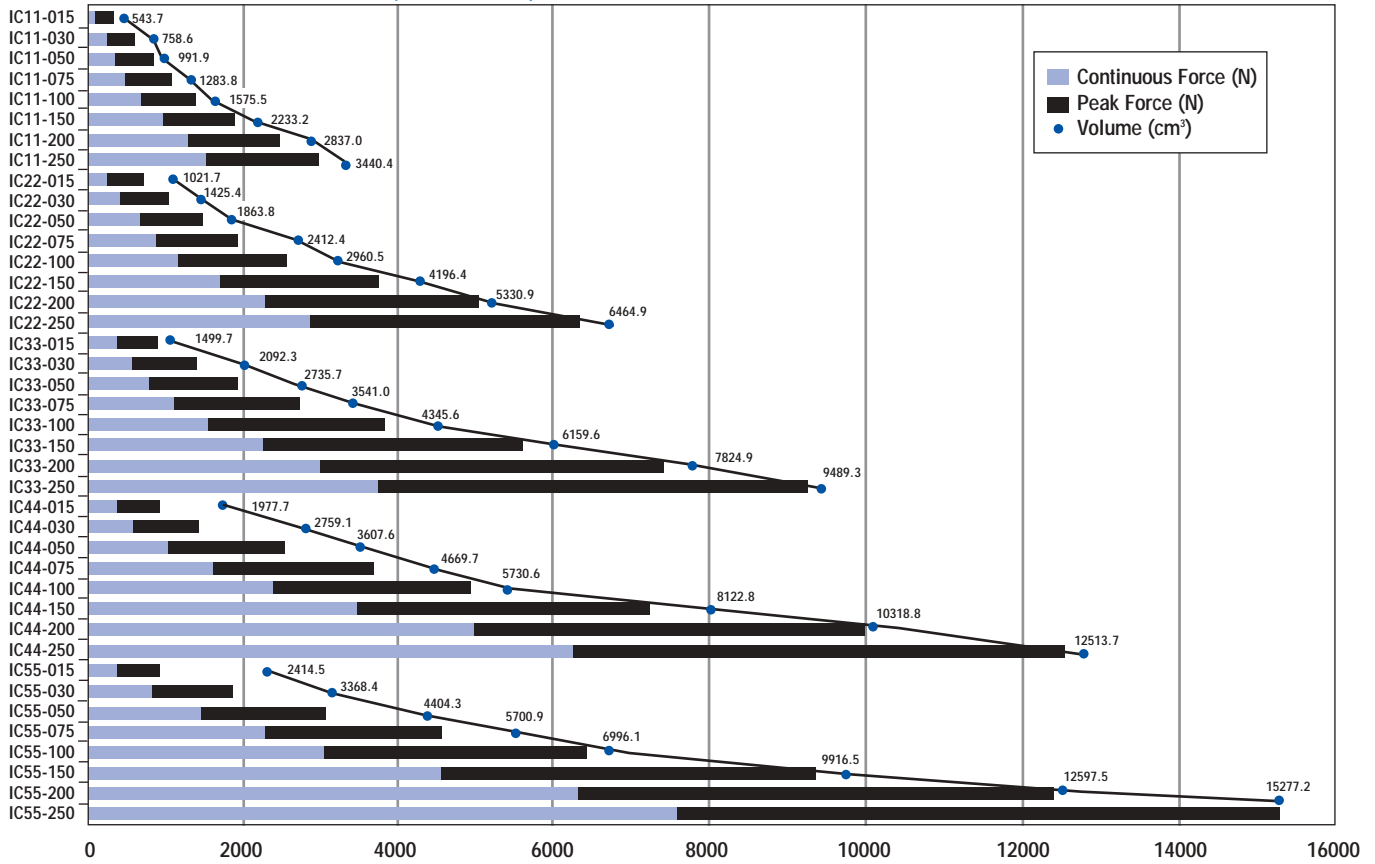
- Zero contact, zero maintenance, brushless design
- 3 phase sinusoidal commutation
- Peak accelerations easily above 10 g's
- High position accuracy and resolution
- Very low settling time
- Low thermal losses
- Modular magnet design

Standard Options:

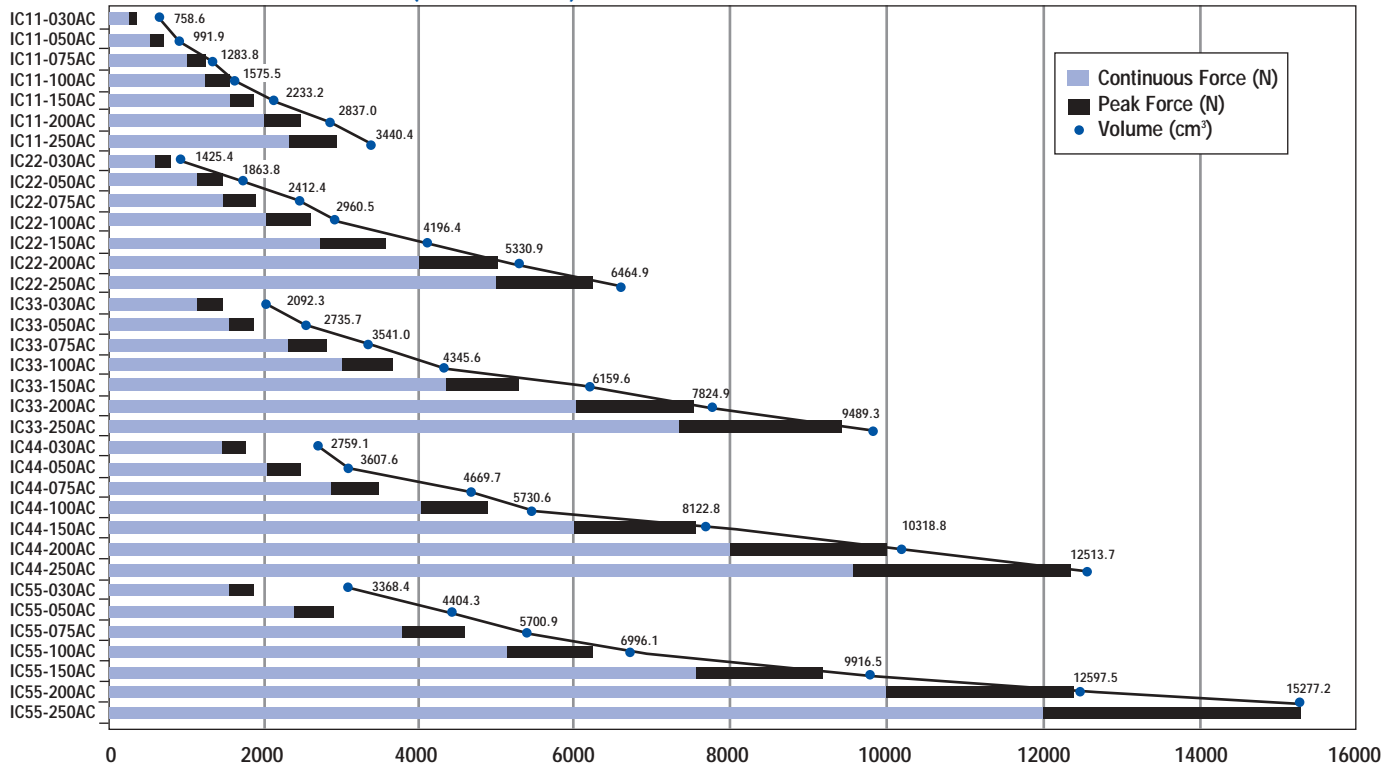
- Hall effect feedback
- Thermal protection
 - Thermistor
 - Thermostat (Ironcore)
- Supplemental air or water cooling (Ironcore)
- Cable options
- Magnet way covers for easy cleaning (Ironcore)
- FM approved, hazardous environment

PLATINUM® IRONCORE SERIES MOTORS

IC SERIES IRONCORE MOTORS (NON-COOLED)



IC SERIES IRONCORE MOTORS (WATER-COOLED)



RATINGS & CHARACTERISTICS

PLATINUM® IRONCORE SERIES MOTORS

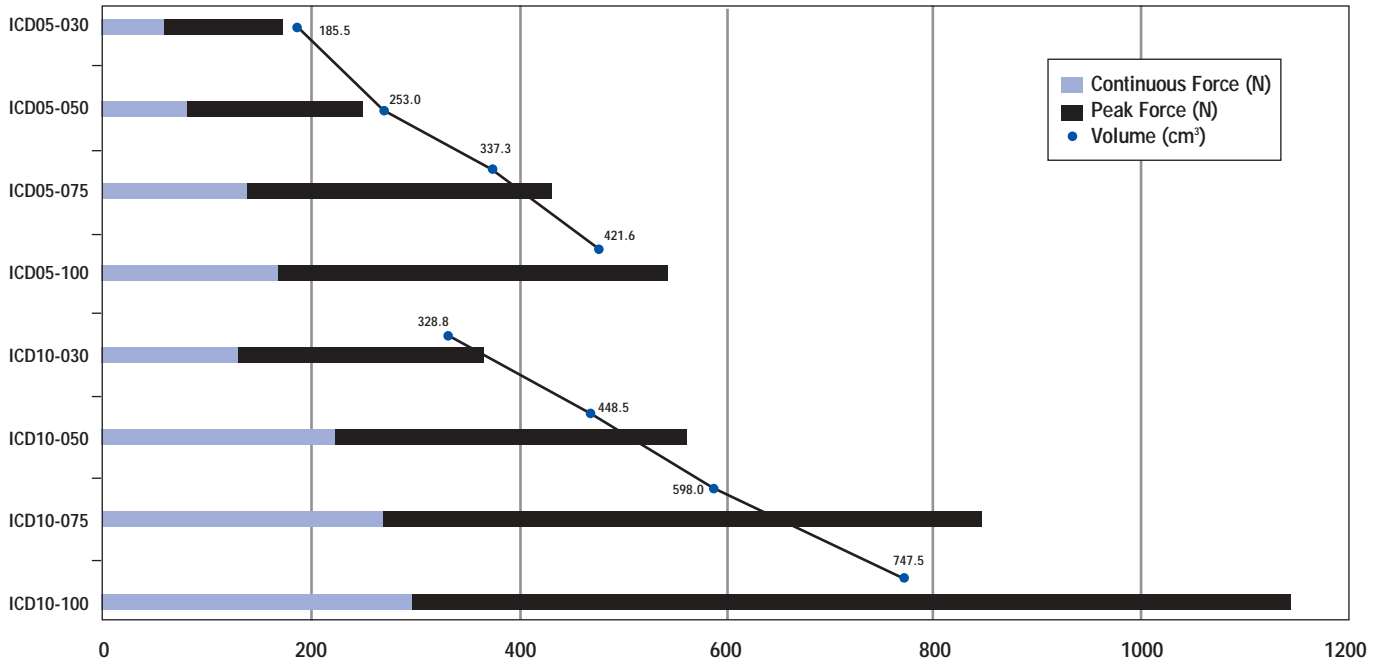
PLATINUM® DDL Motor Model	Peak Force F _P N (lb-f)	Continuous Force @130°C F _C N (lb-f)	Motor Constant @130°C K _M N (lb-f)/√w	Coil Assembly Mass m _c kg (lbs)	Motor Volume cm³ (in³)	Magnet Way
PLATINUM® IC Series Ironcore Motors (Non-Cooled)						
IC11-015	190 (43)	73 (16)	11.0 (2.5)	1.7 (3.7)	543.7 (33.2)	MC015
IC11-030	375 (84)	151 (34)	18.9 (4.2)	2.5 (5.5)	758.6 (46.3)	MC030
IC11-050	625 (141)	276 (62)	26.9 (6.0)	3.6 (7.9)	991.9 (60.5)	MC050
IC11-075	940 (211)	435 (98)	34.8 (7.8)	5 (11.0)	1283.8 (78.3)	MC075
IC11-100	1250 (281)	599 (135)	41.3 (9.3)	6.5 (14.3)	1575.5 (96.1)	MC100
IC11-150	1875 (422)	905 (203)	52.2 (11.7)	9.4 (20.7)	2233.2 (136.3)	MC150
IC11-200	2500 (562)	1255 (282)	61.4 (13.8)	12.3 (27.1)	2837.0 (173.1)	MC200
IC11-250	3125 (703)	1496 (336)	66.9 (15.0)	15.2 (33.5)	3440.4 (209.9)	MC250
IC22-015	375 (84)	143 (32)	15.3 (3.4)	3.2 (7.1)	1021.7 (62.4)	MC015
IC22-030	750 (169)	298 (67)	26.4 (5.9)	4.8 (10.6)	1425.4 (87.0)	MC030
IC22-050	1250 (281)	548 (123)	37.7 (8.5)	6.9 (15.2)	1863.8 (113.7)	MC050
IC22-075	1875 (422)	864 (194)	48.8 (11.0)	9.6 (21.2)	2412.4 (147.2)	MC075
IC22-100	2500 (562)	1198 (269)	58.5 (13.1)	12.5 (27.6)	2960.5 (180.7)	MC100
IC22-150	3750 (843)	1810 (407)	73.9 (16.6)	18.1 (39.9)	4196.4 (256.1)	MC150
IC22-200	5000 (1124)	2513 (565)	87.0 (19.6)	23.7 (52.2)	5330.9 (325.3)	MC200
IC22-250	6250 (1405)	3000 (674)	94.9 (21.3)	29.3 (64.6)	6464.9 (394.5)	MC250
IC33-015	565 (127)	216 (49)	18.8 (4.2)	4.99 (11.0)	1499.7 (91.5)	MC015
IC33-030	1125 (253)	450 (101)	32.4 (7.3)	7.3 (16.1)	2092.3 (127.7)	MC030
IC33-050	1875 (422)	824 (185)	46.3 (10.4)	10.4 (22.9)	2735.7 (166.9)	MC050
IC33-075	2815 (633)	1301 (292)	59.9 (13.5)	14.4 (31.7)	3541.0 (216.1)	MC075
IC33-100	3750 (843)	1796 (404)	71.6 (16.1)	18.9 (41.7)	4345.6 (265.2)	MC100
IC33-150	5625 (1265)	2718 (611)	90.7 (20.4)	27.3 (60.2)	6159.6 (375.9)	MC150
IC33-200	7500 (1686)	3765 (846)	106.5 (23.9)	35.7 (78.7)	7824.9 (477.5)	MC200
IC33-250	9375 (2108)	4496 (1011)	116.1 (26.1)	44.1 (97.2)	9489.3 (579.1)	MC250
IC44-015	750 (169)	286 (64)	21.6 (4.9)	6.4 (14.1)	1977.7 (120.7)	MC015
IC44-030	1500 (337)	597 (134)	37.3 (8.4)	9.6 (21.2)	2759.1 (168.4)	MC030
IC44-050	2500 (562)	1096 (246)	53.3 (12.0)	13.9 (30.6)	3607.6 (220.2)	MC050
IC44-075	3750 (843)	1732 (389)	69.3 (15.6)	19.2 (42.3)	4669.7 (285.0)	MC075
IC44-100	5000 (1124)	2397 (539)	82.7 (18.6)	25 (55.1)	5730.6 (349.7)	MC100
IC44-150	7500(1686)	3617 (813)	104.7 (23.5)	36.2 (79.8)	8122.8 (495.7)	MC150
IC44-200	10000 (2248)	5025 (1130)	123.1 (27.7)	47.4 (104.5)	10318.8 (629.7)	MC200
IC44-250	12500 (2810)	6029 (1355)	134.2 (30.2)	58.5 (129.0)	12513.7 (763.6)	MC250
IC55-015	940 (211)	359 (81)	24.3 (5.5)	8 (17.6)	2414.5 (147.3)	MC015
IC55-030	1875 (422)	748 (168)	41.8 (9.4)	12 (26.5)	3368.4 (205.6)	MC030
IC55-050	3125 (703)	1374 (309)	59.7 (13.4)	17.3 (38.1)	4404.3 (268.8)	MC050
IC55-075	4690 (1054)	2164 (486)	77.3 (17.4)	23.9 (52.7)	5700.9 (347.9)	MC075
IC55-100	6250 (1405)	2989 (672)	92.3 (20.7)	31.2 (68.8)	6996.1 (426.9)	MC100
IC55-150	9375 (2108)	4532 (1019)	117.0 (26.3)	45.1 (99.4)	9916.5 (605.1)	MC150
IC55-200	12500 (2810)	6303 (1417)	137.5 (30.9)	59 (130.1)	12597.5 (768.7)	MC200
IC55-250	15625 (3513)	7496 (1685)	149.9 (33.7)	73 (160.9)	15277.2 (932.3)	MC250
PLATINUM® IC Series Ironcore Motors (Water Cooled)						
IC11-030AC	375 (84)	296 (66)	16.6 (3.7)	2.5 (5.5)	758.6 (46.3)	MC030
IC11-050AC	625 (141)	502 (113)	24.1 (5.4)	3.6 (7.9)	991.9 (60.5)	MC050
IC11-075AC	940 (211)	754 (169)	31.4 (7.1)	5 (11.0)	1283.8 (78.3)	MC075
IC11-100AC	1250 (281)	1006 (226)	37.4 (8.4)	6.5 (14.3)	1575.5 (96.1)	MC100
IC11-150AC	1875 (422)	1490 (335)	46.9 (10.5)	9.4 (20.7)	2233.2 (136.3)	MC150
IC11-200AC	2500 (562)	1991 (448)	55.3 (12.4)	12.3 (27.1)	2837.0 (173.1)	MC200
IC11-250AC	3125 (703)	2410 (542)	60.4 (13.6)	15.2 (33.5)	3440.4 (209.9)	MC250
IC22-030AC	750 (169)	603 (136)	23.8 (5.4)	4.8 (10.6)	1425.4 (87.0)	MC030
IC22-050AC	1250 (281)	1005 (226)	34.1 (7.7)	6.9 (15.2)	1863.8 (113.7)	MC050
IC22-075AC	1875 (422)	1493 (336)	43.9 (9.9)	9.6 (21.2)	2412.4 (147.2)	MC075
IC22-100AC	2500 (562)	1995 (448)	52.6 (11.8)	12.5 (27.6)	2960.5 (180.7)	MC100
IC22-150AC	3750 (843)	2996 (674)	66.7 (15.0)	18.1 (39.9)	4196.4 (256.1)	MC150
IC22-200AC	5000 (1124)	4023 (904)	78.5 (17.7)	23.7 (52.2)	5330.9 (325.3)	MC200
IC22-250AC	6250 (1405)	4806 (1080)	85.2 (19.2)	29.3 (64.6)	6464.9 (394.5)	MC250
IC33-030AC	1125 (253)	896 (202)	29.0 (6.5)	7.3 (16.1)	2092.3 (127.7)	MC030
IC33-050AC	1875 (422)	1492 (335)	41.4 (9.3)	10.4 (22.9)	2735.7 (166.9)	MC050
IC33-075AC	2815 (633)	2240 (504)	54.0 (12.1)	14.4 (31.7)	3541.0 (216.1)	MC075
IC33-100AC	3750 (843)	3014 (677)	64.4 (14.5)	18.9 (41.7)	4345.6 (265.2)	MC100
IC33-150AC	5625 (1265)	4464 (1004)	81.5 (18.3)	27.3 (60.2)	6159.6 (375.9)	MC150
IC33-200AC	7500 (1686)	5990 (1347)	96.0 (21.6)	35.7 (78.7)	7824.9 (477.5)	MC200
IC33-250AC	9375 (2108)	7216 (1622)	104.5 (23.5)	44.1 (97.2)	9489.3 (579.1)	MC250
IC44-030AC	1500 (337)	1201 (270)	33.6 (7.5)	9.6 (21.2)	2759.1 (168.4)	MC030
IC44-050AC	2500 (562)	1990 (446)	47.8 (10.8)	13.9 (30.6)	3607.6 (220.2)	MC050
IC44-075AC	3750 (843)	2980 (669)	62.3 (14.0)	19.2 (42.3)	4669.7 (285.0)	MC075
IC44-100AC	5000 (1124)	4015 (902)	74.3 (16.7)	25 (55.1)	5730.6 (349.7)	MC100
IC44-150AC	7500 (1686)	5990 (1343)	94.0 (21.1)	36.2 (79.8)	8122.8 (495.7)	MC150
IC44-200AC	10000 (2248)	8035 (1806)	110.9 (24.9)	47.4 (104.5)	10318.8 (629.7)	MC200
IC44-250AC	12500 (2810)	9620 (2165)	120.6 (27.1)	58.5 (129.0)	12513.7 (763.6)	MC250
IC55-030AC	1875 (422)	1497 (336)	37.5 (8.4)	12 (26.5)	3368.4 (205.6)	MC030
IC55-050AC	3125 (703)	2511 (564)	53.7 (12.1)	17.3 (38.1)	4404.3 (268.8)	MC050
IC55-075AC	4690 (1054)	3773 (848)	69.9 (15.7)	23.9 (52.7)	5700.9 (347.9)	MC075
IC55-100AC	6250 (1405)	5001 (1124)	83.1 (18.7)	31.2 (68.8)	6996.1 (426.9)	MC100
IC55-150AC	9375 (2108)	7446 (1674)	105.3 (23.7)	45.1 (99.4)	9916.5 (605.1)	MC150
IC55-200AC	12500 (2810)	10033 (2256)	123.9 (27.8)	59 (130.1)	12597.5 (768.7)	MC200
IC55-250AC	15625 (3513)	12023 (2703)	134.8 (30.3)	73 (160.9)	15277.2 (932.3)	MC250

Note:

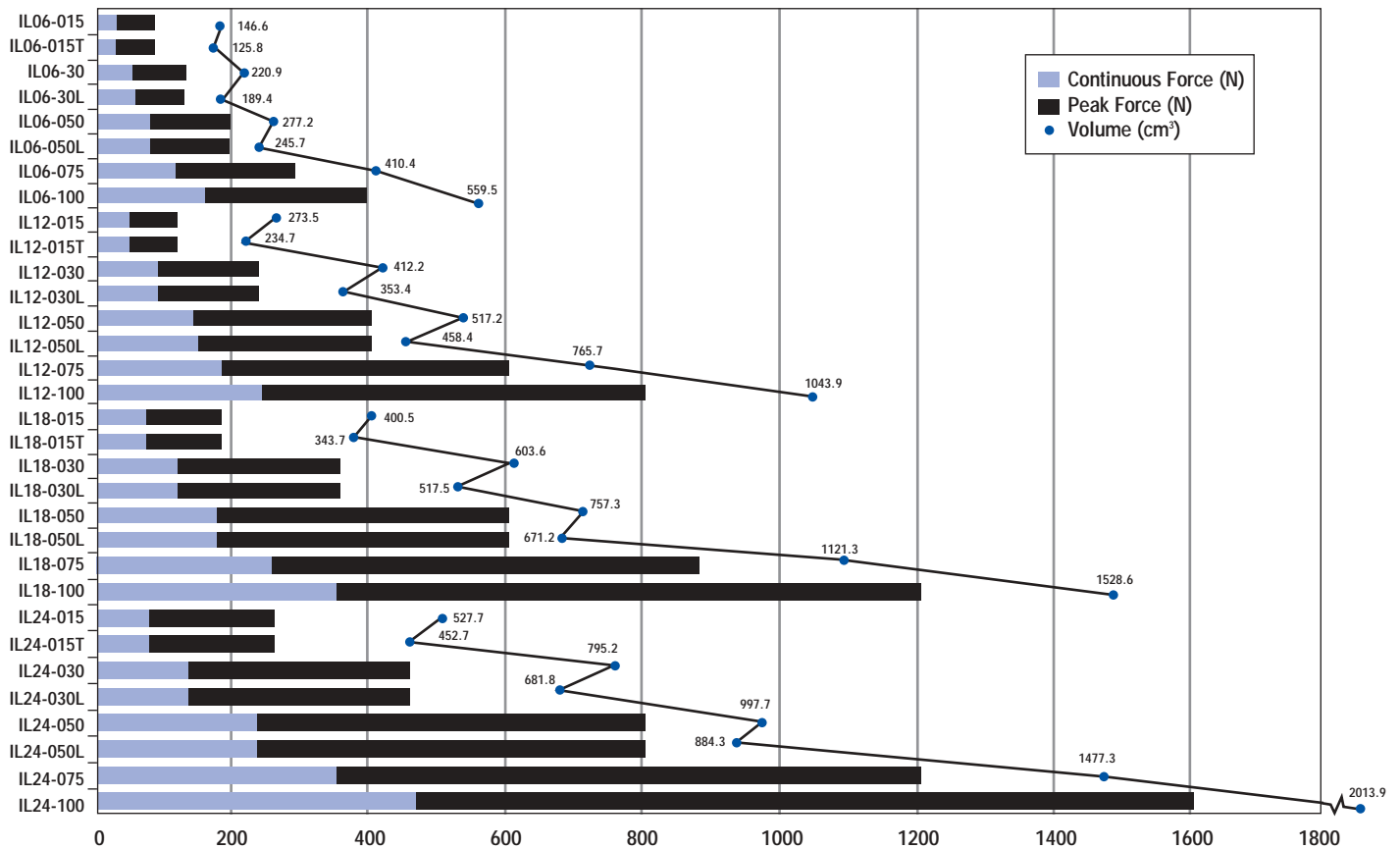
- ① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature T_{max}. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation P_c. The heat load can be limited to a value below P_c by limiting the continuous rated output force of the motor to a value equal to: F_c = K_m x Square Root (P_w); where P_w = the acceptable heat load, in watts, and must be a value below P_c. The RMS current needed to produce this force is simply F_c divided by the force constant K_f. See specific product information for more details.

PLATINUM[®] IRONCORE & IRONLESS SERIES MOTORS

ICD SERIES LOW-PROFILE IRONCORE MOTORS



IL SERIES IRONLESS MOTORS



www.DanaherMotion.com • 815-226-2222

PLATINUM® IRONCORE & IRONLESS SERIES MOTORS

RATINGS & CHARACTERISTICS

PLATINUM® DDL Motor Model	Peak Force F _p N (lb-f)	Continuous Force @130°C F _c N (lb-f)	Motor Constant @130°C K _m N (lb-f) / √w	Coil Assembly Mass m _c kg (lbs)	Motor Volume cm ³ (in ³)	Magnet Way
PLATINUM® ICD Series Low-Profile Ironcore Motors (Non-Cooled)						
ICD05-030	170 (38)	57 (13)	10.3 (2.3)	0.62 (1.4)	185.5 (11.3)	MCD030
ICD05-050	280 (63)	87 (20)	14.5 (3.3)	0.95 (2.1)	253.0 (15.4)	MCD050
ICD05-075	425 (96)	125 (28)	18.6 (4.2)	1.36 (3.0)	337.3 (20.6)	MCD075
ICD05-100	550 (124)	157 (35)	22.0 (4.9)	1.71 (3.8)	421.6 (25.7)	MCD100
ICD10-030	340 (76)	104 (23)	14.6 (3.3)	1.13 (2.5)	328.8 (20.1)	MCD030
ICD10-050	560 (126)	171 (38)	20.5 (4.6)	1.86 (4.1)	448.5 (27.4)	MCD050
ICD10-075	850 (191)	246 (55)	26.4 (5.9)	2.67 (5.9)	598.0 (36.5)	MCD075
ICD10-100	1130 (254)	315 (71)	31.3 (7.0)	3.42 (7.5)	747.5 (45.6)	MCD100
PLATINUM® IL Series Ironless Motors						
IL06-015	60 (13.6)	21 (4.6)	2.8 (0.6)	0.23 (0.5)	146.6 (8.9)	MW015
IL06-015T	60 (13.6)	21 (4.6)	2.8 (0.6)	0.23 (0.5)	125.8 (7.7)	MW015
IL06-030	120 (27)	38 (9)	4.7 (1.1)	0.27 (0.6)	220.9 (13.5)	MW030
IL06-030L	120 (27)	38 (9)	4.7 (1.1)	0.27 (0.6)	189.4 (11.6)	MW030
IL06-050	200 (45)	61 (14)	6.7 (1.5)	0.32 (0.7)	277.2 (16.9)	MW050
IL06-050L	200 (45)	61 (14)	6.7 (1.5)	0.32 (0.7)	245.7 (15.0)	MW050
IL06-075	300 (68)	87 (19)	8.6 (1.9)	0.38 (0.8)	410.4 (25.0)	MW075
IL06-100	400 (90)	113 (25)	10.2 (2.3)	0.45 (1.0)	559.5 (34.1)	MW100
IL12-015	120 (27)	41 (9)	4.0 (0.9)	0.35 (0.8)	273.5 (16.7)	MW015
IL12-015T	120 (27)	41 (9)	4.0 (0.9)	0.35 (0.8)	234.7 (14.3)	MW015
IL12-030	240 (54)	76 (17)	6.6 (1.5)	0.42 (0.9)	412.2 (25.2)	MW030
IL12-030L	240 (54)	76 (17)	6.6 (1.5)	0.42 (0.9)	353.4 (21.6)	MW030
IL12-050	400 (90)	122 (28)	9.5 (2.1)	0.52 (1.1)	517.2 (31.6)	MW050
IL12-050L	400 (90)	122 (28)	9.5 (2.1)	0.52 (1.1)	458.4 (28.0)	MW050
IL12-075	600 (135)	174 (39)	12.2 (2.7)	0.65 (1.4)	765.7 (46.7)	MW075
IL12-100	800 (180)	226 (51)	14.5 (3.3)	0.77 (1.7)	1043.9 (63.7)	MW100
IL18-015	180 (40)	62 (14)	4.9 (1.1)	0.46 (1.0)	400.5 (24.4)	MW015
IL18-015T	180 (40)	62 (14)	4.9 (1.1)	0.46 (1.0)	343.7 (21.0)	MW015
IL18-030	360 (81)	114 (26)	8.2 (1.8)	0.57 (1.3)	603.6 (36.8)	MW030
IL18-030L	360 (81)	114 (26)	8.2 (1.8)	0.57 (1.3)	517.5 (31.6)	MW030
IL18-050	600 (135)	184 (41)	11.6 (2.6)	0.72 (1.6)	757.3 (46.2)	MW050
IL18-050L	600 (135)	184 (41)	11.6 (2.6)	0.72 (1.6)	671.2 (41.0)	MW050
IL18-075	900 (202)	260 (59)	14.9 (3.4)	0.91 (2.0)	1121.3 (68.4)	MW075
IL18-100	1200 (270)	338 (76)	17.7 (4.0)	1.10 (2.4)	1528.6 (93.3)	MW100
IL24-015	240 (54)	83 (19)	5.6 (1.3)	0.57 (1.3)	527.7 (32.2)	MW015
IL24-015T	240 (54)	83 (19)	5.6 (1.3)	0.57 (1.3)	452.7 (27.6)	MW015
IL24-030	480 (108)	152 (34)	9.4 (2.1)	0.72 (1.6)	795.2 (48.5)	MW030
IL24-030L	480 (108)	152 (34)	9.4 (2.1)	0.72 (1.6)	681.8 (41.6)	MW030
IL24-050	800 (180)	245 (55)	13.4 (3.0)	0.92 (2.0)	997.7 (60.9)	MW050
IL24-050L	800 (180)	245 (55)	13.4 (3.0)	0.92 (2.0)	884.3 (54.0)	MW050
IL24-075	1200 (270)	348 (78)	17.3 (3.9)	1.17 (2.6)	1477.3 (90.1)	MW075
IL24-100	1600 (360)	450 (101)	20.5 (4.6)	1.42 (3.1)	2013.9 (122.9)	MW100

Note:

① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature T_{max}. At this operating point the number of watts being dissipated by the coil assembly is equal to the maximum continuous power dissipation P_c. The heat load can be limited to a value below P_c by limiting the continuous rated output force of the motor to a value equal to: F_c = K_m x Square Root (P_w); where P_w = the acceptable heat load, in watts, and must be a value below P_c. The RMS current needed to produce this force is simply F_c divided by the force constant K_f. See specific product information for more details.

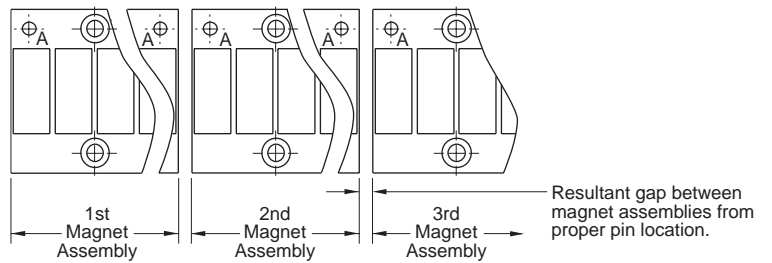
DDL MAGNET WAYS



PLATINUM® Ironcore Motor Magnet Way with cover

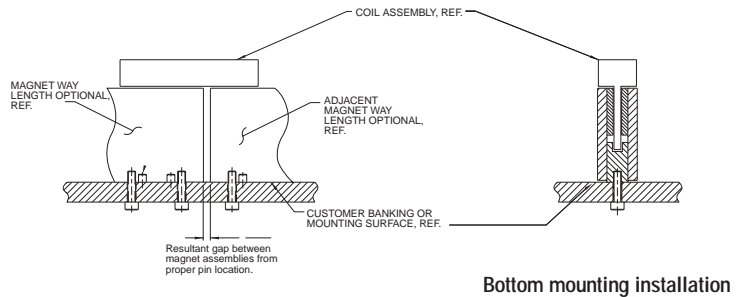
Magnet Way widths correspond to the mating coil assembly width. Magnet Way assemblies are modular and come in standard lengths: 64, 128, 256, 512, 1024 mm. Multiple magnet assemblies can be installed to obtain the desired length. Shown above is the method to mount multiple assemblies.

TYPICAL INSTALLATION OF MULTIPLE IRONCORE MAGNET ASSEMBLIES

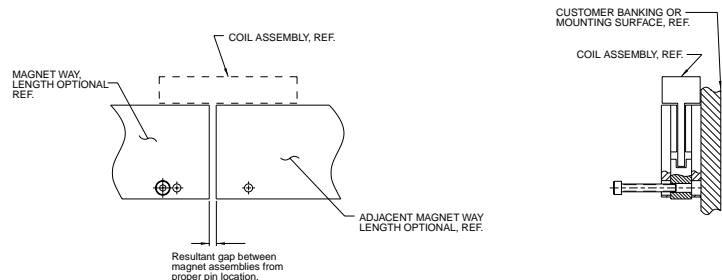


PLATINUM® Ironless Motor Magnet Way

TYPICAL INSTALLATION OF MULTIPLE IRONLESS MAGNET ASSEMBLIES



Bottom mounting installation

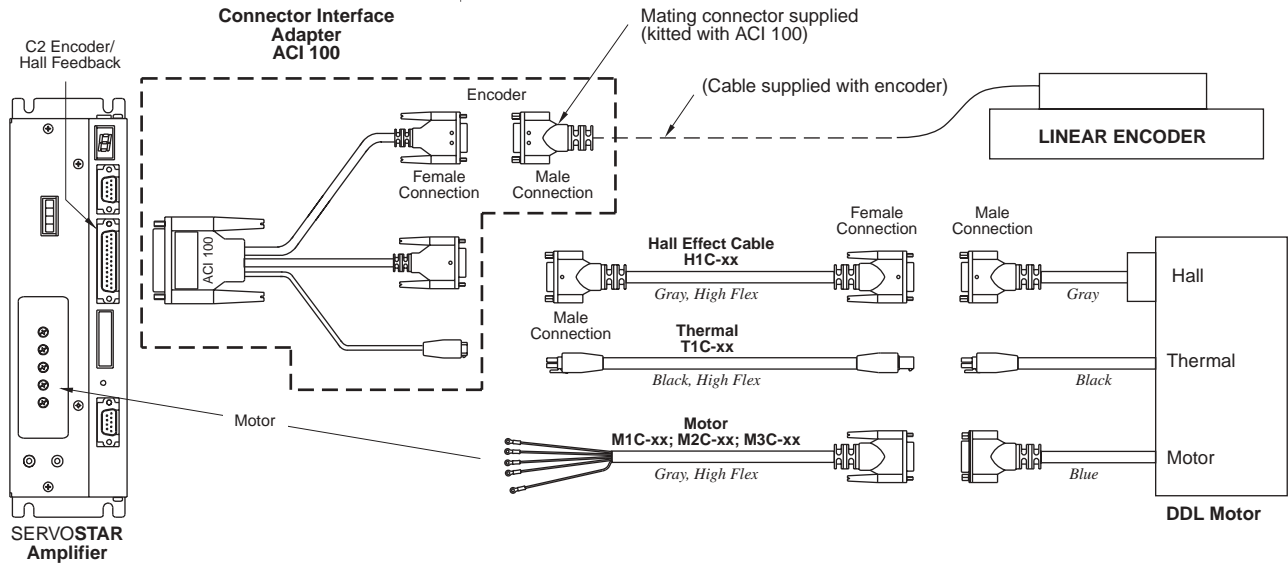


Side mounting installation

DDL CABLES

Kollmorgen PLATINUM® DDL & SERVOSTAR® CD

HIGH FLEX CABLES FOR USE WITH SERVOSTAR



FEATURES:

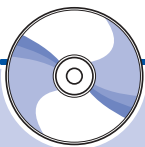
- High Flex cable designed for dynamic, continuous flexing applications
- Cable track compatible
- Molded, high reliability connectors
- Oil resistant PVC jacket
- 105°C/600 V motor cable, 105°C / 300 V Hall Effect and Thermal Sensor cable
- CE compliant, fully shielded low impedance cable and connectors
- 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 are offered. For other lengths, consult a Danaher Motion representative.

Bulk High Flex Cable is available (without connectors) in 3 meter increments. Consult a Danaher Motion representative for specifications. High Flex Cable is also available for other amplifiers.

Note:

Cables are designed for minimum life of millions of cycles under ideal conditions. Actual field applications may or may not yield the cable life described here. Minimum recommended dynamic bend radius is 15x the largest cable diameter used in cable track; use a large bend radius whenever possible.



MOTIONEERING® CD-ROM

For more detailed product and selection information, see the **MOTIONEERING** CD-ROM inside the back cover of this catalog or visit our website at www.DanaherMotion.com.

THE FRAMELESS ADVANTAGE

Housed motors have a traditional configuration including a frame, bearings and a shaft. In use, the housed motor shaft is coupled to the systems element being driven. Housed motors are ideal for use in harsh environments or other applications requiring totally closed units.

The frameless motor concept was developed to meet the need for motors with a large hole through the center. This need is still one of the main reasons that the large diameter, narrow width frameless configuration is often selected over the traditional housed configuration. The large rotor bore can be used as a route for lead wires, as a mounting area for other hardware such as tachometer generators or resolvers, or as an optical path.

Frameless motors are built to be "designed in" as an integral part of the system hardware. The frameless motor can be integrated into the customer hardware rather than coupling a motor shaft to the element being driven. This allows significant savings in space and weight over housed motors by eliminating the motor housings, bearings and shaft. Also, since the frameless motor can be mounted on the driven shaft, the coupling stiffness is improved and torsional play minimized, improving dynamic performance. The backlash normally associated with couplings or gear trains is eliminated from the drive system, improving precision.

FRAMELESS MOTOR CONSTRUCTION

The frameless motor construction is supplied as two separate components:

- Rotor (Field): rotating permanent magnet component
- Stator (Armature): stationary, wound component

The customer is typically supplying the shaft, bearings, housings, and end bells for the motor. Kollmorgen can help in the design of these for the customer, as well as recommend and supply the feedback and drive amplifier to complete the servo system.

The armature consists of a low-loss, laminated and bonded core, wound with a three phase copper winding. This slotted structure is electrically insulated prior to insertion of the copper windings. A three-wire output for connection to the amplifier is provided.

The field assembly, or rotor, consists of permanent magnets bonded to a flux-carrying yoke ring. The magnet material selected will depend on the application. Both Neodymium-iron-boron and Samarium cobalt alloys are used. Rotor banding with composite materials is also provided to ensure reliability, particularly at high speeds.

RBE SERIES DDR BRUSHLESS MOTORS

The Kollmorgen RBE series brushless motors feature high-energy rare earth magnets, resulting in high continuous and peak torque ratings. With over 500,000 motors in the field, this design has become the standard in frameless motor technology and reliability.

- 10 frame sizes from 21 mm to 240 mm (0.82 to 9.45 in) diameter
- Peak torque from 0.025 N-m to 197 N-m (0.018 to 145 lb-ft)

F SERIES DDR BRUSHLESS MOTORS

This new line of frameless motors incorporates the latest in rare earth magnet materials and extends the standard frameless product offering.

- 4 frame sizes from 160 mm to 350 mm (6.3 to 13.8 in) diameter
- Peak torque from 16.9 N-m to 1350 N-m (12.5 to 996 lb-ft)



Kollmorgen Large Diameter Torque Motors



Kollmorgen RBE Frameless Torque Motors



Custom Brand DC torque motors



Kollmorgen's motors power the latest implantable hearts



Kollmorgen custom motor eliminates need for elevator machine room



Custom motors and actuators

THE CUSTOM SOLUTION

Kollmorgen has excelled for over 50 years at creating custom motor solutions for OEM customers in a wide variety of applications. Most motor companies do mechanical variants only, but Kollmorgen designs and manufactures unique electromagnetic solutions in addition to the mechanical specials to tailor the package and performance to the application.

Kollmorgen's electromagnetics expertise can be found in:

- Implantable heart pump motors providing the ultimate in reliability
- CT scan machines using our DDR technology to increase throughput and decrease footprint of the machines
- Both commercial and military aircraft platforms using our custom actuators and motors for performance, weight savings, and size reduction
- New commercial elevators using our DDR technology to lower the total cost
- Semiconductor tools using DDR technology to increase performance, decrease package size, and provide zero maintenance operation

In addition to the basic motor technology, Kollmorgen provides the full package of development capability including:

- Program management to oversee project completion
- Worldwide supply chain management including low cost region manufacturing
- Design-to-cost tools from the DBS (Danaher Business System) portfolio
- Rapid prototyping capability for new, custom motor and mechanical assemblies

Our goal is to ensure the total success of the customer program. Combining world-class technology with these supporting elements is a key value to our OEM customers.

SC/SCE950

**PACIFIC SCIENTIFIC SC/SCE 95x****Programmable single-axis/Position Control Option Card**

For superior motion control, the SC/SCE950 give you maximum programmability using Pacific Scientific's ServoBASIC Plus™ programming language. This Windows® Development Environment programming package uses a powerful interactive debugger to speed set-up and diagnostics. SC/SCE950 gives you the power to control up to 21 separately configurable I/O points, and 8 programmable limit switches easily. PaCLAN™ networking and Opto-22 I/O connectivity are popular options to the SC/SCE950.

FEATURES

- New Windows Development Environment
- Compiled ServoBASIC™ Software
- Powerful interactive debugger
- Intel™ microcontroller inside
- 21 programmable and configurable I/O
- Optional connection to Opto-22 I/O
- Optional connection to DF-1 or Modbus network
- Optional PaCLAN local area network
- 32K NV memory w/optional 128 K available
- 8 programmable limit switches w/module
- Fully adjustable motion profile parameters
- Electronic cam profiling
- Interrupts on motion & program variables

BASIC Programming Language

Since first introducing a standard software programming tool like BASIC in a drive 1987, Pacific Scientific has continued to enhance the functionality and ease of use. The fourth generation SC/SCE950 and Windows development package incorporates functions like RunSpeed and IndexDist integrated with standard While: Wend and For: Next statements to give you true motion programming flexibility. Why not use a language you already know?

Windows Development Environment

This development environment lets you program in modular blocks that can easily be re-used time and time again. The easy-to-use editor and powerful debugger with program variable watch windows make troubleshooting easy. Easy to use as a simple word processor, yet the structured text language controls the most complex machines.

Configurable Bi-Directional I/O

The SC/SCE950 has 21 digital I/O ports. These ports can be configured as either inputs or outputs. The ServoBASIC program also has access to the SC900 base drive's six I/O for a total of 27 ports. The days of not having the right mix of inputs and outputs are over. This I/O can be used to interface to your PLC, or control machine sensors and other control devices. For fully flexible industrial I/O the SC/SCE950 ports are Opto-22 compatible.

Features When Combined with the SC900 or SCE900 Families of Brushless Servo Drives

- Completely digital set-up and tuning
- DSP based servo control algorithms
- Encoder input and encoder output
- Analog input and two analog outputs
- Two high-speed registration inputs
- Digital fault code information
- Full protection and diagnostics
- Ability to run linear motors
- Exclusive Signature Current Control
- Patented DRDC resolver ASIC
- Full range of servo motors — up to 800 lb-in

Local Area Network Option

In addition to the standard RS-232/485 Serial interfaces the SC/SCE950 can be ordered with Pacific Scientific's PaCLAN interface. This is ideal for networking single-axis drives together. It is a 2.5 Mbaud token passing communications port where all variables and real-time motor information can be passed from drive to drive. Connect up to 255 drives together with PaCLAN and you still have serial ports left over to communicate with your Operator Interface!

SERVOSTAR® SC



Kollmorgen SERVOSTAR® SC

The Kollmorgen SERVOSTAR SC Single Axis Controller combines the compact size, advanced servo control features, and proven reliability of the SERVOSTAR CD Compact Drive with the simple, yet flexible, programming capabilities of the SERVOSTAR MC Multi-Axis Controller. The SERVOSTAR SC offers a complete integrated power supply, drive amplifier, and single axis positioner in one compact package.

The SERVOSTAR SC provides tremendous motor flexibility. Capable of operating the complete range of Kollmorgen motors including Kollmorgen GOLDLINE® rotary servomotors, Kollmorgen GOLDLINE® DDR (Direct Drive Rotary), frameless motors and PLATINUM® DDL (Direct Drive Linear) motors.

Kollmorgen's wide motor selection means no compromises in selecting the right motor for your application. With the SERVOSTAR SC all your single axis applications need only one controller.

FEATURES

Servo

- Fully digital current, velocity and position loops
- Update rate
 - Reference generator - 1 KHz (1 ms)
 - Position loop - 2 KHz (500 µsec)
 - Velocity loop - 4 KHz (250 µsec)
 - Current loop - 16 KHz (62.5 µsec)
- Automatic control loop tuning
- Available in 3, 6, and 10 amps, models (continuous RMS current rating)
- Advanced velocity control algorithms (Comp mode, Pole Placement, and Extended Pole Placement)
- PID position loop tuning with feed forward
- Position, velocity, torque limits
- Advanced patented sinewave commutation technology provides smooth, precise low-speed control and high-speed performance
- Accurate torque control due to precision balanced current loops with closed loop sensors
- Patented torque angle control enhances motor performance
- Velocity loop bandwidths up to 400 Hz
- Feedback
 - Resolver, encoder, sine encoder
 - Secondary encoder feedback, used to close a dual loop around the load, or as an input for master/slave or pulse-and-direction operation

Motion

- Profile - Sine acceleration + automatic/manual jerk control
- Profile - Trapezoidal velocity for rapid motions
- Operation modes:
 - Position - digital
 - Velocity - digital/analog
 - Torque - digital/analog
 - On the fly change between modes
 - Master/Slave - gear, cam
- Jogging, incremental/absolute moves, non-zero final velocity, advanced stop/proceed

Communication

- One serial port for use with BASIC MOVES Development Studio and MOTIONLINK®
- One Ethernet port at 10 Mbit/sec for use with BASIC MOVES Development Studio and MOTIONLINK, Ethernet I/O
- One serial port (RS-232) for HMI support.
- If first serial port is not used for BMDS communications, both ports may be used by the user.
- Fieldbus option card for DeviceNet
- Protocol - Ethernet TCP/IP support, serial SLIP support

Programming Language

- MC BASIC (Motion Control BASIC)
- 256 tasks and events
- 16 priority levels
- Events - for handling a-synch scenarios
- Advanced error handling - line, task, system
- Data types - integers, doubles, strings, arrays
- Libraries - functions any task can use
- Task control commands - idle, continue, kill, re-start
- Debugger - step(s), breakpoints, watch

I/O

- Self locking wire clamp connectors, digital I/O is opto-isolated
- Digital Inputs:
 - 5 dedicated inputs - home, limit, capture, remote enable/disable, allow/prohibit motion
 - 19 digital inputs; user defined
- Digital Outputs:
 - Motor brake; dedicated
 - 10 digital outputs; user defined
- Analog I/O:
 - 2 analog inputs, 14 bit resolution
 - 2 analog outputs, 12 bit resolution
 - Output status relay

Memory

- Disk On Chip - for storage of user programs and data - 8 MByte
- RAM - execution environment - 8 MByte DRAM
- NvRAM - for rapid storage of user data that will not be erased at power off - 32 KByte
- Real Time Clock
 - Date/Time of day
 - Time stamp of system errors and notes

Robust Design

- Self-protecting power modules
- Full protection against short circuit, over-voltage, undervoltage, motor and drive over-temperature, over-current and feedback loss
- Flexible current foldback protection

Development Tools

- MOTIONLINK for:
 - Configuration
 - Setup
 - Tuning
- BASIC MOVES Development Studio for:
 - Application building, editing
 - Debugging
 - Maintenance

INTRODUCTION

SPECIALTY ELECTRONIC PRODUCTS

SPECIALTY ELECTRONIC PRODUCTS

Specialty Electronic Products (SEP) is the term used by Danaher Motion to describe its custom motion system capability. Our customers come to us with challenges and we provide solutions based on field-proven building blocks that have been developed over the years in the implementation of standard and custom programs. This enables very fast turn around cycle from concept to prototype, providing a design based on reliable and proven building blocks of software and hardware while leveraging cost to a very competitive price solution even though custom.

Together with Danaher Motion's variety of standard and custom motor and actuator solutions, SEP provides a unique total motion solution capability ranging from motor and servo drives to single and multi-axis motion controllers custom built to your specification – one committed address to an integrated solution.

FEATURES

Danaher Motion's unique specialty electronics capability may be summed up as follows:

- Custom motion control systems designed to meet your exact requirements
- New designs based on library of field-proven Motion Building Blocks
- Product- or system-level solution
- Mechanics, Electronics and/or Software
- Fast engineering turn-around
- Close engineer-to-engineer relationship with OEM

MOTION BUILDING BLOCKS

The capability to make custom motion products depends on the ability to do it quickly. The SEP solution becomes more attractive to the OEM when prototypes can be delivered in less than 4 months, often corresponding with the OEM's own machine development time. The way to achieve rapid prototyping is to have a library of building blocks, from which we build the system that the OEM requires.

The building blocks consist of both electronics and firmware. From the electronics point of view, building blocks can be further divided into control and power stages. A number of control stage building blocks have been developed that enable us to offer solutions across the spectrum, from high level multi-featured systems to reduced feature cost-efficient systems.

Power stages are roughly divided into four categories: 600 V, 300 V, 80 V and 24 V, enabling us to cover a wide range of power requirements. The basic firmware building blocks are the current, velocity and position loop, and communications modules. These modules are augmented by various feedback device interfaces, such as incremental encoder, halls only, sine encoder, and HEIDENHAIN EnDat™.

Every product we make becomes an additional building block in our arsenal.

SOLUTIONS & SPECIALTIES

The following are some of our solution specialties:

- Integrated sine encoder interfaces, to eliminate expensive interpolation boxes
- Low-power digital drives



- Multi-Drive Solutions, for space, wiring and cost optimization



- Rack Mount Systems



- Multi-Axis Motion Controllers



- Turnkey solutions, including mechanical integration and complete test

SERVOSTAR MC

MULTI-AXIS CONTROL

SERVOSTAR® MC MULTI-AXIS MOTION CONTROLLER

The MC software system has three major components: Firmware, User program and Microsoft Windows® software.

The firmware is Kollmorgen dedicated software running on the MC. The user program is the software you write on the MC in MC-BASIC. Finally, the Motion Developer's Kit (MDK) is Windows-based software that includes the development tools and communications routines that let your PC talk to the MC. Let's start with the firmware.



REAL-TIME OPERATING SYSTEM (RTOS)

The foundation of system software is the operating system. Motion systems need rock-solid timing – something that ordinary operating systems like DOS and Windows just can't provide. We needed a "real-time operating system" or RTOS. Most companies write their own, proprietary RTOS. Kollmorgen sought out the best solution and found it available in the off-the-shelf RTOS industry. We chose VxWorks™ by Wind River Systems because they are the leaders in the RTOS industry. That gives our software higher in reliability and performance, and an upgrade path for the future.

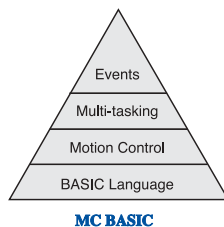
MC-BASIC

What's MC-BASIC? It's BASIC extended to support motion programming. Notice we didn't say "BASIC-like". It's true BASIC. With commands like "PRINT" and "GOTO". With FOR/NEXT loops and WHILE blocks. With MC-BASIC, you'll feel right at home the first time you write a program. And MC BASIC is fast. Because its compiled, not just interpreted, the user program can run in tens of microseconds per line.

But BASIC is just the start. We added motion. We started with point-to-point moves. We added circular interpolation. We made all of our moves dynamically changeable with end points and target speeds that can be adjusted in real-time. We added gearing and the most powerful camming in the industry.

MC-BASIC is multi-tasking. Tens of tasks can run independently. Tasks can control other tasks. They can start, stop, or pause other tasks. And all the tasks run in a well-defined, flexible priority structure where you decide how resources are allocated.

MC-BASIC works with events to control motion? Just about anything that happens in the course of machine operation, like a switch opening or a motor crossing a position threshold. Events are monitored continuously and when one occurs, user "event code" is loaded and executed quickly. MC-BASIC also has libraries for functions and sub-routines. The user can write routines via TCP/IP or serial communications.

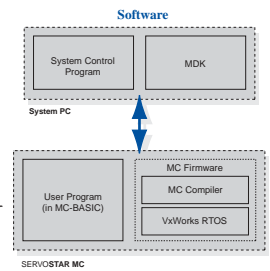


BASIC MOVES DEVELOPMENT STUDIO (BMDS)

BMDS is a fully featured editor and debugger designed to support the MC. BMDS makes developing motion programs simple. BMDS uses true BASIC language programming, a multi-tasking environment and easy to use wizards to get you started.

MOTION DEVELOPER'S KIT (MDK)

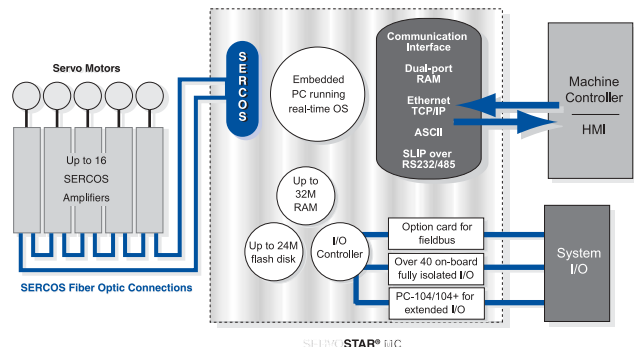
The final part of our software system is the MDK. The MDK includes the Application Programming Interface (API), a library of routines that simplify communication between the PC and the MC. It all goes together to let you quickly build your motion system, using Visual C++ or Visual BASIC with confidence for the future.



SERVOSTAR MC is designed with the requirements of modern motion control systems in mind. Kollmorgen assembled a worldwide team of engineers with decades of design experience, and listened to the needs of the people that use these products everyday. Linking research and design discipline, the end result is a new innovative controller that answers the difficult questions posed by complex and varied applications. Bringing it all together - hardware, firmware and software - the SERVOSTAR MC stands ready to respond to today's challenges.

The design process started with a careful review of problems encountered by motion control engineers everywhere. It was found that the analog connection between the controller and the drive was creating problems. Ground loops. electrical noise. Shielding deficiencies. Intermittent connections. And just too many connections were required.

A fully digital means of communication was needed. That is why the SERVOSTAR MC relies on SERCOS interface™ to connect the controller to its drives. This digital communications technology eliminates noise and ground concerns and reduced the fifty or more connections to just two fiber optic cables.



The MC hardware is powerful. That is because at its heart is a PC – either a dedicated 586 PC or a GXM PC (model dependent) – on a card. It has the processing power to run programs fast. It has a fully functional flash disk on-board to provide permanent memory storage measured in megabytes. The same is true for RAM; the MC starts at 32MB for the GXM processor, and grows to fit your needs.

Finally, the SERVOSTAR MC controller provides the Input/Output flexibility that is needed. There are over forty on-board optically-isolated I/Os. Each axis has additional I/O points that can be easily connected into the system. Even more, the SERVOSTAR MC has its own internal PC-104 bus so that a wide variety of I/O can be added, depending on the requirements. PC-104 can also be used to add other hardware features: external encoder, fieldbus, analog I/O, extra communication ports, etc.

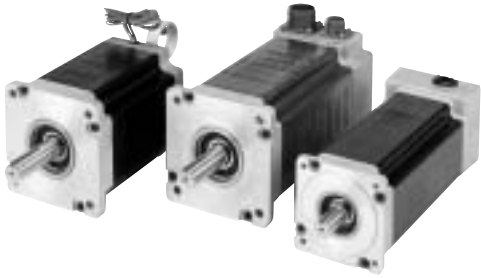
With the Kollmorgen SERVOSTAR MC, motion controllers have taken a leap forward in providing power, performance, reliability and flexibility to the motion control engineer.

INTRODUCTION

www.DanaherMotion.com • 815-226-2222



INTRODUCTION



SIGMAX® AND STANDARD HYBRID STEP MOTORS

Here's how Sigmax works.

- Stator mounted rare earth magnets concentrate flux at desired points between the rotor and stator
- Flux focusing action optimizes flux paths
- Produces higher torque and current utilization is better than a comparably sized standard hybrid

GENERAL PURPOSE MOTORS

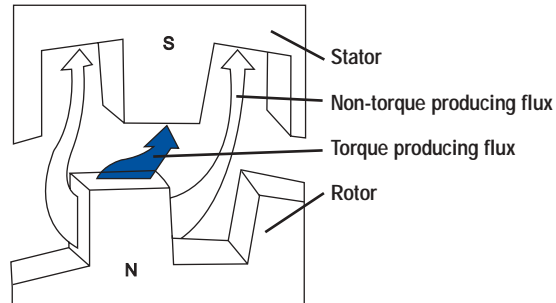
These motors offer torque, speed and acceleration characteristics to fulfill commonly encountered applications. The P and M Powermax motors represent both standard and Sigmax® configurations. Powermax II® hybrid motors are the economical and high performance alternative to conventional NEMA 23 step motors.



HIGH TORQUE - HIGH ACCELERATION

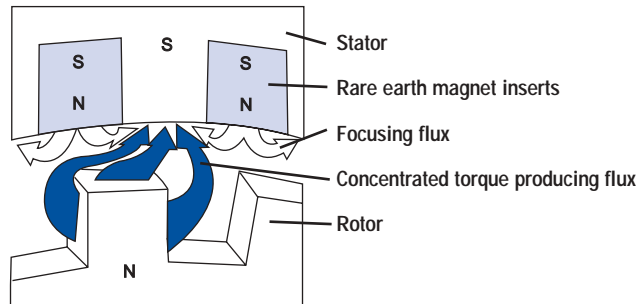
New T Series motors, in NEMA 23 frame and the N and K Series, in both NEMA 34 and 42 frames, provide an impressive range of high torque output. They have high torque-to-inertia ratios that provide high acceleration rates to move loads fast. The K Series, which incorporates the flux-focusing Sigmax technology, provides the highest acceleration rates. Specify the K Series for the most rapid load positioning. See the pages that follow for performance information and rating and characteristics. For detailed information see the MOTIONEERING® CD in the back of this catalog, or look online at www.DanaherMotion.com for more information.

STANDARD HYBRID



Typical paths of flux transfer in an energized conventional hybrid step motor. Some flux leakage occurs in normal operation.

SIGMAX® TECHNOLOGY



Patented Sigmax technology* redirects magnetic flux to inhibit leakage and optimize torque production.

*Sigmax technology is covered by U.S. patents 4,712,028, 4,713,470, 4,763,034 and 4,827,164.

6410/6415 MICROSTEPPING DRIVES



PACIFIC SCIENTIFIC 6400 MICROSTEPPING DRIVES ARE...

Modular, Functional, and Flexible

Modular

The Pacific Scientific 6000 series high performance microstepper drives are modular to support a broad range of requirements. The modular design assures that you maximize your value. Offered in two power levels, the 6200 and 6400 microsteppers are ideally suited for single or multi-axis applications where space is at a premium.

Functional & Flexible

Each series is designed to be mounted in either a bookshelf or cold plate configuration. This flexibility allows the user to optimize the available space in your panel. Microstep resolution is selected via DIP switches. Microstepping assures smooth low speed operation and optimum system resolution. The 6200 and 6400 resolutions are adjustable up to 20,000 and 51,200 steps per revolution respectively.

Current ranges are DIP switch selectable as well. Idle current reduction is also offered. This provides the ability to reduce motor heating when at idle. It also conserves system energy typically useful when operating with battery back systems. The 6200 drives require a 24-40 VDC input power source. The 6400 drives require a 24-75 VDC power source.

Both packages are available with two standard options: The 6210 and 6410 accept step and direction inputs from a remote indexing sources. The 6215 and 6415 include an on-board Oscillator card. These units include 4 built-in potentiometers to adjust acceleration, deceleration low speed and run speed settings. Or you can apply an external voltage source and use the pre-configured input to start and stop the motion.

AGENCY APPROVAL

cUL, CE

6410 FEATURES

- Single power supply input
- Patented 4-phase Bipolar Chopper Drive for superior current regulation and low ripple current
- Output current adjustable from 0.625 A to 5 A_{RMS} with 3 position dipswitch
- Microstepping provides smooth operation and increased resolution
- Patented Digital electronic Damping™ reduces instability at mid-speed ranges
- Idle current reduction reduces motor heating in many applications
- Selectable step filter rejects noise on step input
- Fault Protection:
 - line-to-line and line-to-neutral shorts
 - Internal power supply under-voltage
 - Bus overvoltage
- Compact size

6415 FEATURES

- Single power supply input
- Patented 4-phase Bipolar Chopper Drive for superior current regulation and low ripple current
- Output current adjustable from 0.625 A to 5 A_{RMS} with 3 position dipswitch
- Microstepping up to 51,200 steps/revolution
- Patented Digital Electronic Damping™ reduces instability at mid-speed ranges
- Idle current reduction reduces motor heating in many applications
- Selectable step filter rejects noise on step input
- Fault Protection:
 - line-to-line and line-to-neutral shorts
 - Internal power supply under-voltage
 - Bus overvoltage
- Compact size
- Low/high speed select input
- On-board multi-turn potentiometers
- External customer potentiometer
- Customer supplied ±10 VDC analog input
- Optional heat sink

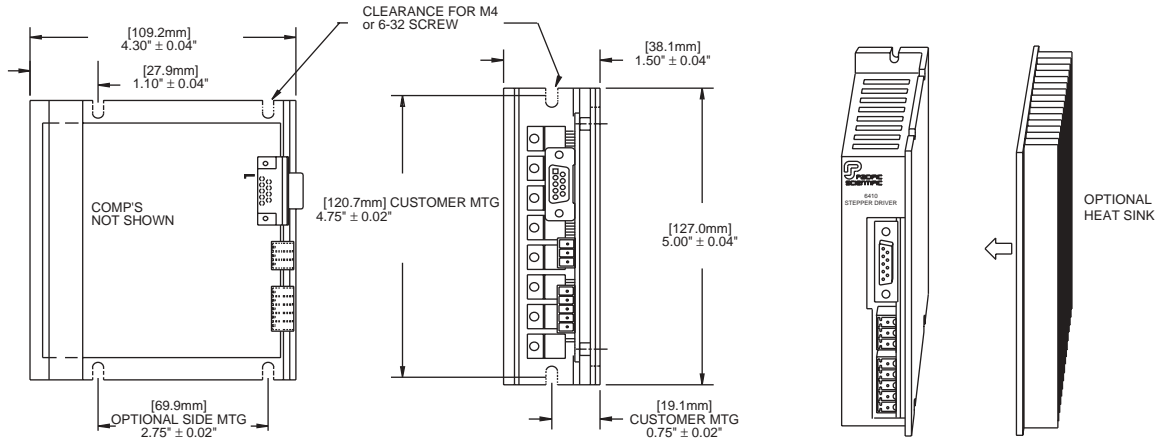
DRIVE SPECIFICATIONS

	6410	6415
Step Sizes	Binary or Decimal, full to 1/250 or 1/256	Binary or Decimal, full to 1/250 or 1/256
Input Voltage	24-75 VDC	24-75 VDC
Output Current	0.625-7.1 amps, Peak	0.625-7.1 amps, Peak
Interface		
Inputs	Step and Direction	±10 VDC, Step/Dir, Discrete Input
Outputs	n/a	n/a
Connectors	Screw Terminal, D Sub	Screw Terminal, D Sub
Package Size	39.62 x 104.90 x 82.55 mm	39.62 x 104.90 x 82.55 mm
W (w/heat sinks)xHxD	(1.56 x 4.13 x 3.25 in)	(1.56 x 4.13 x 3.25 in)

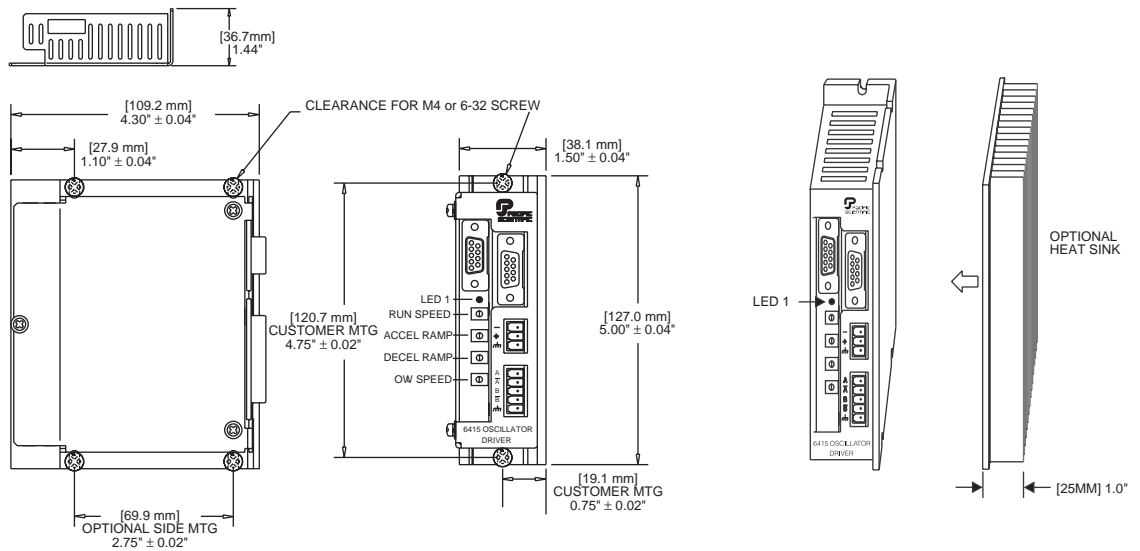
SEE SYSTEM RECOMMENDATIONS AND DATA ON PAGES 86-93.

6410/6415 MICROSTEPPING DRIVES

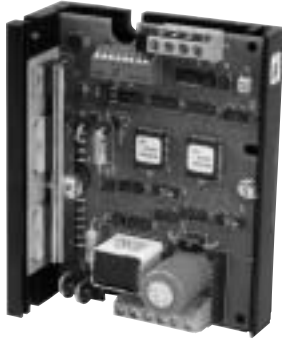
6410 [mm] in



6415 [mm] in



6210/6215 MICROSTEPPING DRIVES



DRIVE SPECIFICATIONS

	6210	6215
Step Sizes	1/2, 1/10, 1/25, 1/100	1/2, 1/10, 1/25, 1/100
Input Voltage	24-40 VDC	24-40 VDC
Output Current	1 to 3.5 amps, Peak	1 to 3.5 amps, Peak
Interface		
Inputs	Step and Direction	±10 VDC, Step/Dir, Discrete Input
Outputs	n/a	n/a
Connectors	Screw Terminal	Two-Speed Terminal
Package Size	39.62 x 104.90 x 82.55 mm	39.62 x 104.90 x 82.55 mm
W (w/heat sinks)xHxD	(1.56 x 4.13 x 3.25 in)	(1.56 x 4.13 x 3.25 in)

PACIFIC SCIENTIFIC 6200 MICROSTEPPING DRIVES ARE...

Modular, Functional and Flexible

Modular

The Pacific Scientific 6000 series high performance microstepper drives are modular to support a broad range of requirements. The modular design assures that you maximize your value. Offered in two power levels, the 6200 microsteppers are ideally suited for single or multi-axis applications where space is at a premium.

Functional & Flexible

Each series is design to be mounted in either a bookshelf or cold plate configuration. This flexibility allows the user to optimize the available space in your panel. Microstep resolution is selected via DIP switches. Microstepping assures smooth low speed operation and optimum system resolution. The 6200 resolutions are adjustable up to 20,000 and 51200 steps per revolution respectively.

Current ranges are DIP switch selectable as well. Idle current reduction is also offered. This provides the ability to reduce motor heating when at idle. It also conserves system energy typically useful when operating with battery back systems. The 6200 drives require a 24-40 VDC input power source.

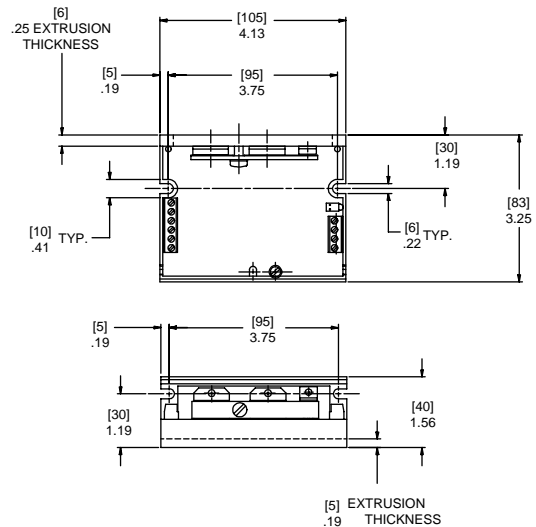
Both packages are available with two standard options: The 6210 accepts step and direction inputs from a remote indexing sources. The 6215 include an on-board Oscillator card. These units include 4 built-in potentiometers to adjust acceleration, deceleration low speed and run speed settings. Or you can apply an external voltage source and use the pre-configured input to start and stop the motion.

AGENCY APPROVAL

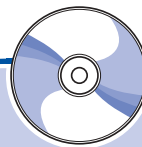
cUL, CE

6210/6215

[mm] in



SEE SYSTEM RECOMMENDATIONS AND DATA ON PAGES 86-91.



MOTIONEERING® CD-ROM

For more detailed product and selection information, see the **MOTIONEERING** CD-ROM inside the back cover of this catalog or visit our website at www.DanaherMotion.com.

IMPULSE MICROSTEPPING DRIVES



IMPULSE MICROSTEPPING DRIVES

IDC introduces the Impulse microstepping drive as the newest addition to their family of high performance microstepping drives and controls. The Impulse microstepping drive uses the power of a Digital Signal Processor (DSP) to obtain the ultimate performance out of a stepping motor. Five new advanced motor control functions now are made possible with each providing unparalleled performance. Having 4 amps of available current, up to 34 frame size stepping motors can be powered. With our complete line of motors, electric cylinders, rodless actuators, and precision positioning tables, IDC has the IDEal™ system for your application.

Five Key Features

- Open Loop Stall Detect™ (OLSD™)
 - Detect a motor stall without an encoder or resolver
- Multi-Stepping™
 - Low resolution step input = 25,600 microsteps out
- Dynamic Smoothing™
 - Rounds the edges of the move profile (pseudo-S curve)
- Xtreme Smoothness™
 - Eliminates the motor's natural resonance speeds
- Motion Node option
 - Move capabilities

Other Features

- Anti-Resonance
 - Best performing and largest range in the industry (7.2°)
- Programmable jog function with dual speed settings
- Current reduction modes with programmable time and reduction amount
- 4 programmable inputs
 - -Jog+, Jog-, Jog Speed, EOT, Move Select, Warm Boot, Stop, Kill
- Programmable output
 - Brake, In Motion, Stalled (in addition to fault output)
- All I/O user configurable to active high or active low operation
- Input resolution, programmable from 200-100,000 step/rev in increments of 200
- DIN rail mountable
- Internal fan powered cooling tunnel
- Ultra compact size and ability to mount tightly together
- 160 VDC bus voltage for more torque at higher speeds
- Built in regenerative circuit
- Diagnostic LED
- Configurable with Application Developer software or FP100 keypad

AGENCY APPROVAL

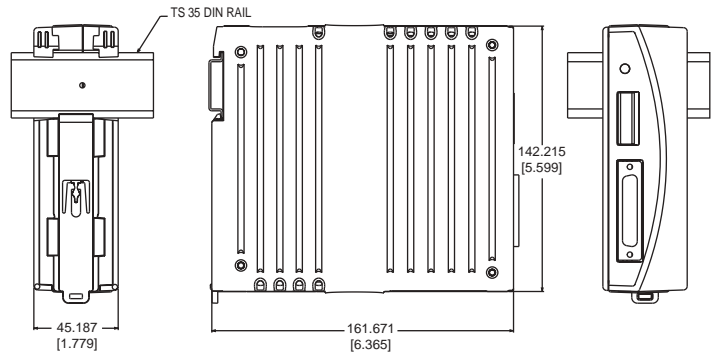
- UL recognized
 - 508C (Type R), file #E137798
- Models CE Compliant: EMC standard EB61800-3 and safety standard EN50178

DRIVE SPECIFICATIONS

	IMPULSE
Step Sizes	200 to 100,000 in increments of 200
Input Voltage	90 to 120 VAC single phase, 50/60 Hz, 500 VA max @ 4A
Output Current	0.75 to 4.0 amps
Interface	
Inputs	Step and Direction
Outputs	24 V, 100 mA sinking
Protection	Single-Ended Mode Input Voltage (VDC), Differential Mode (VDC between + and -), and Input Current (any terminal @ 0 V to Gnd)
Package Size	45.21 x 142.24 x 161.79 mm (1.78 x 5.60 x 6.37 in)

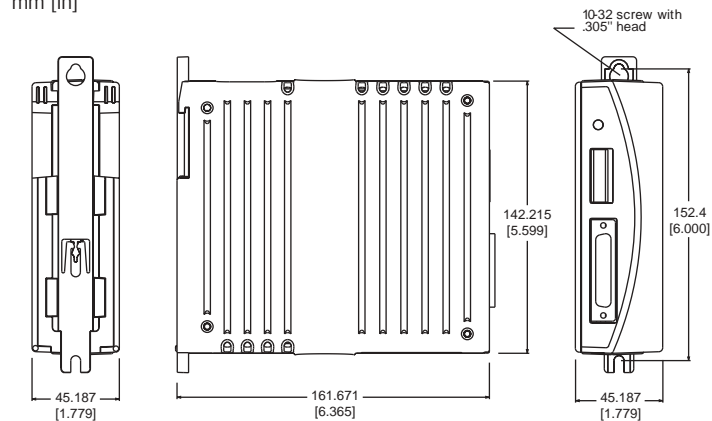
IMPULSE WITH DIN-RAIL MOUNTING BRACKET

mm [in]



IMPULSE WITH SCREW TYPE MOUNTING BRACKET

mm [in]



SEE SYSTEM RECOMMENDATIONS AND DATA ON PAGES 88-93.

NEXTSTEP MICROSTEPPING DRIVES



NEXTSTEP® MICROSTEPPING DRIVES

An IDC NextStep microstepping drive incorporates all the standard features you expect from a competitive, world class motor/drive package and much more, all at a competitive price. IDC has taken step motor performance to a new level of innovation providing performance enhancements, convenience, and quality resulting in genuine value. The NextStep's revolutionary design consumes significantly less panel space than other fully packaged systems, delivers an industry leading 17 watts/in³, is designed for long life and durability, and most important, the NextStep increases your system's throughput to levels previously unachievable using open-loop positioning systems.

NextStep in Functionality and Flexibility

- Operates from standard line voltages of 120 VAC & 240 VAC
- Accepts step & direction or optional CW/CCW step input
- Descriptive tri-color diagnostic LEDs
- Eight user-selectable drive resolutions of up to 50,000 steps/rev with additional resolutions optional
- Achieves peak step motor performance from the motor supplier of your choice
 - 160 VDC bus voltage (120 version) with selectable motor current setting of up to 7.9 amps
 - 320 VDC bus voltage (240 version) with selectable motor current setting of up to 3.9 amps
 - Adjustable motor current waveform for optimal smoothness, and step to step accuracy
- Built in regenerative circuit safely dissipates energy from large inertial loads

AGENCY APPROVAL

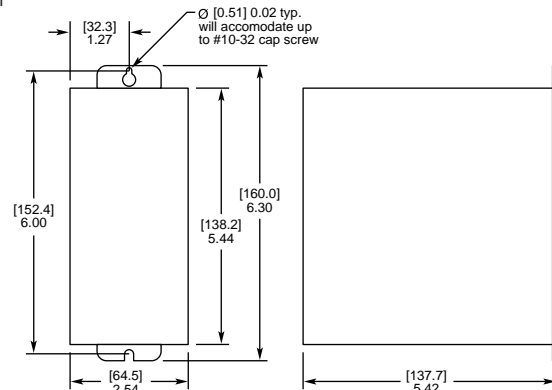
- UL recognized
 - 508C (Type R), file #E137798
- Models CE Compliant: EMC standard EB61800-3 and safety standard EN50178

DRIVE SPECIFICATIONS

	NextStep	NextStep-240
Step Sizes	5000, 10000, 18000, 20000, 25000, 25400, 36000, 50000	
Input Voltage	90 to 120 VAC single phase, 50/60 Hz, 500 VA max @ 7.9 amp setting	100 to 240 VAC single phase, 50/60 Hz, 500 VA max @ 3.9 amp setting
Output Current	0-7.9 amps, 0.1 amp increments. If current setting is higher than 6 amps, drive will fold back current to 6 amps when motor is at rest	0-3.9 amps, 0.1 amp increments. No automatic current fold back feature
Interface	Step Direction	
Outputs	Fault Output	
Protection	Short Circuit, Brownout (Under Voltage), Over Temperature, Interlock, and Regen/Over Voltage	
Package Size	137.16 x 137.16 x 63.5 mm (5.4 x 5.4 x 2.5 in)	

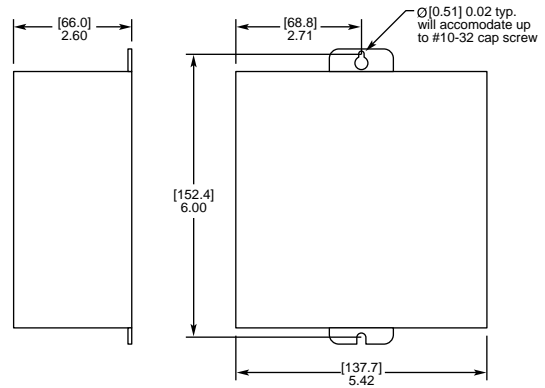
NEXTSTEP (Standard)

[mm] in



NEXTSTEP Minimum Depth (Optional)

[mm] in



SEE SYSTEM RECOMMENDATIONS AND DATA ON PAGES 88-93.

SMARTSTEP MICROSTEPPING DRIVES



SMARTSTEP MICROSTEPPING DRIVES

IDC's SMARTSTEP is a complete, packaged microstepping drive/control that provides a user friendly system, as well as many compelling features and benefits. Consider a SMARTSTEP when your application requires:

- High Throughput. The SMARTSTEP has the same outstanding dynamic performance as the NextStep microstepping drive which incorporates the latest in Anti-Resonance technology to maximize the torque, and optimize the performance of step motors.
- Ease of Integration. The SMARTSTEP uses IDC's IDEal™ programming language, and Application Developer software package which simplifies system set-up and integration.
- Small Panel Space. The SMARTSTEP has an internal heatsink and fan which keeps the panel space required for each unit small, and allows multiple units to be stacked together in multi-axis applications.
- Smoother performance across the entire motion profile.
- Up to 8 amps of motor current. The SMARTSTEP is compatible with both standard and enhanced 17 frame to 42 frame step motors.

Additional SMARTSTEP Features

- c L/C rated
- Flash memory allows the SMARTSTEP to be completely reconfigured from a file obtained via the Internet for easy upgrades of both hardware and firmware
- 60K memory, up to 400 programs standard
- RS-232 communications standard, RS-485 optional
- Operates from 120 VAC standard, or 240 VAC optional
- All system configuration and drive settings are software configurable, which means there are no switches to set
- High Speed Registration input
- Faster microprocessor and data bus improves the SmartStep's computational horsepower compared to the S6961
- Go Immediate Mode. This mode of operation allows the controller to multitask between motion control and I/O operations
- User scaling of position, velocity, and acceleration
- Descriptive variables, math and conditional branching
- Accepts encoder feedback for Stall Detection, Closed Loop operation, and Position Maintenance
- 1-99 Axis of immediate control via host RS-232C communication
- Compatible with IDC's Application Developer Software
- Sixteen configurable I/O (8 inputs, 8 outputs,)
 - 1 dedicated home and 2 dedicated end of travel inputs
- Optically isolated I/O, 12/24 VDC compatible
- Compatible with IDC's S series step motors, and P/K series enhanced step motors.
- A handful of accessories simplify integration.

AGENCY APPROVAL

- Models CE Compliant: EMC standard EB61800-3 and safety standard EN50178

For 17 or 23 frame step motor applications IDC has developed the SMARTSTEP23. Some of the features included in the SMARTSTEP23 are:

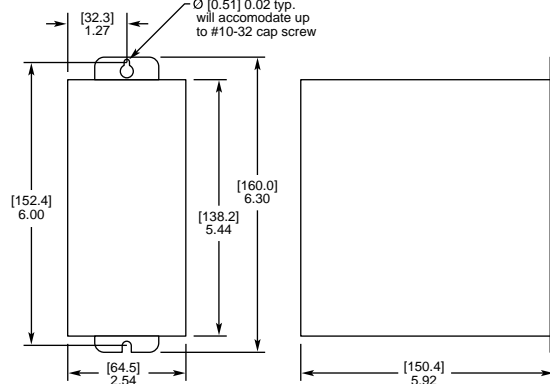
- The SMARTSTEP23 provides up to 3 amps of current which makes it ideal for 17 or 23 frame step motor applications
- Same outstanding dynamic performance as the NextStep microstepping drive
- Operates from 120 VAC
- All the same features and benefits found in the SMARTSTEP

DRIVE SPECIFICATIONS

	SMARTSTEP	SMARTSTEP23	SMARTSTEP-240
Step Sizes	36000 steps/motor rev		
Input Voltage	90 to 120 VAC single phase, 50/60 Hz, 500 VA max @ 7.9 amp setting	90 to 120 VAC single phase, 50/60 Hz, 250 VA max @ 3.0 amp setting	100 to 240 VAC single phase, 50/60 Hz, 500 VA max @ 3.9 amp setting
Output Current	0-7.9 amps, 0.1 amp increments. If current setting is higher than 6 amps, drive will fold back current to 6 amps when motor is at rest	0-3 amps, 0.1 amp increments	0-3.9 amps, 0.1 amp increments
Interface	8 Programmable, Limits, Home Incremental Encoder		
Inputs	8 Programmable LED Indications		
Outputs	Short Circuit, Brownout (Under Voltage), Over Temperature, Interlock, and Regen/Over Voltage		
Protection	Short Circuit, Brownout (Under Voltage), Over Temperature, Interlock, and Regen/Over Voltage		
Package Size	63.5 x 160.02 x 149.86 mm (2.5 x 6.3 x 5.9 in)		

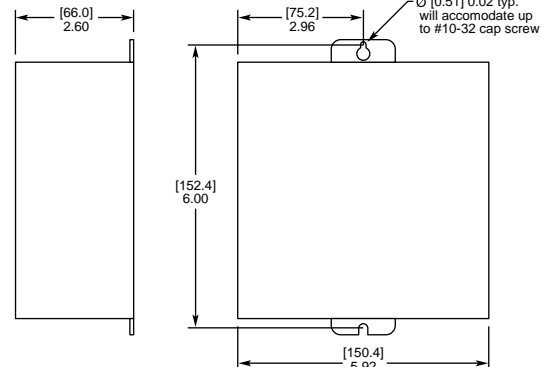
SMARTSTEP (Standard)

[mm] in



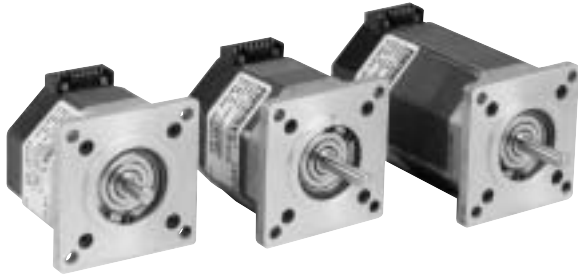
SMARTSTEP Minimum Depth (Optional)

[mm] in



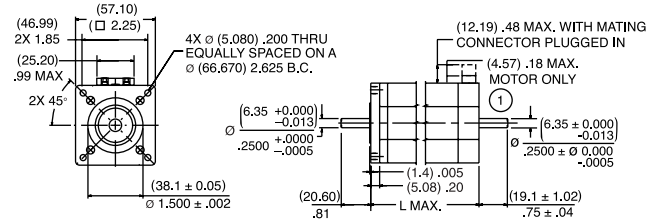
SEE SYSTEM RECOMMENDATIONS AND DATA ON PAGES 88-93.

PACIFIC SCIENTIFIC POWERMAX II MOTORS



MOTOR DIMENSIONS

(mm) in

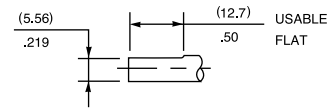


① Optional rear shaft extension available as shown. Same diameter as front shaft extension.

Connector Motor Model	Length	
	mm	in
P2H	40.7	1.60
P or M21	52.3	2.06
P or M22	78.7	3.10

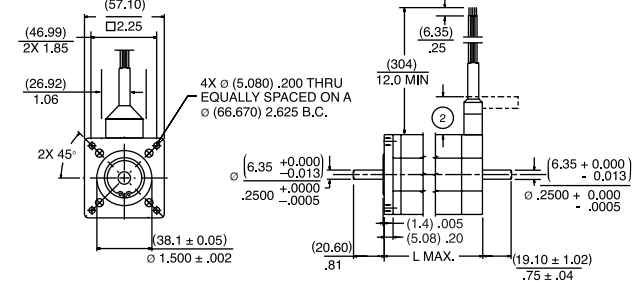
Standard Shaft Options

1. Shaft modifications also available. Contact factory.
2. Optional flat available on front shaft as shown.



FLYING LEAD MOTOR

(mm) in



② Flexible rubber boot may be bent as shown. Normal height 1.0 inch (25.4)

Flying Lead Motor Model	Length	
	mm	in
P2H	40.7	1.60
P or M21	52.4	2.06
P or M22	78.8	3.10

Features

Two year warranty

Polymer encapsulated stator

Polymer end bell with threaded inserts

Largest available shaft diameter on a NEMA 23 stepper

Oversized 30 mm bearings

Optional Sigmax® technology

Optional low inertia rotor

Precision ground rotor OD and honed stator ID for concentric air gap in an economical motor design

Exposed laminations aids thermal dissipation

Benefits

High quality, dependable operation

Exceptional thermal dissipation

End bell runs cooler, provides greater flexibility in mounting encoder and brake options

Withstands high radial and axial loads. Supports numerous shaft modifications

Increases bearing fatigue life (L₁₀), extends motor life, reduces downtime

Increases available torque

Produces the highest acceleration rate possible

High quality performance in an economical motor design

Improved heat dissipation extends motor life, reduces downtime

PACIFIC SCIENTIFIC POWERMAX II MOTORS

RATINGS AND CHARACTERISTICS SEE SYSTEM RECOMMENDATIONS AND DATA ON PAGE 87.

Motor parameters and winding data.

Typical Leadwire Motor Model Number	Connection ^①			Holding Torque ^② (2 phases on) oz-in (N-m) ±10%	Rated Current/Phase ^③ (amps DC)	Phase Resistance (ohms) ±10%	Phase Inductance ^④ (mH) Typical	Detent Torque oz-in (N-m)	Thermal Resistance ^⑤ (°C/watt)	Rotor Inertia oz-in-S ² (kgm ² x 10 ⁻³)	Net Weight kg (lbs)
	Parallel	Series	Unipolar								
STANDARD P2H SERIES 1/2 ROTOR STACK											
P2HNRFH-LNN-NS-00	●			59 (0.42)	5.2	0.22	0.5	2.5 (0.018)	6.6	0.0010 (0.007)	0.45 (1.0)
P2HNRFB-LNN-NS-00		●		59 (0.42)	2.6	0.90	1.9				
P2HNRFB-LNN-NS-00			●	42 (0.29)	3.68	0.44	0.5				
P2HNRFB-LNN-NS-00	●			59 (0.42)	2.6	0.76	1.9				
P2HNRFB-LNN-NS-00		●		59 (0.42)	1.3	3.04	7.6				
P2HNRFB-LNN-NS-00			●	42 (0.29)	1.84	1.52	1.9				
SIGMAX[®] M21 SERIES 1 ROTOR STACK											
M21NRFA-LNN-NS-00	●			142 (1.00)	5.6	0.23	0.7	9.4 (0.066)	5.5	0.0017 (0.012)	0.68 (1.5)
M21NRFB-LNN-NS-00		●		142 (1.00)	2.8	0.92	2.8				
M21NRFB-LNN-NS-00			●	100 (0.71)	4.0	0.46	0.7				
M21NRFB-LNN-NS-00	●			137 (0.97)	4.6	0.32	1.0				
M21NRFB-LNN-NS-00		●		137 (0.97)	2.3	1.28	4.0				
M21NRFB-LNN-NS-00			●	97 (0.68)	3.3	0.64	1.0				
STANDARD P21 SERIES 1 ROTOR STACK											
P21NRFA-LNN-NS-00	●			114 (0.81)	5.6	0.23	0.8	4 (0.028)	5.5	0.0017 (0.012)	0.68 (1.5)
P21NRFB-LNN-NS-00		●		114 (0.81)	2.8	0.92	3.2				
P21NRFB-LNN-NS-00			●	81 (0.57)	4.0	0.46	0.8				
P21NRFB-LNN-NS-00	●			111 (0.79)	4.6	0.32	1.1				
P21NRFB-LNN-NS-00		●		111 (0.79)	2.3	1.28	4.4				
P21NRFB-LNN-NS-00			●	79 (0.55)	3.3	0.64	1.1				
SIGMAX[®] M22 SERIES 2 ROTOR STACK											
M22NRFA-LNN-NS-00	●			230 (1.62)	6.5	0.21	0.7	17 (0.12)	4.5	0.0036 (0.025)	1.13 (2.5)
M22NRFB-LNN-NS-00		●		230 (1.62)	3.3	0.84	2.8				
M22NRFB-LNN-NS-00			●	163 (1.15)	4.6	0.42	0.7				
M22NRFB-LNN-NS-00	●			253 (1.79)	4.6	0.38	1.7				
M22NRFB-LNN-NS-00		●		253 (1.79)	2.3	1.52	6.8				
M22NRFB-LNN-NS-00			●	179 (1.26)	3.3	0.76	1.7				
STANDARD P22 SERIES 2 ROTOR STACK											
P22NRFH-LNN-NS-00	●			197 (1.39)	6.5	0.21	0.8	7 (0.049)	4.5	0.0036 (0.025)	1.13 (2.5)
P22NRFB-LNN-NS-00		●		197 (1.39)	3.3	0.84	3.2				
P22NRFB-LNN-NS-00			●	139 (0.98)	4.6	0.42	0.8				
P22NRFB-LNN-NS-00	●			214 (1.51)	4.6	0.38	2.1				
P22NRFB-LNN-NS-00		●		214 (1.51)	2.3	1.52	8.4				
P22NRFB-LNN-NS-00			●	151 (1.07)	3.3	0.76	2.1				

All ratings typical and at 25°C unless otherwise noted.

- ① Refer to Selection Guide for more information.
- ② With rated current applied.

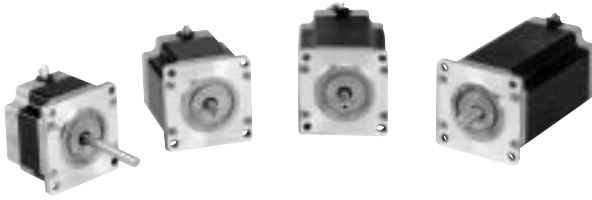
- ③ Windings at 130°C and motor in still air at 40°C (without heat sink). Operation of these motors above rated current may cause demagnetization. Contact factory.
- ④ Small signal inductance as measured with impedance bridge at 1kHz, 1 amp.
- ⑤ Thermal resistance measured with motor hanging in still air (unmounted).



MOTIONEERING[®] CD-ROM

For more detailed product and selection information, see the MOTIONEERING CD-ROM inside the back cover of this catalog or visit our website at www.DanaherMotion.com.

PACIFIC SCIENTIFIC T-SERIES NEMA 23 HIGH TORQUE MOTORS



Features

With holding torques to 380 oz-in, (356 lb-in), the T Series provide the highest torques per frame size in the industry—more than 3 and 5 phase designs.

Improved torque linearity (above rated current) provides high peak torque capability (duty cycle dependent, contact factory)

High torque at moderate speeds

Low detent torque harmonic

Rugged "housingless" square frame

Two phase design

Optional encoder mounting provisions

Optional terminal box construction

Wide selection of shaft configurations, terminations, and windings

Benefits

Optimized magnetics provide maximum performance in small envelope, reducing space required for the motor.

Acceleration boost to move loads even faster. Provides more torque for intermittent duty applications.

Cost effective alternative to servo motors

Provides smoother microstepping performance

Efficient use of volume for optimal magnetic circuit

Compatible with most drivers, smoother microstepping, and lower input power required vs. three phase for same torque

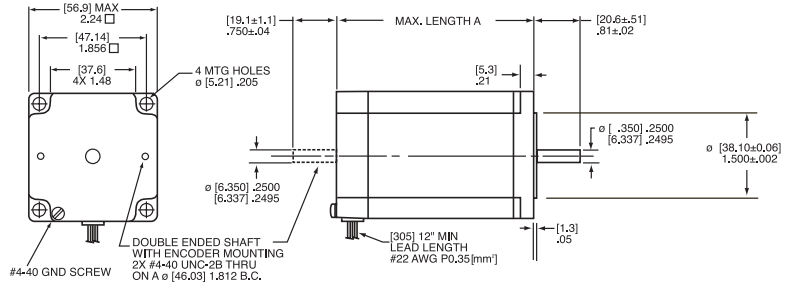
Optimizes control scheme

Enclosed connections for more demanding environments

Standard and custom configurations for cost effective system integration

LEADWIRE HOOKUP MODELS

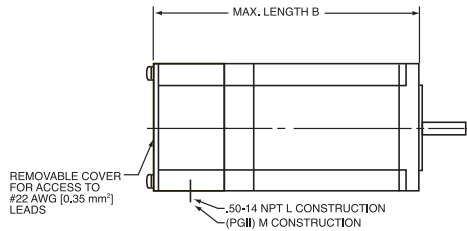
[mm] in



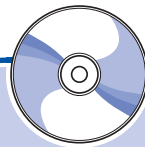
Leaded Motor Model	Max Length A	
	mm	in
T2H	41.6	1.64
T21	56.1	2.21
T22	77.7	3.06
T22	103.1	4.06

TERMINAL BOX CONSTRUCTION

[mm] in.



Leaded Motor Model	Max Length B	
	mm	in
T21	86.6	3.41
T22	108.2	4.26
T22	133.6	5.26



MOTIONEERING® CD-ROM

For more detailed product and selection information, see the MOTIONEERING CD-ROM inside the back cover of this catalog or visit our website at www.DanaherMotion.com.

PACIFIC SCIENTIFIC T-SERIES NEMA 23 HIGH TORQUE MOTORS

RATINGS AND CHARACTERISTICS SEE SYSTEM RECOMMENDATIONS AND DATA ON PAGES 88-89.

Typical Leadwire Motor Model Number	Connection ^①		Holding Torque ^② (2 phases on) oz-in (N-m) ±10%	Rated Current/Phase ^③ (amps DC)	Phase Resistance (ohms) ±10%	Phase Inductance ^④ (mH) Typical	Detent Torque oz-in (N-m)	Thermal Resistance ^⑤ (°C/watt)	Rotor Inertia oz-in-S ² (kgm ² x 10 ⁻³)	Net Weight kg (lbs)
	4 Lead	6 Lead								
T SERIES - 1/2 ROTOR STACK										
T2HNRHK-LNN-NS-00	●		74 (0.52)	5.3	0.19	0.63	2 (0.0141)	6.14	0.00154 (0.0114)	0.5 (1.03)
T2HNRHJ-LNN-NS-00	●		74 (0.52)	4	0.28	1				
T2HNRHL-LNN-NS-00	●		74 (0.52)	2.7	0.64	2.5				
T2HNRDL-LNN-NS-00	●		74 (0.52)	1.1	3.6	16				
T SERIES - 1 ROTOR STACK										
T21NRHK-LNN-NS-00	●		180 (1.27)	5.4	0.23	1.1	3 (0.0212)	4.64	0.0034 (0.0248)	0.7 (1.6)
T21NRHJ-LNN-NS-00	●		180 (1.27)	4.1	0.33	1.8				
T21NRHL-LNN-NS-00	●		180 (1.27)	2.7	0.85	4.6				
T21NRLE-LNN-NS-00	●		180 (1.27)	1.4	3.0	16				
T21NRDL-LNN-NS-00	●		180 (1.27)	1.1	4.9	30				
T SERIES - 2 ROTOR STACK										
T22NRHK-LNN-NS-00	●		280 (1.98)	6.6	0.20	0.85	6 (0.0424)	3.69	0.0056 (0.0408)	1.0 (2.3)
T22NRHJ-LNN-NS-00	●		280 (1.98)	4.1	0.49	2.5				
T22NRHL-LNN-NS-00	●		280 (1.98)	3.3	0.75	3.4				
T22NRGL-LNN-NS-00	●		280 (1.98)	2.5	1.3	7.1				
T22NRLE-LNN-NS-00	●		280 (1.98)	1.5	2.9	17				
T SERIES - 3 ROTOR STACK										
T23NRHK-LNF-NS-00	●		380 (2.68)	6.0	0.28	1.5	7 (0.0494)	3.04	0.0084 (0.0612)	1.5 (3.2)
T23NRHJ-LNF-NS-00	●		380 (2.68)	3.8	0.64	3.9				
T23NRHL-LNF-NS-00	●		380 (2.68)	3.0	1.0	6.2				
T23NRFL-LNF-NS-00	●		380 (2.68)	1.8	2.8	17				
T23NRLE-LNF-NS-00	●		380 (2.68)	1.5	4.1	24				

All ratings typical and at 25°C unless otherwise noted.

① Refer to Selection Guide for more information.

② With rated current applied.

③ Windings at 105°C and motor in still air at 40°C (without heat sink). Operation of these motors above rated current may cause demagnetization. Contact factory.

④ Small signal inductance as measured with impedance bridge at 1 kHz, 1 amp.

⑤ Thermal resistance measured with motor hanging in still air (unmounted).

PACIFIC SCIENTIFIC N&K-SERIES NEMA 34 HIGH TORQUE MOTORS



Features

With holding torques to 5700 oz-in (356 lb-in), the N and K Series provide the highest torques per frame size in the industry—more than 3 and 5 phase designs.

Improved torque linearity (above rated current) provides high peak torque capability (duty cycle dependent, contact factory)

High torque at moderate speeds

Low detent torque harmonic

K Series uses patented Sigmax[®] technology to develop 25% more torque than N Series

Runs cooler than comparable steppers using identical drive parameters

Special rotor design for high acceleration

Rugged "housingless" square frame

Sealed per IP65

Outer bearing races won't turn—front locked (in steel insert) and rear held by O-ring

Extensive selection of shaft configurations, terminations, standard and special windings

Two phase design

Optional encoder mounting provisions

Benefits

Optimized magnetics provide maximum performance in small envelope, reducing space required for the motor.

Acceleration boost to move loads even faster. Provides more torque for intermittent duty applications.

Cost effective alternative to servo motors

Provides smoother microstepping performance

Select from broad performance range to meet your requirement

Longer, more reliable motor life—backed by a two year warranty

Move/position loads fast

Efficient use of volume for optimal magnetic circuit

For splashproof requirements

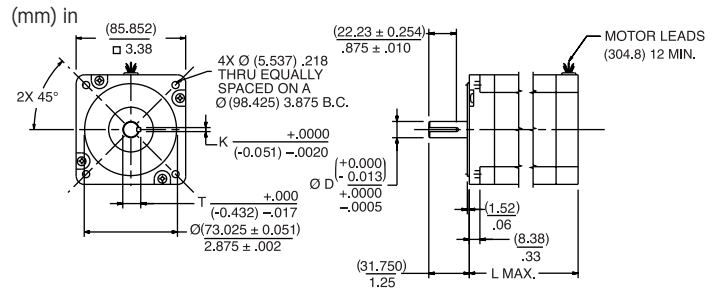
Long life bearings—also prevents axial shaft movement for encoder applications

Match your requirements

Compatible with most drivers, smoother microstepping, and lower input power required vs. three phase for same torque

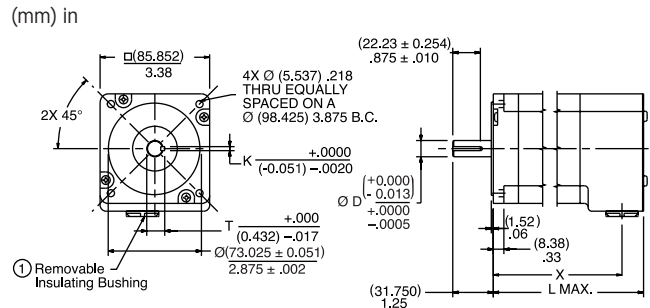
Optimizes control scheme

LEADWIRE HOOKUP MODELS



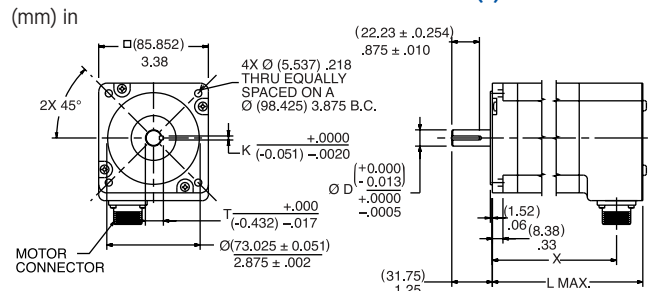
Motor	D	K	T	L MAX
31xR	(12.700) 0.5000	(3.175) 0.1250	(14.097) 0.555	(79.502) 3.13
32xR	(12.700) 0.5000	(3.175) 0.1250	(14.097) 0.555	(118.11) 4.65
33xR	(15.875) 0.6250	(4.763) 0.1875	(17.907) 0.705	(155.70) 6.13
34xR	(15.875) 0.6250	(4.763) 0.1875	(17.907) 0.705	(195.07) 7.68

SPLASHPROOF CONSTRUCTION-TERMINAL BOARD CONNECTIONS



Motor	D	K	T	X	L MAX
31xL	(12.700) 0.5000	(3.175) 0.1250	(14.097) 0.555	(93.98) 3.70	(112.78) 4.44
32xL	(12.700) 0.5000	(3.175) 0.1250	(14.097) 0.555	(132.59) 5.22	(151.38) 5.96
33xL	(15.875) 0.6250	(4.763) 0.1875	(17.907) 0.705	(171.20) 6.74	(89.99) 7.48
34xL	(15.875) 0.6250	(4.763) 0.1875	(17.907) 0.705	(209.55) 8.25	(228.35) 8.99

SPLASHPROOF CONSTRUCTION-MS CONNECTOR(S)



Motor	D	K	T	X	L MAX
31xC	(12.700) 0.5000	(3.175) 0.1250	(14.097) 0.555	(90.42) 3.56	(112.78) 4.44
32xC	(12.700) 0.5000	(3.175) 0.1250	(14.097) 0.555	(128.78) 5.07	(151.38) 5.96
33xC	(15.875) 0.6250	(4.763) 0.1875	(17.907) 0.705	(165.10) 6.59	(89.99) 7.48
34xC	(15.875) 0.6250	(4.763) 0.1875	(17.907) 0.705	(205.99) 8.11	(228.35) 8.99

PACIFIC SCIENTIFIC N&K-SERIES NEMA 34 HIGH TORQUE MOTORS

RATINGS AND CHARACTERISTICS SEE SYSTEM RECOMMENDATIONS AND DATA ON PAGES 90-91.
Motor parameters and winding data.

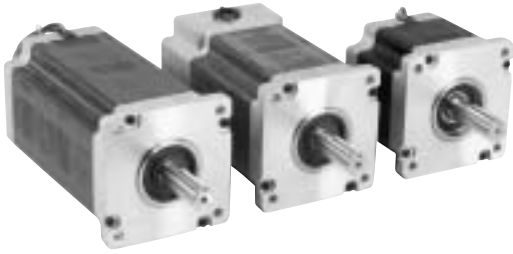
Typical Leadwire Motor Model Number	Connection ^①			Holding Torque ^② (2 phases on) oz-in (N-m) ±10%	Rated Current/Phase ^③ (amps DC)	Phase Resistance (ohms) ±10%	Phase Inductance ^④ (mH) Typical	Detent Torque oz-in (N-m)	Thermal Resistance ^⑤ (°C/watt)	Rotor Inertia oz-in-S ² (kgm ² x 10 ⁻³)	Net Weight kg(lbs)
	Parallel	Series	Unipolar								
K SERIES - SIGMAX[®] 1 ROTOR STACK											
K31HRFL-LNK-NS-00	●			830 (5.86)	8.6	0.18	1.2	25 (0.18)	2.7	0.0202 (0.14)	2.27 (5)
K31HRFL-LNK-NS-00		●		830 (5.86)	4.3	0.72	4.7				
K31HRFL-LNK-NS-00			●	590 (4.16)	6.1	0.36	1.2				
K31HRFK-LNK-NS-00	●			845 (5.96)	6.6	0.29	2.1				
K31HRFK-LNK-NS-00		●		845 (5.96)	3.3	1.16	8.3				
K31HRFK-LNK-NS-00			●	600 (4.23)	4.7	0.58	2.1				
N SERIES - Standard 1 ROTOR STACK											
N31HRFL-LNK-NS-00	●			650 (4.59)	8.6	0.18	1.4	18 (0.13)	2.7	0.0202 (0.14)	2.27 (5)
N31HRFL-LNK-NS-00		●		650 (4.59)	4.3	0.72	5.8				
N31HRFL-LNK-NS-00			●	460 (3.25)	6.1	0.36	1.4				
N31HRFK-LNK-NS-00	●			665 (4.69)	6.6	0.29	2.6				
N31HRFK-LNK-NS-00		●		665 (4.69)	3.3	1.16	10.3				
N31HRFK-LNK-NS-00			●	470 (3.32)	4.7	0.58	2.6				
K SERIES - SIGMAX[®] 2 ROTOR STACK											
K32HRFM-LNK-NS-00	●			1535 (10.83)	10	0.18	1.4	50 (0.35)	2	0.038 (0.27)	3.81 (8.4)
K32HRFM-LNK-NS-00		●		1535 (10.83)	5	0.7	5.5				
K32HRFM-LNK-NS-00			●	1085 (7.66)	7.1	0.35	1.4				
K32HRFL-LNK-NS-00	●			1515 (10.69)	8.1	0.26	2				
K32HRFL-LNK-NS-00		●		1515 (10.69)	4.1	1.03	8.1				
K32HRFL-LNK-NS-00			●	1070 (7.55)	5.8	0.52	2				
N SERIES - Standard 2 ROTOR STACK											
N32HRFM-LNK-NS-00	●			1215 (8.58)	10	0.18	1.8	36 (0.25)	2	0.038 (0.27)	3.81 (8.4)
N32HRFM-LNK-NS-00		●		1215 (8.58)	5	0.7	7				
N32HRFM-LNK-NS-00			●	860 (6.07)	7.1	0.35	1.8				
N32HRFL-LNK-NS-00	●			1200 (8.47)	8.1	0.26	2.6				
N32HRFL-LNK-NS-00		●		1200 (8.47)	4.1	1.03	10.3				
N32HRFL-LNK-NS-00			●	850 (6.00)	5.8	0.52	2.6				
K SERIES - SIGMAX[®] 3 ROTOR STACK											
K33HRFM-LNK-NS-00	●			2150 (15.17)	9.9	0.22	1.7	75 (0.53)	1.6	0.0567 (0.40)	5.39 (11.9)
K33HRFM-LNK-NS-00		●		2150 (15.17)	5	0.87	7				
K33HRFM-LNK-NS-00			●	1520 (10.73)	7	0.44	1.7				
K33HRFL-LNK-NS-00	●			2340 (16.52)	9	0.26	2.6				
K33HRFL-LNK-NS-00		●		2340 (16.52)	4.5	1.06	10.6				
K33HRFL-LNK-NS-00			●	1655 (11.68)	6.3	0.53	2.6				
N SERIES - Standard 3 ROTOR STACK											
N33HRFM-LNK-NS-00	●			1715 (12.10)	9.9	0.22	2.3	54 (0.38)	1.6	0.0567 (0.40)	5.39 (11.9)
N33HRFM-LNK-NS-00		●		1715 (12.10)	5	0.87	9				
N33HRFM-LNK-NS-00			●	1215 (8.58)	7	0.44	2.3				
N33HRFL-LNK-NS-00	●			1845 (13.02)	9	0.26	3.4				
N33HRFL-LNK-NS-00		●		1845 (13.02)	4.5	1.06	13.6				
N33HRFL-LNK-NS-00			●	1305 (9.21)	6.3	0.53	3.4				
K SERIES - SIGMAX[®] 4 ROTOR STACK											
K34HRFM-LNK-NS-00	●			2725 (19.23)	11.3	0.2	2	65 (0.50)	1.3	0.075 (0.53)	6.84 (15.1)
K34HRFM-LNK-NS-00		●		2725 (19.23)	5.6	0.82	8.2				
K34HRFM-LNK-NS-00			●	1930 (13.62)	8	0.41	2				
K34HRFL-LNK-NS-00	●			2790 (19.69)	8.7	0.33	3.6				
K34HRFL-LNK-NS-00		●		2790 (19.69)	4.4	1.32	14.5				
K34HRFL-LNK-NS-00			●	1975 (13.94)	6.2	0.66	3.6				
N SERIES - Standard 4 ROTOR STACK											
N34HRFM-LNK-NS-00	●			2140 (15.10)	11.3	0.2	2.6	57 (0.40)	1.3	0.075 (0.53)	6.84 (15.1)
N34HRFM-LNK-NS-00		●		2140 (15.10)	5.6	0.82	10.6				
N34HRFM-LNK-NS-00			●	1510 (10.66)	8	0.41	2.6				
N34HRFL-LNK-NS-00	●			2180 (15.39)	8.7	0.33	4.7				
N34HRFL-LNK-NS-00		●		2180 (15.39)	4.4	1.32	18.8				
N34HRFL-LNK-NS-00			●	1545 (10.90)	6.2	0.66	4.7				

All ratings typical and at 25°C unless otherwise noted.

- ① Refer to Selection Guide for more information.
- ② With rated current applied.

- ③ Windings at 130°C and motor in still air at 40°C (without heat sink). Operation of these motors above rated current may cause demagnetization. Contact factory.
- ④ Small signal inductance as measured with impedance bridge at 1kHz, 1 amp.
- ⑤ Thermal resistance measured with motor hanging in still air (unmounted).

PACIFIC SCIENTIFIC N&K-SERIES NEMA 42 HIGH TORQUE MOTORS



Features

With holding torques to 5700 oz-in (356 lb-in), the N and K Series provide the highest torques per frame size in the industry— more than 3 and 5 phase designs.

Improved torque linearity (above rated current) provides high peak torque capability (duty cycle dependent, contact factory)

High torque at moderate speeds

Low detent torque harmonic

K Series uses patented Sigmax[®] technology to develop 25% more torque than N Series

Runs cooler than comparable steppers using identical drive parameters

Special rotor design for high acceleration

Rugged "housingless" square frame

Sealed per IP65

Outer bearing races won't turn— front locked (in steel insert) and rear held by O-ring

Extensive selection of shaft configurations, terminations, standard and special windings

Two phase design

Optional encoder mounting provisions

Benefits

Optimized magnetics provide maximum performance in small envelope, reducing space required for the motor.

Acceleration boost to move loads even faster. Provides more torque for intermittent duty applications.

Cost effective alternative to servo motors

Provides smoother microstepping performance

Select from broad performance range to meet your requirement

Longer, more reliable motor life— backed by a two year warranty

Move/position loads fast

Efficient use of volume for optimal magnetic circuit

For splashproof requirements

Long life bearings— also prevents axial shaft movement for encoder applications

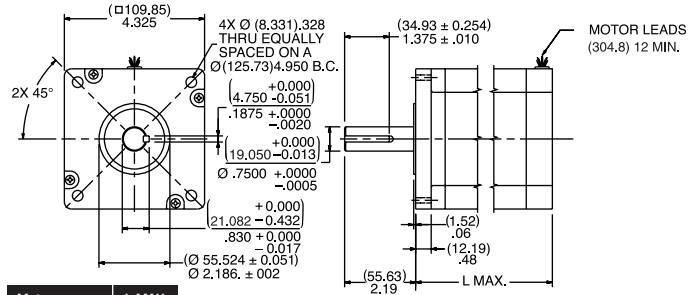
Match your requirements

Compatible with most drivers, smoother microstepping, and lower input power required vs. three phase for same torque

Optimizes control scheme

LEADWIRE HOOKUP MODELS

(mm) in

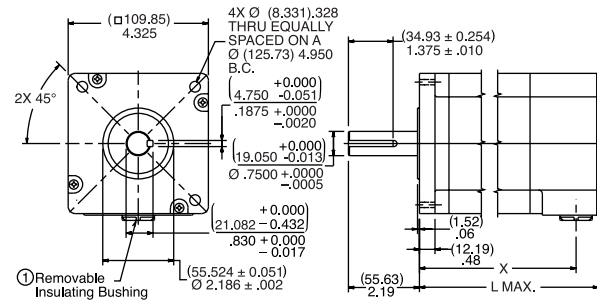


Motor	L MAX
41xx	(98.81) 3.89
42xx	(150.11) 5.91
43xx	(201.17) 7.92

① Motor leads 12.0 Min.

SPLASHPROOF CONSTRUCTION-TERMINAL BOARD CONNECTIONS

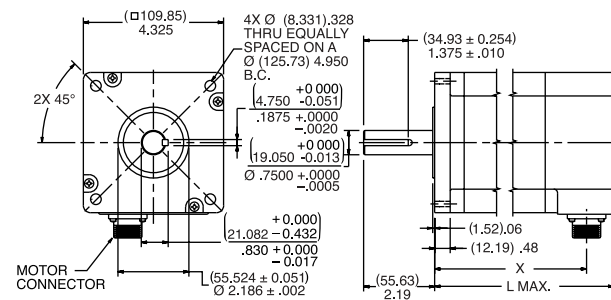
(mm) in



Motor	X	L MAX
41xx	(113.28) 4.46	(132.08) 5.20
42xx	(164.59) 6.48	(183.39) 7.22
43xx	(215.65) 8.49	(234.44) 9.23

SPLASHPROOF CONSTRUCTION-MS CONNECTOR(S)

(mm) in



Motor	X	L MAX
41xx	(109.73) 4.32	(132.08) 5.20
42xx	(160.78) 6.33	(183.39) 7.22
43xx	(212.09) 8.35	(234.44) 9.23

PACIFIC SCIENTIFIC N&K-SERIES NEMA 42 HIGH TORQUE MOTORS

RATINGS AND CHARACTERISTICS SEE SYSTEM RECOMMENDATIONS AND DATA ON PAGE 93.

Motor parameters and winding data.

Typical Leadwire Motor Model Number	Connection ^①			Holding Torque ^② (2 phases on) oz-in (N-m) ±10%	Rated Current/Phase ^③ (amps DC)	Phase Resistance (ohms) ±10%	Phase Inductance ^④ (mH) Typical	Detent Torque oz-in (N-m)	Thermal Resistance ^⑤ (°C/watt)	Rotor Inertia oz-in-S ² (kgm ² x 10 ⁻³)	Net Weight kg (lbs)
	Parallel	Series	Unipolar								
K SERIES - SIGMAX[®] 1 ROTOR STACK											
K41HRFM-LNK-NS-00	●			2135 (15.07)	10.7	0.16	2.2	65 (0.46)	1.9	0.0783 (0.55)	4.98 (11)
K41HRFM-LNK-NS-00		●		2135 (15.07)	5.3	0.63	8.7				
K41HRFM-LNK-NS-00			●	1510 (10.66)	7.5	0.31	2.2				
K41HRFL-LNK-NS-00	●			2090 (14.75)	8.7	0.23	3.1				
K41HRFL-LNK-NS-00		●		2090 (14.75)	4.4	0.93	12.3				
K41HRFL-LNK-NS-00			●	1480 (10.45)	6.2	0.47	3.1				
N SERIES - Standard 1 ROTOR STACK											
N41HRFM-LNK-NS-00	●			1655 (11.68)	10.7	0.16	2.8	42 (0.30)	1.9	0.0783 (0.55)	4.98 (11)
N41HRFM-LNK-NS-00		●		1655 (11.68)	5.3	0.63	11.1				
N41HRFM-LNK-NS-00			●	1170 (8.26)	7.5	0.31	2.8				
N41HRFL-LNK-NS-00	●			1625 (11.47)	8.7	0.23	3.9				
N41HRFL-LNK-NS-00		●		1625 (11.47)	4.4	0.93	15.8				
N41HRFL-LNK-NS-00			●	1150 (8.12)	6.2	0.47	3.9				
K SERIES - SIGMAX[®] 2 ROTOR STACK											
K42HRFM-LNK-NS-00	●			4000 (28.23)	15.8	0.1	1.6	126 (0.89)	1.3	0.1546 (1.09)	8.34 (18.4)
K42HRFM-LNK-NS-00		●		4000 (28.23)	7.9	0.41	6.5				
K42HRFM-LNK-NS-00			●	2830 (19.97)	11.2	0.21	1.6				
K42HRFM-LNK-NS-00	●			4025 (28.41)	9.9	0.25	4.2				
K42HRFM-LNK-NS-00		●		4025 (28.41)	4.9	1.02	16.9				
K42HRFM-LNK-NS-00			●	2845 (20.08)	7	0.51	4.2				
N SERIES - Standard 2 ROTOR STACK											
N42HRFM-LNK-NS-00	●			3130 (22.09)	15.8	0.1	2.1	84 (0.59)	1.3	0.1546 (1.09)	8.34 (18.4)
N42HRFM-LNK-NS-00		●		3130 (22.09)	7.9	0.41	8.4				
N42HRFM-LNK-NS-00			●	2215 (15.63)	11.2	0.21	2.1				
N42HRFM-LNK-NS-00	●			3145 (22.20)	9.9	0.25	5.5				
N42HRFM-LNK-NS-00		●		3145 (22.20)	4.9	1.02	22				
N42HRFM-LNK-NS-00			●	2225 (15.70)	7	0.51	5.5				
K SERIES - SIGMAX[®] 3 ROTOR STACK											
K43HRFM-LNK-NS-00	●			5700 (40.23)	15.4	0.14	2.5	118 (0.83)	1	0.2293 (1.62)	11.64 (25.7)
K43HRFM-LNK-NS-00		●		5700 (40.23)	7.7	0.55	10				
K43HRFM-LNK-NS-00			●	4030 (28.44)	10.9	0.28	2.5				
K43HRFM-LNK-NS-00	●			5630 (39.74)	9.9	0.33	5.9				
K43HRFM-LNK-NS-00		●		5630 (39.74)	4.9	1.32	23.7				
K43HRFM-LNK-NS-00			●	3985 (28.13)	7	0.66	5.9				
N SERIES - Standard 3 ROTOR STACK											
N43HRFM-LNK-NS-00	●			4365 (30.81)	15.4	0.14	3.2	106 (0.75)	1	0.2293 (1.62)	11.64 (25.7)
N43HRFM-LNK-NS-00		●		4365 (30.81)	7.7	0.55	13				
N43HRFM-LNK-NS-00			●	3090 (21.81)	10.9	0.28	3.2				
N43HRFM-LNK-NS-00	●			4320 (30.49)	9.9	0.33	7.7				
N43HRFM-LNK-NS-00		●		4320 (30.49)	4.9	1.32	30.7				
N43HRFM-LNK-NS-00			●	3055 (21.56)	7	0.66	7.7				

All ratings typical and at 25°C unless otherwise noted.

① Refer to Selection Guide for more information.

② With rated current applied.

③ Windings at 130°C and motor in still air at 40°C (without heat sink). Operation of these motors above rated current may cause demagnetization. Contact factory.

④ Small signal inductance as measured with impedance bridge at 1 kHz, 1 amp.

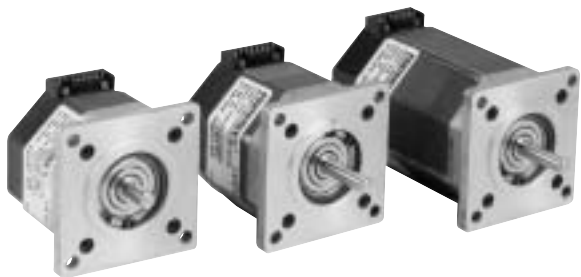
⑤ Thermal resistance measured with motor hanging in still air (unmounted).



MOTIONEERING[®] CD-ROM

For more detailed product and selection information, see the MOTIONEERING CD-ROM inside the back cover of this catalog or visit our website at www.DanaherMotion.com.

POWERMAX II STEPPER SYSTEMS



The performance information shown in the torque/speed curves that follow show the POWERMAX II family of NEMA 23 step motors with windings, connections and current levels selected for maximum performance with the drives shown on this page. For additional assistance in sizing or selecting the stepper system appropriate for your application, contact Danaher Motion Customer Support at 815-226-2222.

POWERMAX II STEPPER SYSTEMS

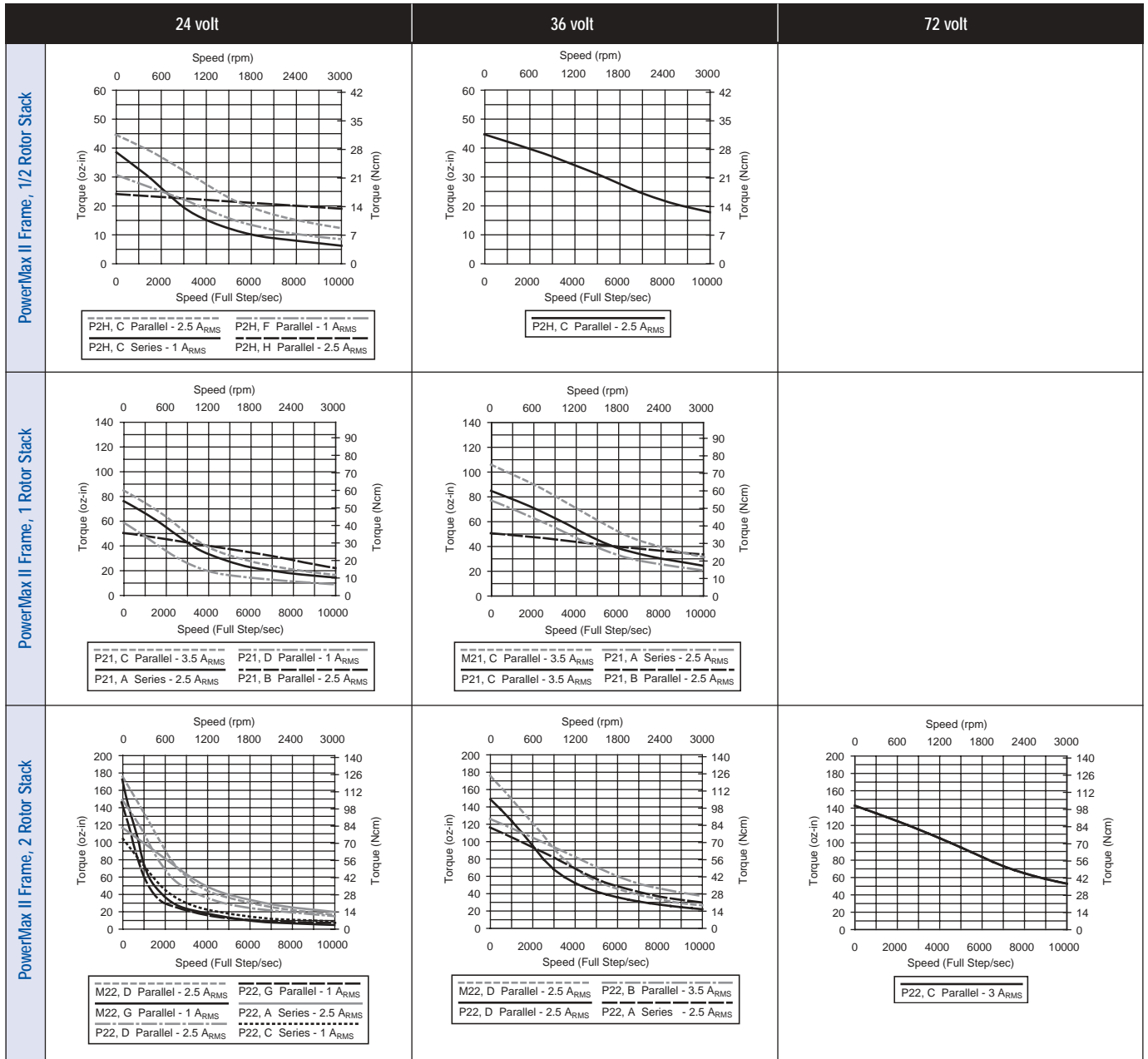
**6210/6215 Microstepping Drives** SEE PAGE 74

- 24-40 VDC input
- Step/direction input or oscillator models
- Current selectable from 1 to 3.5 amps peak
- Microstepping - 4 step sizes

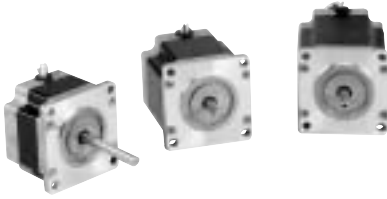
**6410/6415 Microstepping Drives** SEE PAGE 72

- 24-75 VDC input
- Step/direction input or oscillator models
- Current selectable from 0.625 to 7.1 amps peak
- Selectable step sizes, binary or decimal, full to 1/250 or 1/256

POWERMAX II STEPPER SYSTEMS



PACIFIC SCIENTIFIC T-SERIES NEMA 23 STEPPER SYSTEMS



The performance information shown in the torque/speed curves that follow show the T series of NEMA 23 step motors with windings, connections and current levels selected for maximum performance with the drives shown on this page. For additional assistance in sizing or selecting the stepper system appropriate for your application, contact Danaher Motion Customer Support at 815-226-2222.

PACIFIC SCIENTIFIC T-SERIES NEMA 23 STEPPER SYSTEMS



6210/6215 Microstepping Drives SEE PAGE 74

- 24-40 VDC input
- Step/direction input or oscillator models
- Current selectable from 1 to 3.5 amps peak
- Microstepping - 4 step sizes



6410/6415 Microstepping Drives SEE PAGE 72

- 24-75 VDC input
- Step/direction input or oscillator models
- Current selectable from 0.625 to 7.1 amps peak
- Selectable step sizes, binary or decimal, full to 1/250 or 1/256



Impulse Microstepping Drives SEE PAGE 75

- 90-120 VAC input, 160 VDC bus
- Step/direction input
- Programmable inputs/outputs
- Current selectable from 0.75 to 4.0 amps
- Microstepping 200 to 100,000, selectable in increments of 200



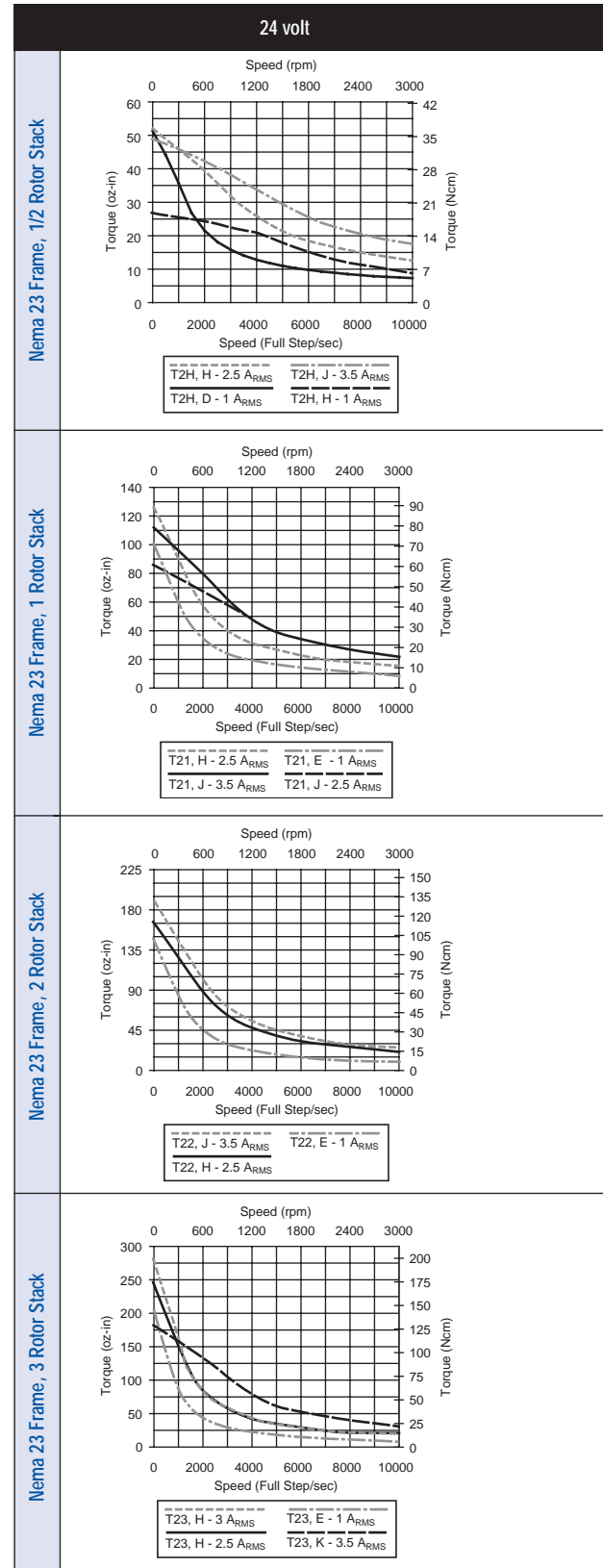
NextStep® Microstepping Drives SEE PAGE 76

- 90-120 VAC input, 160 VDC bus
- Step/direction input
- Current selectable from 0 to 7.9 amps
- 5,000 steps/rev to 50,000 steps/rev microstepping

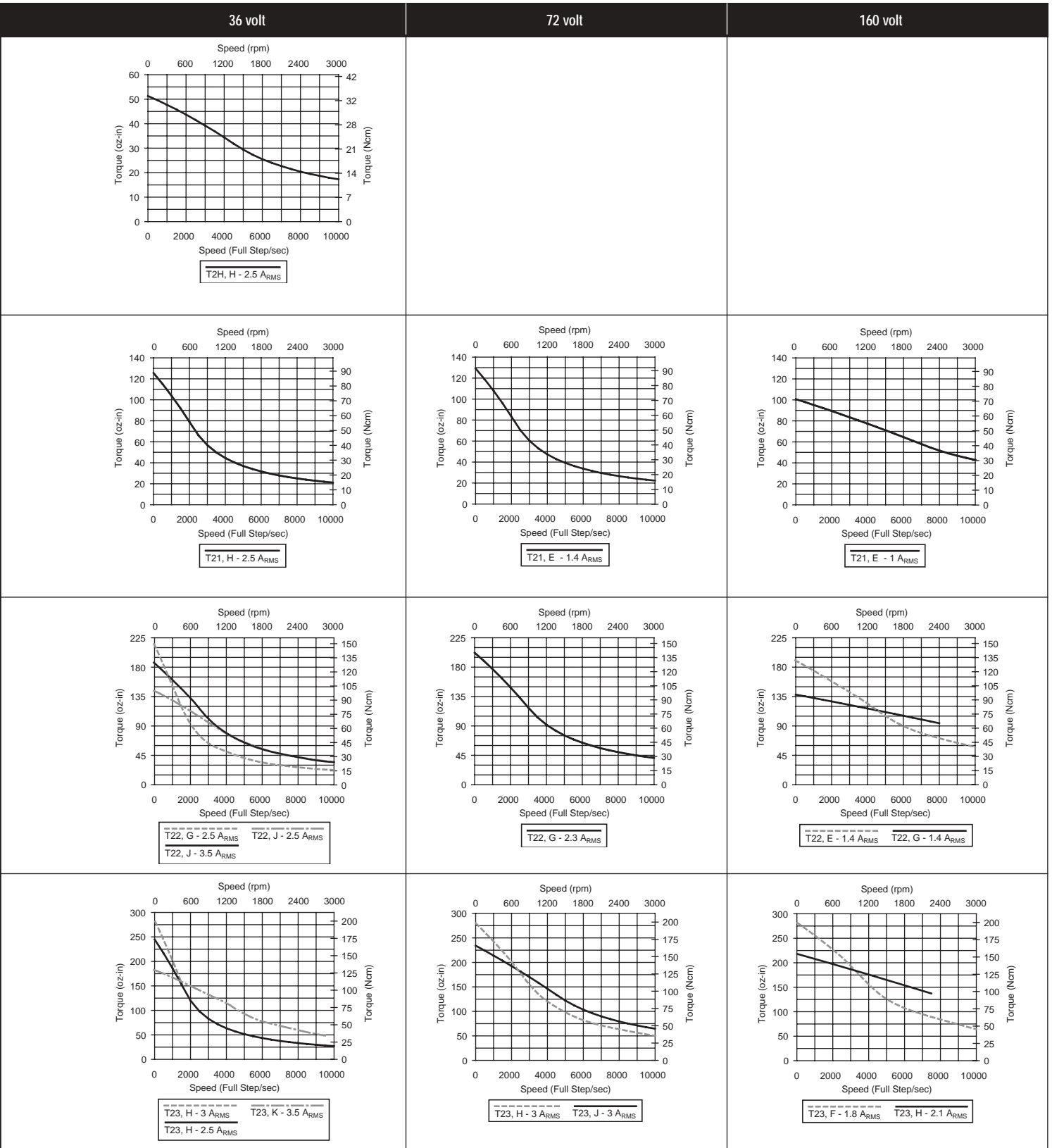


SMARTSTEP Microstepping Drives SEE PAGE 77

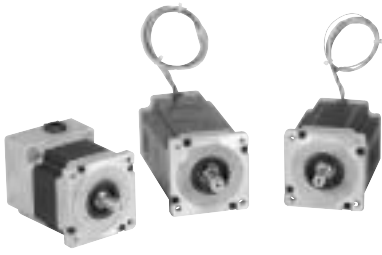
- 90-120 VAC input, 160 VDC bus
- Programmable indexing
- Current selectable from 0 to 7.9 amps
- 36,000 steps/rev microstepping



PACIFIC SCIENTIFIC T-SERIES NEMA 23 STEPPER SYSTEMS



PACIFIC SCIENTIFIC N&K-SERIES NEMA 34 STEPPER SYSTEMS



The performance information shown in the torque/speed curves that follow show the N & K series of NEMA 34 step motors with windings, connections and current levels selected for maximum performance with the drives shown on this page. For additional assistance in sizing or selecting the stepper system appropriate for your application, contact Danaher Motion Customer Support at 815-226-2222.

PACIFIC SCIENTIFIC N&K-SERIES NEMA 34 STEPPER SYSTEMS



6210/6215 Microstepping Drives SEE PAGE 74

- 24-40 VDC input
- Step/direction input or oscillator models
- Current selectable from 1 to 3.5 amps peak
- Microstepping - 4 step sizes



6410/6415 Microstepping Drives SEE PAGE 72

- 24-75 VDC input
- Step/direction input or oscillator models
- Current selectable from 0.625 to 7.1 amps peak
- Selectable step sizes, binary or decimal, full to 1/250 or 1/256



Impulse Microstepping Drives SEE PAGE 75

- 90-120 VAC input, 160 VDC bus
- Step/direction input
- Programmable inputs/outputs
- Current selectable from 0.75 to 4.0 amps
- Microstepping 200 to 100,000, selectable in increments of 200



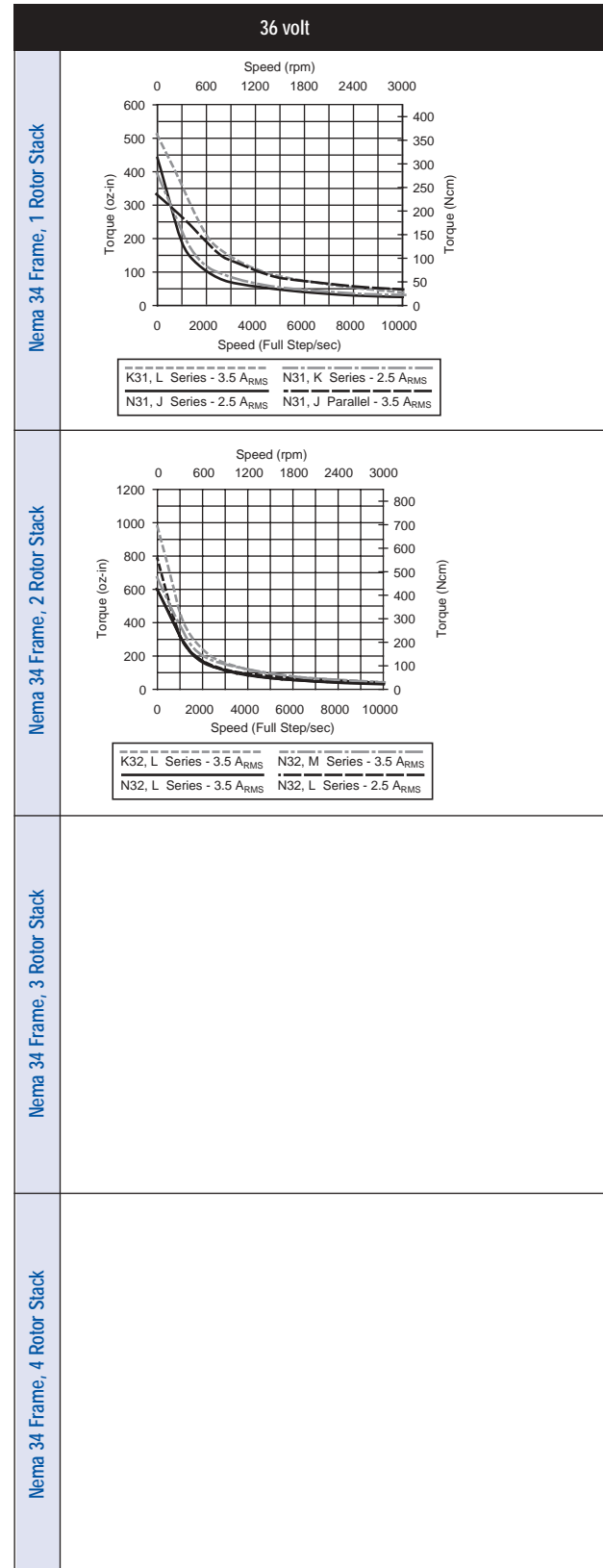
NextStep® Microstepping Drives SEE PAGE 76

- 90-120 VAC input, 160 VDC bus. 240 V model available
- Step/direction input
- Current selectable from 0 to 7.9 amps, to 3.9 A for 240 V model
- 5,000 steps/rev to 50,000 steps/rev microstepping

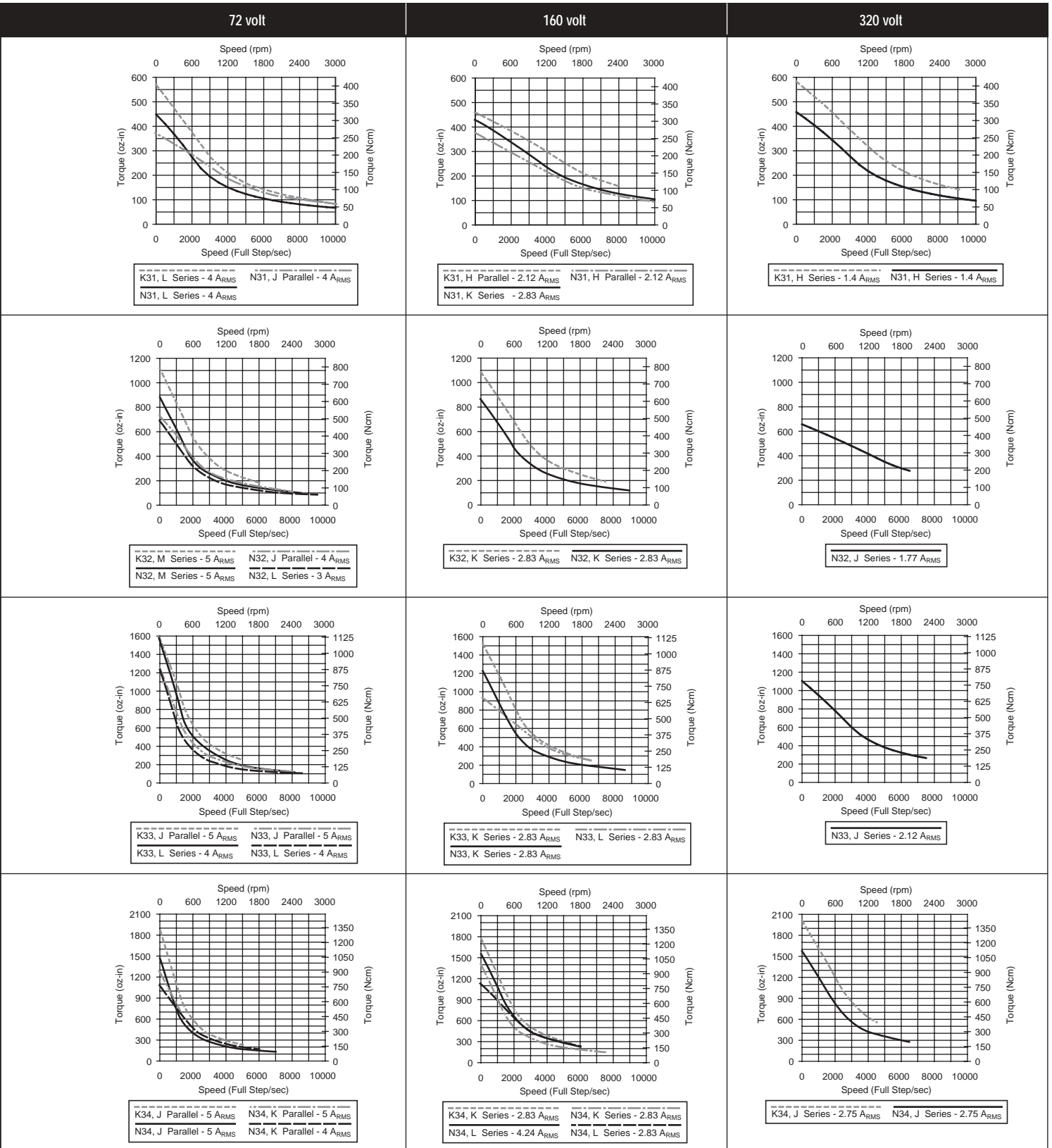


SMARTSTEP Microstepping Drives SEE PAGE 77

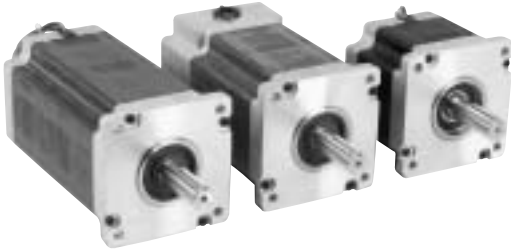
- 90-120 VAC input, 160 VDC bus. 240 V model available
- Programmable indexing
- Current selectable from 0 to 7.9 amps, to 3.9 A for 240 V model
- 36,000 steps/rev microstepping



PACIFIC SCIENTIFIC N&K-SERIES NEMA 34 STEPPER SYSTEMS



PACIFIC SCIENTIFIC N&K-SERIES NEMA 42 STEPPER SYSTEMS



The performance information shown in the torque/speed curves that follow show the N & K series of NEMA 42 step motors with windings, connections and current levels selected for maximum performance with the drives shown on this page. For additional assistance in sizing or selecting the stepper system appropriate for your application, contact Danaher Motion Customer Support at 815-226-2222.

PACIFIC SCIENTIFIC N&K-SERIES NEMA 42 STEPPER SYSTEMS



6410/6415 Microstepping Drives SEE PAGE 72

- 24-75 VDC input
- Step/direction input or oscillator models
- Current selectable from 0.625 to 7.1 amps peak
- Selectable step sizes, binary or decimal, full to 1/250 or 1/256



Impulse Microstepping Drives SEE PAGE 75

- 90-120 VAC input, 160 VDC bus
- Step/direction input
- Programmable inputs/outputs
- Current selectable from 0.75 to 4.0 amps
- Microstepping 200 to 100,000, selectable in increments of 200



NextStep® Microstepping Drives SEE PAGE 76

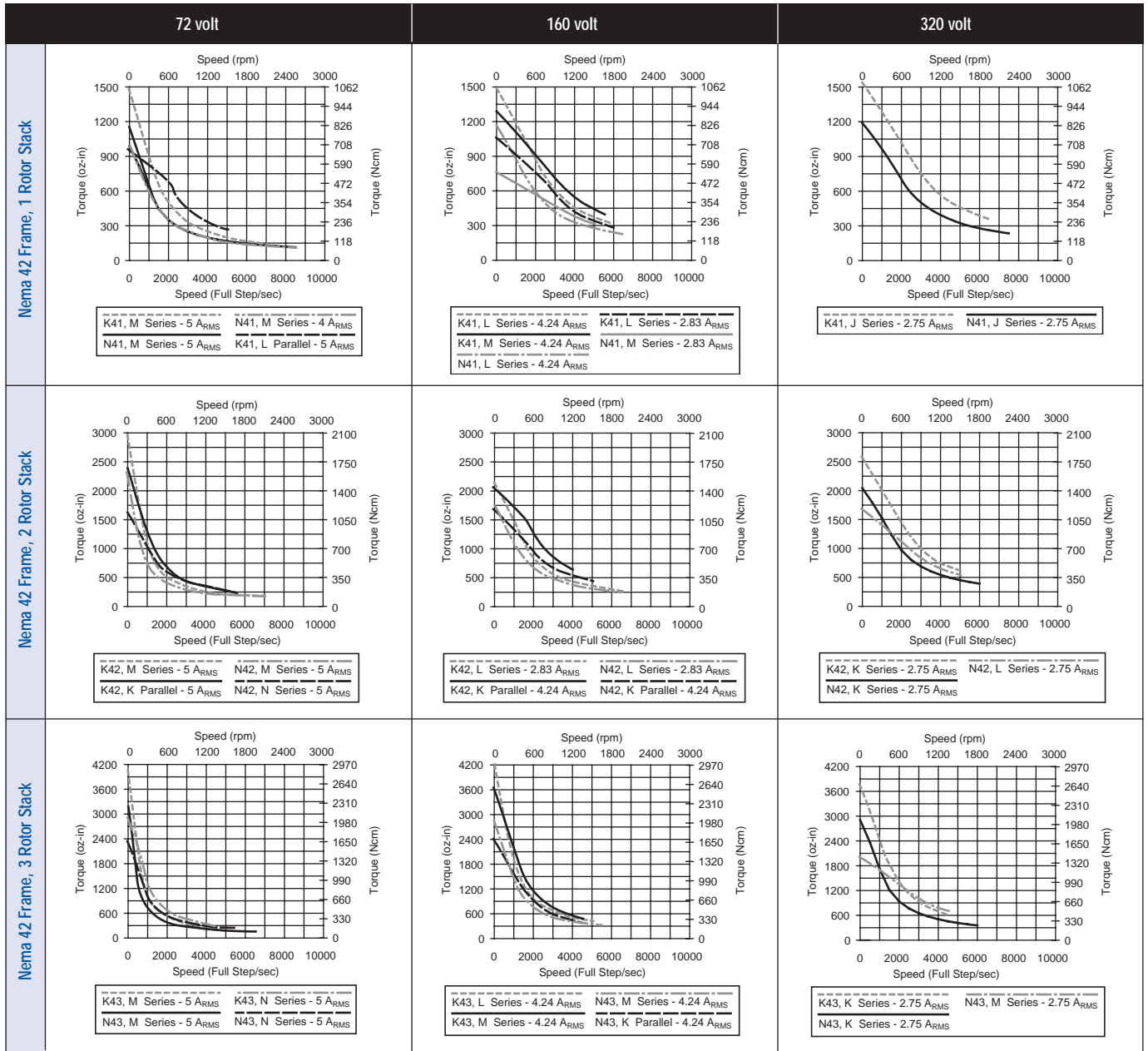
- 90-120 VAC input, 160 VDC bus. 240 V model available
- Step/direction input
- Current selectable from 0 to 7.9 amps, to 3.9 A for 240 V model
- 5,000 steps/rev to 50,000 steps/rev microstepping



SMARTSTEP Microstepping Drives SEE PAGE 77

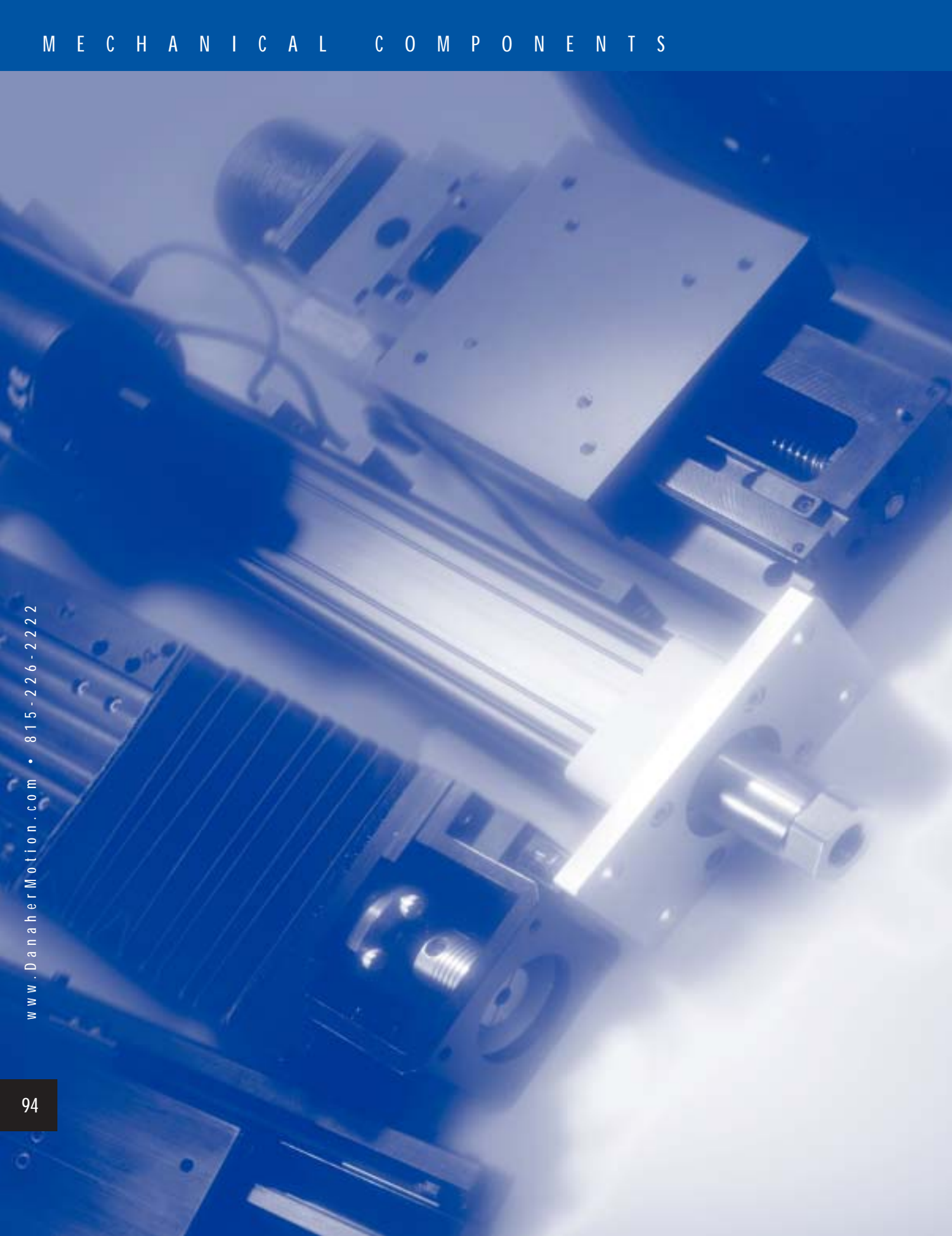
- 90-120 VAC input, 160 VDC bus. 240 V model available
- Programmable indexing
- Current selectable from 0 to 7.9 amps, to 3.9 A for 240 V model
- 36,000 steps/rev microstepping

PACIFIC SCIENTIFIC N&K-SERIES NEMA 42 STEPPER SYSTEMS



MOTIONEERING® CD-ROM

For more detailed product and selection information, see the MOTIONEERING CD-ROM inside the back cover of this catalog or visit our website at www.DanaherMotion.com.





If you're in the need of linear motion components or positioning systems, you've come to the right place. In the pages of this catalog, you will find a sampling of one of the most comprehensive ranges of electric linear actuators, mechanical positioning stages, ball screws, lead screws and rotary positioning systems available from any manufacturer in the world.

ELECTRIC CYLINDERS

Primarily designed to apply a force through an extendable rod, applications for IDC Electric Cylinders have gone from being a clean and efficient replacement for hydraulic actuators and pneumatic cylinders to becoming a common alternative to many types of linear transmissions. A wide variety of mounting and coupling alternatives significantly increases the problem solving potential of IDC Electric Cylinders.



RODLESS ACTUATORS

Need more load carrying capability? Long travel, quiet operation and high moment loading differentiates IDC Rodless Actuators from other mechanical transmissions. The dichotomy of the high-force screw drive option and the high-speed belt option makes these products an ideal solution in many applications.



CARTESIAN SYSTEMS

Let Danaher Motion's experts completely design and, if you wish, assemble a multi-axis electromechanical system for you. IDC Cartesian systems are made by combining our moderate and heavy-duty actuators into 2 and 3-axis linear motion systems covering over 6048 square inches of work area. Put our engineers and technicians to work for you.



POSITIONING STAGES

IDC's family of positioning stages work best where accurate and repeatable motion is critical. IDC offers a wide variety of single and multi-axis configurations, open and closed frame stages, ball screw, lead screw or linear motor driven and overhung and constant-support geometry configurations.



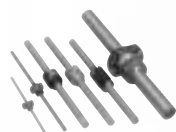
ROTARY TABLES

IDC rotary tables provide high rotary positioning repeatability and accuracy in driven and direct-drive models.



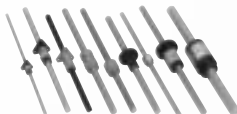
BALL SCREW ASSEMBLIES

For maximum precision and minimum friction, BS&A ball screw assemblies provide a wide range of available linear motion options. With many ball nut mounting configurations and screw precision grades, BS&A offers a ball screw that's right for your needs.



LEAD SCREW ASSEMBLIES

Rolled Acme lead screws are an excellent, economical means of accomplishing linear motion in many applications. For over 15 years, Ball Screws and Actuators has manufactured the highest quality lead screw assemblies. Our precision rolling machines ensure accurate positioning to 0.003 in/ft and our PTFE coating process produces assemblies that have less drag torque and last longer.




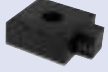
Ball Screws and Actuators provides a large array of standard plastic nut assemblies in anti-backlash or standard Supernut™ designs. For significantly higher loads, standard bronze nuts are available.

With the introduction of our new patent pending Zero-Backlash designs, BS&A provides assemblies with high axial stiffness, zero backlash and the absolute minimum drag torque to reduce motor requirements. These designs produce nuts that cost less, perform better and last longer. Both automatically adjust for wear, insuring zero backlash for the life of the nut.

IDC SELECTION OVERVIEW

ACTUATORS, STAGES

Product Description			Maximum Speed mm/sec (in/sec)(Note 3)
Electric Cylinder Rod Type SEE PAGE 98		Highest Force (Thrust) Clean, Hydraulic Replacement Compact Cross Section Extends into Work Area	1300 (51.3)
Rodless Actuators Screw Drive SEE PAGE 99		Highest Force (Thrust) High Repeatability Long Travel Load Carrying Capability	1000 (40)
Rodless Actuators Belt Drive SEE PAGE 99		Very High Speed Quiet Operation Long Travel Load Carrying Capability	3000 (120)
Cartesian Systems Complete 2 & 3 Axis Assemblies SEE PAGES 100-101		Fully Engineered Multi-Axis Systems Large Work Area – 60x108 inches Multiple & Custom Configurations Long Travel	3000 (120)
Positioning Stages SEE PAGES 102-105		Smoothest Motion High Precision (Straightness & Flatness) Highest Moment Loads High Accuracy XY, XYZ, and XYθ Configurations	1300 (51.3)
Positioning Stages High Precision Ballscrew Stage SEE PAGES 107-109		Smoothest Motion High Accuracy Ideal for Vertical Applications	250 (9.8)
Positioning Stages Linear Shuttle Stage SEE PAGES 110-111		Highest Speed High Accuracy Longest Travel	3000 (120)
Positioning Stages Crossed Roller Ballscrew Stage SEE PAGE 106		Smoothest Motion High Precision High Accuracy Low-Profile Monolithic Design	250 (9.8)

Product Description			Maximum Speed rev/sec (rev/min)
Rotary Table SEE PAGES 104-105		Accuracy to 3 arc minutes Ratios to 36:1 to 180:1 Low Static Torque Low Backlash	1.5 (900) input 0.42 (25) output
Direct Drive Rotary Table SEE PAGES 112-113		Accuracy to 0.6 arc minutes Free of Backlash and Torque Variations Compact Cross-section and Footprint High Precision	10 (600) output

Note 1: Electric Cylinders are designed primarily for thrust applications where loads are supported externally.

Note 2: Thrust ratings are based on mechanical limits rather than motor limits unless indicated.

Note 3: Maximum Speed and Thrust ratings are not necessarily achievable simultaneously.

IDC SELECTION OVERVIEW

ACTUATORS, STAGES

Repeatability mm (in) (Note 5)	Maximum Thrust N (lbs) (Notes 2 & 3)	Maximum Payload N (lbs)	Maximum Travel mm (in)
0.013 (to 0.0005)	25000 (5620)	(Note 1)	1524 (60)
0.013 (to 0.0005)	3110 (to 700)	1335 (300)	2743 (108)
0.1 (to 0.004)	1335 (300)	1335 (300)	2743 (108)
(667) (Note 6)	(1524x2743) (Note6)	to 150	60x108
0.004 (to 0.00016) bi-directional	1041 (to 234)	6592 (to 1482)	1524 (to 60)
0.001 (0.0004) bi-directional	Note 7	185 (407)	250 (10)
0.001 (0.0004) bi-directional	Note 7	75 (165)	915 (36)
0.001 (0.0004) bi-directional	Note 7	80 kg (175)	250x250 (10x10)

Repeatability arc minutes	Axial Load N (lbs)	Radial Load N (lbs)	Diameter mm (in)
0.3	480 (to 214)	152 to 304.8 (to 108)	100 to 305
0.14	980	490	100, 200 (4, 8)

Note 4: Repeatability is dependent on encoder resolution, load, friction, settling time and gain settings in the servo control.
 Note 5: Repeatability is uni-directional unless otherwise specified.
 Note 6: Cartesian systems can be configured using a combination of IDC technologies. Repeatability and Max. Thrust are dependent on the technology selected.
 Note 7: Electric Cylinders and Rodless Actuators are preferred for higher thrust applications. Consult factory for axial load applications requiring precision stages.

www.DanaherMotion.com • 815-226-2222

IDC ELECTRIC CYLINDER

ACTUATORS



IDC ELECTRIC CYLINDER

The year 2000 marked 25 years since IDC pioneered the “electric cylinder” technology as a hydraulic and pneumatic alternative. Twenty-five years of research, design and application experience are represented by IDC’s N Series and EC Series of electric cylinders. The terms robust, flexible and quick delivery are best used to contrast these product lines. Introduced in ‘98, the robust design of IDC’s EC line of electric cylinders delivers industry leading performance and specifications. High grade components are used to create a more durable, reliable and forgiving actuator.

After selling tens of thousands of special and standard N Series cylinders to thousands of customers in hundreds of applications, IDC introduced the next generation N cylinder, the N2. Years of development makes the N2 the industry’s most flexible electric cylinder available. Odds are that if you need it, an N series cylinder has done it.

Flexible – The N2 is IDC’s follow-up to the popular N Series cylinder which has found its way into thousands of applications throughout the world. Regardless of the environment or requirement, IDC has likely solved your application before with a standard or modified N Series cylinders. The new design of the N2 adds improved durability and ease-of-use to the industry’s largest selection of factory engineered options available today.

Robust – The EC series is IDC’s highest performance line of electric cylinders. Designed for the most demanding applications, the EC series is Ideal when the maximum available performance and the longest cycle life are required. Precision rolled ballscrews provide smooth motion, accurate positioning, and quiet operation.

An Electric Cylinder is Preferred When:

- Positioning an externally guided and supported load.
- Moving a load that pivots.
- There is a high concentration of airborne contaminants (rodless actuators are inherently less well protected)
- Replacing a hydraulic or pneumatic cylinder with an electro-mechanical solution.

EC Series

- Highest performance
- Precision rolled ballscrews: for smoothness and accuracy
- Robust: designed for highest loads and longest life possible
- Environmentally sealed (IP54/optional IP65)
- Metric dimensions ISO6431
- Acme screw versions available

N Series

- Smallest package
- Most flexible: (largest selection of factory-engineered options in the industry)
- English NFPA dimensions
- Improved durability
- Quick delivery
- Acme screw versions available

SPECIFICATIONS

	EC2	EC3	EC4	EC5	N2
Thrust					
N (lbs)	3600 (810)	7200 (1620)	12000 (2700)	25000 (5620)	2670 (600)
Speed					
mm/s (in/s)	1280 (50.4)	1280 (50.4)	1330 (52.4)	1330 (52.4)	760 (29.9)
Stroke					
mm (in)	600 (23.6)	750 (29.5)	1500 (59.1)	1500 (59.1)	420 (16.5)



IDC RODLESS ACTUATOR

ACTUATORS



IDC RODLESS ACTUATOR

The name “Rodless Actuator” comes from this technology’s close relationship to Electric Cylinders sharing many of the same components. Rather than having a rod, Rodless Actuators incorporate a carriage supported by linear bearings. Where Electric Cylinders are designed to extend in and out of the work area delivering force or thrust, Rodless Actuators are designed to be load carrying mechanisms (up to 300 lbs) incorporating ballscrew, leadscrew, or belt drive transmissions with optional integrated gearboxes.

Rodless Actuators also share many of the fundamental design characteristics of Precision Positioning Tables . Precision Tables are designed to carry larger payloads and deliver superior repeatability and accuracy performance, Rodless Actuators offer longer travels (up to 108”) and higher speeds (belt drives maximum speed 120 in/sec) at a lower price.

The R Series Rodless Actuator also forms the basis of IDC’s Cartesian products. Rodless Actuators and Electric Cylinders can be combined to form a formidable XYZ positioning solution. See page 100-101.

Use Rodless Actuators (vs. Electric Cylinders) When You Need:

- To position and guide a load for the lowest system cost.
- To save space by eliminating external guides and ways.
- The shortest overall work envelope (extended length equals retracted length).
- To combine multiple units into Cartesian systems.
- To complete, compact linear positioning system.

R Series

- Ballscrew, Acme Screw & Belt Versions
- Integrated load carrying support bearing
- Integrated seal strip
- IDEal system option
- English and metric actuator carriage mounting

SPECIFICATIONS

	R2A Screw Driven	R2A Belt Driven	R3 Screw Driven	R3 Belt Driven	R4 Screw Driven	R4 Belt Driven
Thrust N (lbs)	450 (100)	100	600	200	800	300
Speed mm/s (in/s)	760 (30)	2000 (80)	760 (30)	3000 (120)	1000 (40)	3000 (120)
Travel mm (in)	1830 (72)	1830 (72)	1830 (72)	1830 (72)	2740 (108)	2740 (108)
Loading N (lbs)	220 (50)	220 (50)	440 (100)	440 (100)	1300 (300)	1300 (300)



IDC CARTESIAN SYSTEMS OVERVIEW

ACTUATOR SYSTEMS



IDC CARTESIAN SYSTEMS

Overview

Cartesian Actuator Systems combine R3 or R4 Series rodless actuators to create two and three-axis linear motion systems. Work areas range up to 4 by 8 feet, depending on mechanical configuration, with optional Z-axis options up to 12 inches. IDC offers a complete system, including motors and controls, a driveshaft, interface brackets, and cable track kits. Factory-based engineering services include component selection assistance, CAD drawings of your system, and your choice of shipped assembled, or as components.

Design Services

To assist in the integration process, IDC's engineering staff offers the following:

- Component sizing and part number selection
- System configuration
- Verifying available work area, load/actuator interference checking
- Dimensional/layout drawing of Assembled System
- Shipped as a fully assembled, crated system (optional)

Cartesian Actuator Capabilities

- Speeds up to 120 in/sec
- Payloads from 0 to 150 lb
- Speed/Thrust performance characterized for all cataloged motors
- 2", 3" and 4" Brushless Servo Motors
- NEMA 23, 34, and 42 Step Motors

Custom Capabilities

Consult the factory regarding the following options:

- Larger work areas
- Higher payloads
- Precision planetary gearheads, mounted between motor and actuator, for lower backlash or alternate speed range
- Custom carriage options for special Z-axis or special mounting hole pattern
- Complete Cartesian Systems, pre-assembled by our factory technical staff
- High flex cables for motors, limit switches

MULTI-AXIS INTEGRATION COMPONENTS

Driveshaft

Tubular driveshaft with high torque flexible couplings, available in lengths as required by your application.



Idler/Driven Actuators

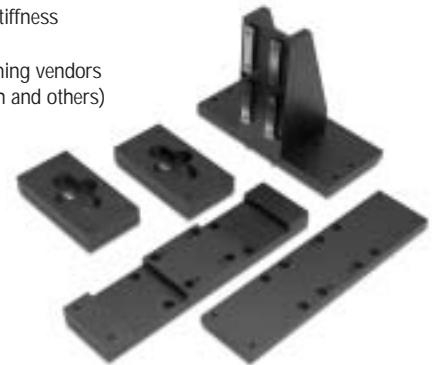
Idler actuators provide external bearing support to build low-cost systems when actuators are mounted less than 15" apart. Driven actuators are used with a driveshaft.



Brackets/Adapters

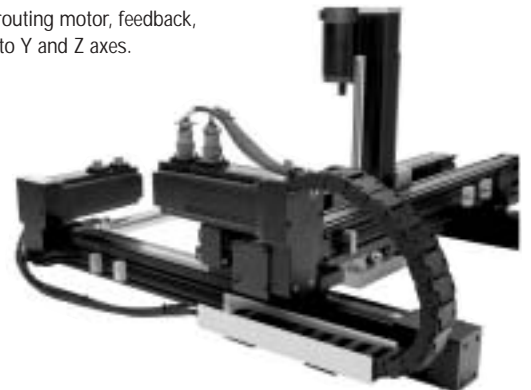
Standard mounting brackets are available for the following:

- Z-axis actuators
- A second Y actuator for added stiffness
- Inverted Y axis actuator(s)
- X-axis adapter to aluminum framing vendors (universal for Item, 80/20, Bosch and others)



Cable Track Kits

Flexible cable track for routing motor, feedback, and limit switch cables to Y and Z axes.



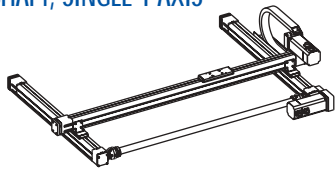
IDC CARTESIAN SYSTEMS OVERVIEW

ACTUATOR SYSTEMS

COMMON SYSTEM TYPES

TYPE 1 - DUAL X WITH DRIVESHAFT, SINGLE Y-AXIS

- Basic Cartesian system
- Driveshaft increases accuracy
- Y-axis travel up to 60" (1.5 m)

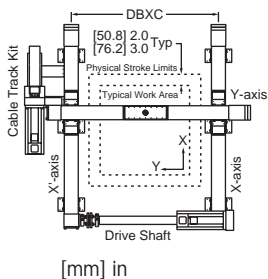


X/X': Two R3 or R4 Series, coupled with driveshaft

Y: One R3 or R4 Series

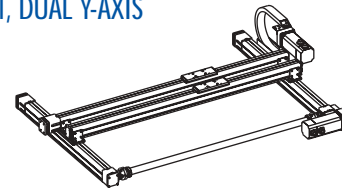
Sample Components List

- X-axis: R3S33V-50T-S-24-AR-ASE
 X'-axis: R3-T-SR-24-ASE
 Y-axis: R3S23V-20T-18-BR-ASE
 Driveshaft: DS-R3-25
 Cable Track: CT-R3-R3-24-B
 Limit Switches: 2 RPI-25 (home),
 4 RP2-25 (end of travel)



TYPE 2 - DUAL X WITH DRIVESHAFT, DUAL Y-AXIS

- Recommended for Z-axis application
- Stiffest Y-axis configuration
- Driveshaft increases accuracy
- Y-axis travel up to 60" (1.5 m)

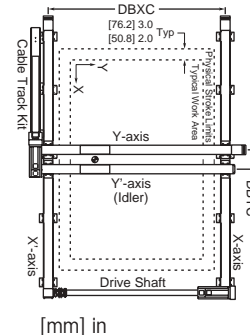


X/X': Two R3 or R4 Series, coupled with driveshaft

Y: Two R3 or R4 Series: One with motor, one Idler

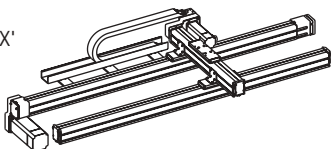
Sample Components List

- X-axis: R3B32-50T-S-60-AR-ASE
 X'-axis: R3-T-SR-60-ASE
 Y-axis: R3B32-50T-S-42-AR-ASE
 Y'-axis: R3-IDLER-42-ASE
 Driveshaft: DS-R3-49
 Cable Track: CT-R3-R3-60-A
 Limit Switches: 2 RPI-25 (home),
 4 RP2-25 (end of travel)
 Mtg. Brackets: 2 MB-2R3-R3 (mounts Y & Y' to X & X' carriages)



TYPE 3 - DUAL X WITH IDLER, SINGLE Y-AXIS

- Lowest cost X-Y system
- 15" max. spacing between X and X'

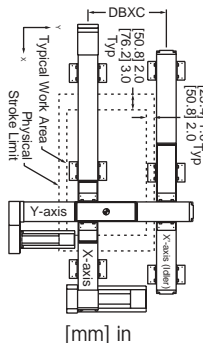


X/X': Two R3 or R4 Series: Screw or belt, one with motor, one Idler

Y: One R3 or R4 Series

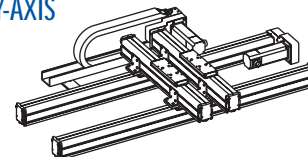
Sample Components List

- X-axis: R4B41-100T-36-CR-ASE
 X'-axis: R4-IDLER-36-ASE
 Y-axis: R4B32-501B-12-PR-ASE
 Driveshaft: Not required
 Cable Track: Optional
 Limit Switches: 2 RPI-25 (home),
 4 RP2-25 (end of travel)
 Mtg. Brackets: 6 MB-R4-AF1 (mounts X & X' to aluminum framing)



TYPE 4 - DUAL X WITH IDLER, DUAL Y-AXIS

- Lowest cost Z-axis capable system
- 15" max. spacing between X and X'
- Increased roll stiffness (Y-axis)

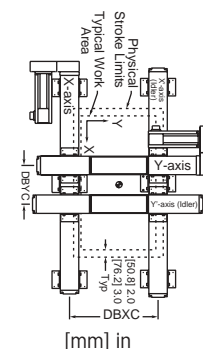


X/X': Two R3 or R4 Series: One with motor, one Idler, screw or belt

Y: Two R3 or R4 Series: One with motor, one Idler

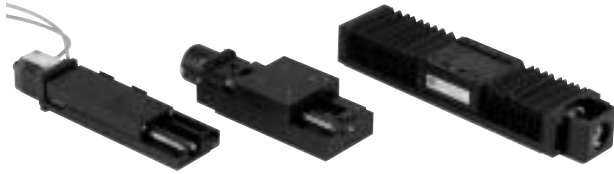
Sample Components List

- X-axis: R3B23-105B-24-PR-ASE
 X'-axis: R3-IDLER-24-ASE
 Y-axis: R3B23-102B-18-PR-ASE
 Y'-axis: R3-IDLER-18-ASE
 Driveshaft: Not required
 Cable Track: Optional
 Limit Switches: 2 RPI-25 (home),
 4 RP2-25 (end of travel)
 Mtg. Brackets: 2 MB-2R3-R3 (mounts Y & Y' to X & X' carriages)



		R3/R3 Driveshaft (Type 1, 2)	R4/R4 Driveshaft (Type 1, 2)	R3/R3 Idler (Type 3, 4)	R4/R4 Idler (Type 3, 4)
Max Travel Area (X by Y)	mm (in)	2750 x 1520 (108 x 60)	2750 x 1520 (108 x 60)	2750 x 610 (108 x 24)	1220 x 610 (48 x 24)
Max. Spacing Between X & X'	mm (in)	1700 (to 67)	1700 (to 67)	380 (to 15)	380 (to 15)
Load Capacity	N (lb)	220 (0-50)	660 (0-150)	220 (0-50)	660 (0-150)
Max. Speed	mm/s (in/s)	3000 (120)	3000 (120)	3000 (120)	3000 (120)
Repeatability (per axis)	mm (in)	±0.004 (±0.10)	±0.004 (±0.10)	±0.004 (±0.10)	±0.004 (±0.10)
Backlash					
20T, 30T models	mm (in)	±0.75 (0.03)	±0.75 (0.03)	±0.75 (0.03)	±0.75 (0.03)
50T, 70T, 100T models	mm (in)	±1.50 (0.06)	±1.50 (0.06)	±1.50 (0.06)	±1.50 (0.06)
Motor Types Available		1.8' Step Motor Brushless Servo	1.8' Step Motor Brushless Servo	1.8' Step Motor Brushless Servo	1.8' Step Motor Brushless Servo

IDC STAGES



IDC STAGES

Do I need a Precision Table?

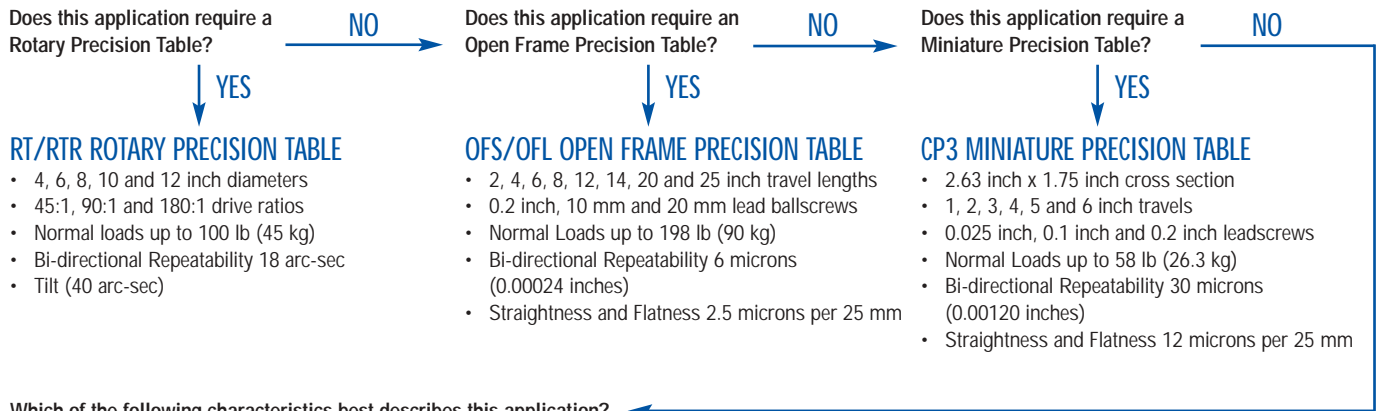
The first step toward choosing the correct motion system for your application, before considering specific performance parameters or technologies, is to consider which type of motion system might be the best fundamental fit for your application goals.

Electric Cylinders are essentially thrust producing devices that are best suited for applications requiring high axial force with the moment and side loads already properly supported. Screw driven Rodless Actuators are also thrust producing devices that are best for axial force applications where the space is limited and a payload must also be supported or carried. As individual components, Rodless Actuators are not well suited for moment loading; however, they can be effectively combined into complete Cartesian Systems for some multi-axis applications. For higher speed, lower thrust applications, Rodless Actuators can be repeatably driven with a timing belt instead of a screw. Linear Motor Actuators are ideal for high throughput applications that require repeatability and high system dynamics. Precision Positioning Tables are best suited for applications where the accuracy and repeatability requirements are more important than axial thrust of the drive train. Precision Positioning Tables can also be used in less precise applications where adequate moment load support is necessary. Precision Positioning Tables are ideal building blocks for complete multi-axis positioning systems.



STAGES SELECTION OVERVIEW

STAGES



Non-recirculating Bearings

- Shorter Travels
- No Heavy Moment Loading
- Cantilevered Top
- Ultra Smooth Motion
- No Heavy Impact Loading
- Acceleration up to 1.0 g

Recirculating Bearings

- Longer Travels
- Moment Loading
- Protective Covers
- Very Smooth Motion
- Impact Loading
- Acceleration up to 2.0 g

Does this application require a small footprint or protective covers? **NO** → Does this application require a wider footprint or longer travel? **NO** → Please refer to the Recirculating Bearing Precision Table Choices.

YES → **PB4 ULTRA PRECISION TABLE**

- 4 inch x 2.5 inch cross section
- 2 and 4 inch travels
- 2.5 mm and 0.2 inch lead ballscrews
- Normal Loads up to 79 lb (35.8 kg)
- Bi-directional Repeatability 6 microns (0.00024 inches)
- Straightness and Flatness 2 microns per 25 mm
- Protective neoprene bellows covers

YES → **CP8 ULTRA PRECISION TABLE**

- 8 inch x 2.5 inch cross section
- 5, 7, 9 and 12 inch travels
- 2.5 mm, 0.2 inch and 0.5 inch lead ballscrews
- Normal Loads up to 279 lb (127 kg)
- Bi-directional Repeatability 6 microns (0.00024 inches)
- Straightness and Flatness 2 microns per 25 mm

Does this application require normal loading or travel up to the following limits? (If the answer to these questions is more, please contact IDC to discuss your application.)

97 lb (44 kg)

RB4A HIGH PRECISION TABLE

- 4 inch x 2.5 inch cross section
- 2, 4, 6, 8, 12 and 16 inches
- 2.5 mm, 0.2 inch and 0.5 inch lead ballscrews
- Normal Loads up to 97 lb (44 kg)
- Bi-directional Repeatability 6 microns (0.00024 inches)
- Straightness and Flatness 2 microns per 25 mm
- Protective neoprene bellows covers

425 lb (193 kg)

RB6 AND RC6 HIGH PRECISION TABLES

- 6 inch x 3.5 inch cross section
- 6, 12, 18, 24, 30, 36, 42 and 48 inch travels
- 0.2 inch, 10 mm and 20 mm lead ballscrews
- Normal Loads up to 425 lb (193 kg)
- Bi-directional Repeatability 6 microns (0.00024 inches)
- Straightness and Flatness 2 microns per 25 mm

1250 lb (567 kg)

RB8 HIGH PRECISION TABLE

- 8 inch x 3.5 inch cross section
- 6, 12, 18, 24, 30, 36, 42, 48, 54 and 60 inch travels
- 0.2 inch, 10 mm and 1.0 inch lead ballscrews
- Normal Loads up to 1250 lb (567 kg)
- Bi-directional Repeatability 6 microns (0.00024 inches)
- Straightness and Flatness 2 microns per 25 mm
- Protective neoprene bellows covers

Which covers are needed?

Protective Bellows

Aluminum Plate

RB6 HIGH PRECISION TABLE

RC6 HIGH PRECISION TABLE

IDC STAGE DATA

STAGES



STAGE DATA

	RTR	OFS/OFL	CP3	PB4	CP8
Type	Rotary Axis	Linear Axis	Linear Axis	Linear Axis	Linear Axis
Series	Precision	Precision	Precision	Ultra Precision	Ultra Precision
Travel or Diameter (in)	4, 6, 8, 10, 12	2, 4, 6, 8, 12, 14, 20, 25	1, 2, 3, 4, 5, 6	2, 4	5, 7, 9, 12
Normal Load (lb)	100	198	up to 58	up to 79	up to 279
Height (in)	2.5	varies	1.75	2.5	2.5
Width (in)	varies with diameter	varies with travel	2.63	4.0	8.0
Drive Screw	Worm Gear	Ballscrew, Leadscrew	Leadscrew	Ballscrew	Ballscrew
Lead or Ratio	45:1, 90:1, 180:1	2 mm, 5 mm, 0.1 mm, 0.2 mm	0.025 in, 0.1 in, 0.2 in	2.5 mm, 0.2 in	2.5 mm, 0.2 in, 0.5 in
Bearing Style	Rotary Recirculating	Non-recirculating	Non-recirculating	Non-recirculating	Non-recirculating
Bearing Type	Ball Bearing or Cross Roller	Ball Bearing	Cross Roller	Cross Roller	Cross Roller
Bi-directional Repeatability	18 arc-sec	6 microns	30 microns	6 microns	6 microns
Straightness & Flatness (Precision Option)	(tilt) 40 arc-sec*	2.5 microns per 25 mm N/A	12 microns per 25 mm N/A	2 microns per 25 mm 1 micron per 25 mm	2 microns per 25 mm 1 micron per 25 mm
Covers	N/A	N/A	N/A	Neoprene Bellows	N/A
Motor Type	Stepper or Servo	Stepper or Servo	Stepper or Servo	Stepper or Servo	Stepper or Servo
NEMA Motor Size	23	23	17 or 23	23	23
Encoder Resolution (um)	N/A	5, 1, 0.5, 0.1	1, 2	1, 2	1, 2

* Tilt is measured instead of Straightness and Flatness for RG Rotary Precision Tables.

IDC STAGE DATA

STAGES



STAGE DATA

	RB4A	RB6	RC6	RB8
Type	Linear Axis	Linear Axis	Linear Axis	Linear Axis
Series	High Precision	High Precision	High Precision	High Precision
Travel or Diameter (in)	2, 4, 6, 8, 12, 16	6, 12, 18, 24, 30, 36, 42, 48	6, 12, 18, 24, 30, 36, 42, 48	6, 12, 18, 24, 30, 36, 42, 48, 54, ??
Normal Load (lb)	97	425	425	1250
Height (in)	2.5	3.5	3.5	3.5
Width (in)	4.0	6.0	6.0	8.0
Drive Screw	Ballscrew	Ballscrew	Ballscrew	Ballscrew
Lead or Ratio	2.5 mm, 0.2 in, 0.5 in	0.2 in, 10 mm, 20 mm	0.2 in, 10 mm, 20 mm	0.2 in, 10 mm, 1.0 in
Bearing Style	Recirculating	Recirculating	Recirculating	Recirculating
Bearing Type	Linear Guideway	Linear Guideway	Linear Guideway	Linear Guideway
Bi-directional Repeatability	6 microns	6 microns	6 microns	6 microns
Straightness & Flatness (Precision Option)	2 microns per 25 mm 1 micron per 25 mm	2 microns per 25 mm 1 micron per 25 mm	2 microns per 25 mm 1 micron per 25 mm	2 microns per 25 mm 1 micron per 25 mm
Covers	Neoprene Bellows	Neoprene Bellows	Aluminum Plate	Neoprene Bellows
Motor Type	Stepper or Servo	Stepper or Servo	Stepper or Servo	Stepper or Servo
NEMA Motor Size	23	23 or 34	23 or 34	34
Encoder Resolution (um)	1, 2	1, 2	1, 2	1, 2

IDC XYRB



Features

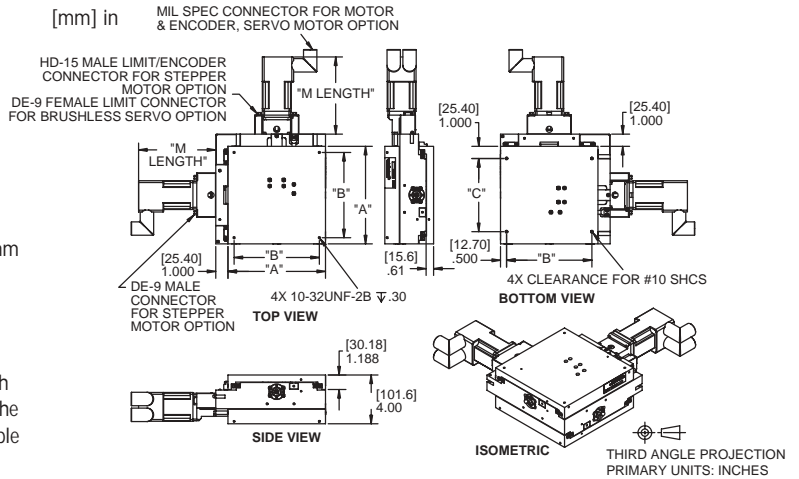
- Low profile, monolithic design
- Precision crossed roller for high stiffness
- High speed, precision ground ballscrews
- Travels from 2" 2" to 10" x 10"
- Stage limits adjustable to any range of motion

IDC XYRB CROSSED ROLLER BALLSCREW STAGE

IDC XYRB crossed roller stages are low profile stages designed for a wide range of applications. Common uses include factory automation, microelectronics assembly, and laser machining. These tables use 3 mm crossed roller ways and provide high stiffness. Precision ground preloaded ballscrews allow higher speeds speeds with excellent repeatability.

The XYRB stages are built using a monolithic, three piece design which precisely locates the critical duplex and radial bearing journals within the massive center section. This design results in the lowest profile available for an X-Y table (4.0"), and "machined-in" orthogonality, which is determined solely by the center section machining.

Both motors are mounted to the center section and move with the lower axis. Pinch cover protection is also standard, eliminating any safety concerns. Motors, couplings, adjustable hall-effect limits, and locking connectors are included. Standard travels range from 2" x 2" to 10" x 10".



Model	A	B	C	Motor Options	M Length
XYRB-4040	4.00	3.00	2.00	Stepper	
XYRB-6060	6.00	5.00	4.00	150 oz-in, 200 step/rev	6.27
XYRB-8080	8.00	7.00	6.00	150 oz-in, 200 step/rev w/Brake	8.05
XYRB-1010	10.00	9.00	8.00	118 oz-in, 400 step/rev	5.45
XYRB-1212	12.00	11.00	10.00	118 oz-in, 400 step/rev w/Brake	7.23
				Brushless Servo	6.34
				Brushless Servo w/Brake	8.12

SPECIFICATIONS

	XYRB-4040	XYRB-6060	XYRB-8080	XYRB-1010	XYRB-1212
SPECIFICATIONS					
Travel (in)	2 x 2	4 x 4	6 x 6	8 x 8	10 x 10
Overall Height (in)	4.0	4.0	4.0	4.0	4.0
Accuracy (microns)	13	15	20	25	30
Bi-directional Repeatability (microns)	1.0	1.0	1.0	1.0	1.0
Load Capacity (kg)	25	35	50	75	80
Axial Load Capacity (kg) ^①	20	20	20	20	20
Moment Load Capacity (N-m) ^②	19	25	34	42	53
Moving Mass					
Upper Axis (kg)	0.5	1.0	1.7	2.5	3.6
Lower Axis (kg)	3.4	6.3	9.2	14.1	20.0
Total Mass (kg)	3.9	7.3	10.9	16.6	23.6
Pitch & Yaw (arc-seconds) ^③	< 20	< 25	< 30	< 35	< 40
Flatness & Straightness (microns) ^③	6	8	10	12	14
Orthogonality (arc seconds)	20	20	20	20	20
OPTIONS					
Ballscrew Lead (mm)	2, 5	2, 5	2, 5	2, 5	2, 5
Motor Stepper (oz-in, 200 step/rev)	150	150	150	150	150
Motor Stepper (oz-in, 400 step/rev)	118	118	118	118	118
Motor Servo, Brushless (oz-in)	61	61	61	61	61
Brake	Optional	Optional	Optional	Optional	Optional
Encoder Stepper (cts/rev) ^④	2000, 4000	2000, 4000	2000, 4000	2000, 4000	2000, 4000

① Upper axis only.
 ② Calculated from centerline of stage table.
 ③ With nominal 2 kg payload.
 ④ Servo motor 2048 cts/rev std.

IDC RBS

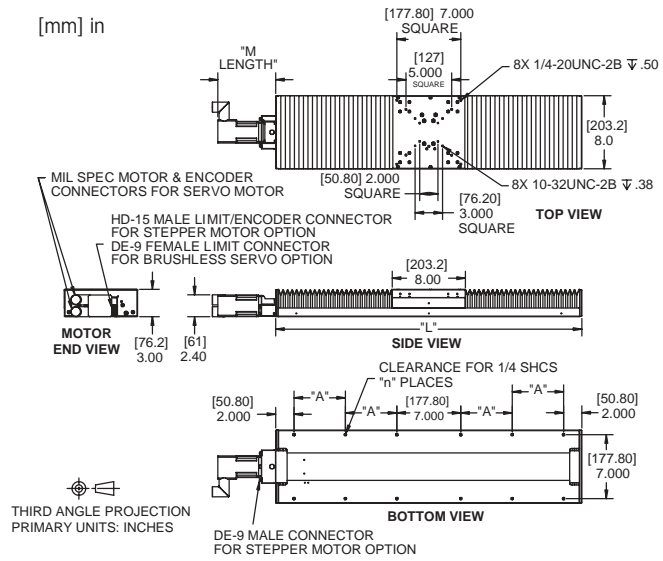


IDC RBS BALLSCREW SHUTTLE STAGE

IDC RBS ballscrew driven stages are a companion line to our SAS™ linear motor stages. Both lines share a common base, bearing guideways, and moving carriage. The principal difference is the actuator; RBS stages employ precision ground ballscrews while SAS stages incorporate linear motors.

RBS stages offer significant mechanical advantages and are better in applications where larger payloads and/or axial forces are present. These include vertically oriented applications for which an optional motor-mounted brake is available.

The ballscrew is available with leads of 2 mm, 5 mm, and 10 mm, providing a wide range of linear resolutions and speeds. The inherent symmetry of its center-mounted design avoids the offset torques present in side-driven stages. Flexible bellows are a standard feature and protect the guideways and ballscrew from environmental dirt and debris. With its compact, 3" x 8" cross-section and space-saving recirculating shuttle design, RBS stages combine high performance positioning with a minimal footprint.



Model	Travel	Length	N	A	Motor Options	M Length
RBS-800	8.00	22	8		Stepper	
RBS-1200	12.00	26	8		150 oz-in, 200 step/rev	6.27
RBS-1800	18.00	32.5	12	7.625	150 oz-in, 200 step/rev w/Brake	8.05
RBS-2400	24.00	39.5	12	9.125	118 oz-in, 400 step/rev	5.45
					118 oz-in, 400 step/rev w/Brake	7.23
					Brushless Servo	6.34
					Brushless Servo w/Brake	8.12
					High Torque Brushless Servo	8.18
					High Torque Brushless Servo w/Brake	9.96

SPECIFICATIONS

	RBS-800	RBS-1200	RBS-1800	RBS-2400
SPECIFICATIONS				
Travel (in)	8	12	18	24
Overall Height (in)	3.0	3.0	3.0	3.0
Accuracy (microns)	9.0	12.0	18.0	24.0
Bi-directional Repeatability (microns)	1.0	1.0	1.0	1.0
Load Capacity (kg)	75	75	75	75
Axial Load Capacity (kg)	35	35	35	35
Moment Load Capacity (N-m) ^①	90	90	90	90
Moving Mass (kg)	5.0	5.0	5.0	5.0
Total Mass (kg)	18	21	25	30
Pitch & Yaw (arc-seconds) ^②	< 15	< 20	< 35	< 30
Flatness & Straightness (microns) ^②	5	7	10	15
OPTIONS				
Ballscrew Lead (mm)	2, 5, 10	2, 5, 10	2, 5, 10	2, 5, 10
Motor Stepper (oz-in, 200 step/rev)	150	150	150	150
Motor Stepper (oz-in, 400 step/rev)	118	118	118	118
Motor Servo, Brushless (oz-in)	61, 192	61, 192	61, 192	61, 192
Brake	Optional	Optional	Optional	Optional
Encoder Stepper (cts/rev) ^③	2000, 4000	2000, 4000	2000, 4000	2000, 4000

① Calculated from centerline of stage table.

② With nominal 2 kg payload.

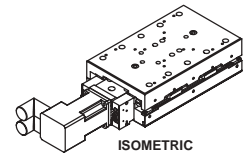
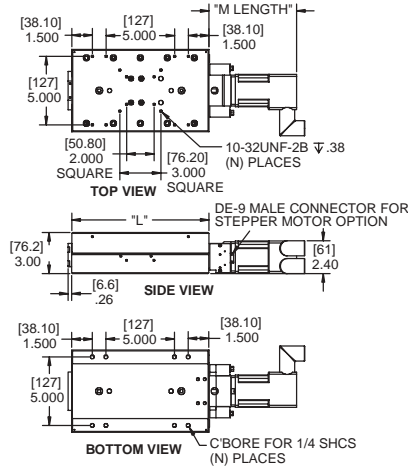
③ Servo motor 2048 cts/rev std.



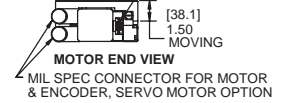
IDC FM HEAVY DUTY BALLSCREW STAGE

IDC FM tables are ideal for applications requiring low angular errors and high speeds. This unit utilizes precision ground interface surfaces and crossed roller ways to achieve exceptionally low angular errors and high stiffness. Its center-driven ballscrew design allows speeds to 500 mm/second, and the stage cross-section is only 3 inches high. The inherent symmetry of its center-driven design avoids offset torques that can be created by side-driven stages. Convenient ballscrew access makes servicing easy, and a way cover provides pinch point protection, eliminating any safety concerns. These units include a motor with coupling, Hall-effect limit sensors, and locking motor and limit/encoder connectors with strain-relieved cables. FM stages are an ideal choice for automation and inspection systems, disk drive testing, and laser machining applications.

[mm] in



HD-15 MALE LIMIT/ENCODER CONNECTOR FOR STEPPER MOTOR OPTION
DE-9 FEMALE LIMIT CONNECTOR FOR BRUSHLESS SERVO OPTION



MIL SPEC CONNECTOR FOR MOTOR & ENCODER, SERVO MOTOR OPTION



THIRD ANGLE PROJECTION
PRIMARY UNITS: INCHES

Model	Travel	L	N
FM-400	4	8.00	4
FM-600	6	10.00	8
FM-800	8	12.00	8

Motor Options	M Length
Stepper	
150 oz-in, 200 step/rev	6.27
150 oz-in, 200 step/rev w/Brake	8.05
118 oz-in, 400 step/rev	5.45
118 oz-in, 400 step/rev w/Brake	7.23
Brushless Servo	6.34
Brushless Servo w/Brake	8.12
High Torque Brushless Servo	8.18
High Torque Brushless Servo w/Brake	9.96

SPECIFICATIONS

	FM-400	FM-600	FM-800
SPECIFICATIONS			
Travel (in)	4	6	8
Overall Height (in)	3.0	3.0	3.0
Accuracy (microns)	8	12	16
Bi-directional Repeatability (microns)	1.0	1.0	1.0
Load Capacity (kg)	125	150	185
Axial Load Capacity (kg)	38	38	38
Moment Load Capacity			
Pitch (N-m)①	100	117	123
Roll (N-m)①	48	62	79
Moving Mass (kg)	0.7	0.9	1.1
Moving Mass (kg)	2.7	3.2	3.6
Total Mass (kg)	6.4	8.2	10.0
Pitch & Yaw (arc-seconds)②	< 10	< 15	< 20
Flatness & Straightness (microns)②	4	6	8
Maximum Ballscrew Speed (rps)	50	50	50
OPTIONS			
Ballscrew Lead (mm)	2, 5	2, 5	2, 5
Motor Stepper (oz-in, 200 step/rev)	150	150	150
Motor Stepper (oz-in, 400 step/rev)	118	118	118
Motor Servo, Brushless (oz-in)	61, 192	61, 192	61, 192
Brake	Optional	Optional	Optional
Encoder Stepper (cts/rev)③	2000, 4000	2000, 4000	2000, 4000

① Calculated from centerline of stage table.
② With nominal 2 kg payload.
③ Servo motor 2048 cts/rev std.

IDC LMB

STAGES

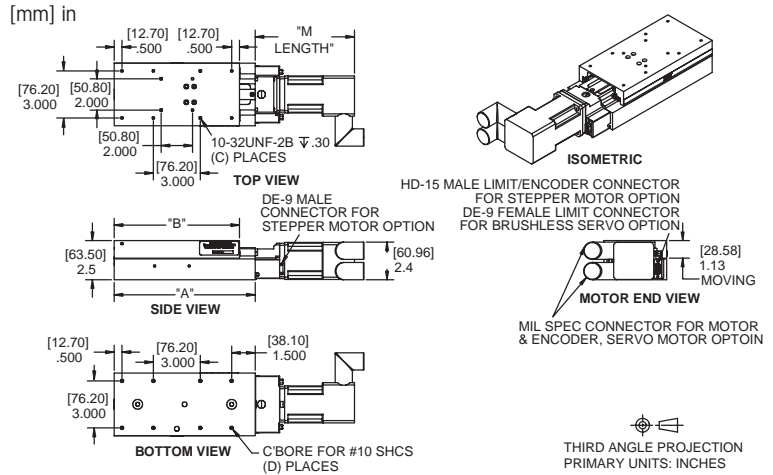


IDC LMB BALLSCREW STAGE

The LMB ballscrew driven positioner is a high performance variant of our popular LM stage, and shares many of its features. These include a compact 2.5" high x 4.0" wide cross-section, as well as base and table mounting hole locations. The principal difference lies in the LMB's incorporation of a precision ground ballscrew as the linear actuator. This delivers a substantial increase in the top speed of the stage, as well as higher acceleration capability. As a result, the LMB series is well suited to applications that seek to maximize throughput (moves per second), and it permits much higher duty cycles than conventional friction screw designs. The centered leadscrew also avoids the offset torques common to stages with side-mounted screws.

The precision ground ballscrew provides higher axial stiffness, as does the high capacity duplex angular contact bearing, resulting in a high natural frequency and excellent servo bandwidth capability. The LMB stage is ideal for vertical orientations for which an optional motor mounted brake is available to prevent back driving. LMB stages feature a monolithic design which machines the critical guideway surfaces and leadscrew bearing bores into a single base, maintaining accurate

alignment throughout the service life. Any two LMB stages can be bolted directly together to form an X-Y configuration without the need for adapter plates. The LMB series is available in travels from 2" to 10" in 2" increments.



Model	Travel	A	B	C	D	Motor Options	M Length
LMB-200	2	5.00	4.00	8	4	Stepper	
LMB-400	4	7.00	6.00	12	8	150 oz-in, 200 step/rev	6.27
LMB-600	6	9.00	8.00	12	8	150 oz-in, 200 step/rev w/Brake	8.05
LMB-800	8	11.00	10.00	12	8	118 oz-in, 400 step/rev	5.45
LMB-1000	10	13.00	12.00	12	8	118 oz-in, 400 step/rev w/Brake	7.23
						Brushless Servo	6.34
						Brushless Servo w/Brake	8.12

SPECIFICATIONS

	LMB-200	LMB-400	LMB-600	LMB-800	LMB-1000
SPECIFICATIONS					
Travel (in)	2	4	6	8	10
Overall Height (in)	2.5	2.5	2.5	2.5	2.5
Accuracy (microns)	13	15	20	25	30
Bi-directional Repeatability (microns)	1.0	1.0	1.0	1.0	1.0
Load Capacity (kg)	25	35	50	75	80
Axial Load Capacity (kg)	20	20	20	20	20
Moment Load Capacity					
Pitch (N-m)①	56	68	68	68	76
Roll (N-m)①	20	27	35	44	55
Moving Mass	0.5	0.7	0.9	1.1	1.4
Total Mass (kg)	2.5	3.2	3.9	4.6	5.2
Pitch & Yaw (arc-seconds)②	< 15	< 20	< 25	< 30	< 35
Flatness & Straightness (microns)②	5	6	8	10	12
OPTIONS					
Ballscrew Lead (mm)	2, 5	2, 5	2, 5	2, 5	2, 5
Motor Stepper (oz-in, 200 step/rev)	150	150	150	150	150
Motor Stepper (oz-in, 400 step/rev)	118	118	118	118	118
Motor Servo, Brushless (oz-in)	62	62	62	62	62
Brake	Optional	Optional	Optional	Optional	Optional
Encoder Stepper (cts/rev)③	2000, 4000	2000, 4000	2000, 4000	2000, 4000	2000, 4000

① Calculated from centerline of stage table.
 ② With nominal 2 kg payload.
 ③ Servo motor 2048 cts/rev std.

IDC SAS



IDC SAS LINEAR MOTOR SHUTTLE STAGE

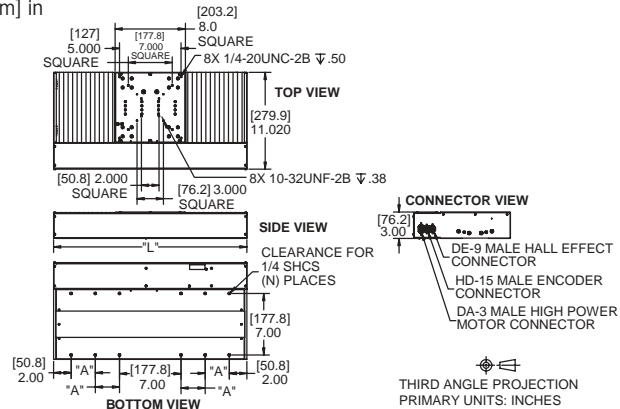
SAS single-axis shuttle stages provide high speed in a very compact design. The stage design uses recirculating bearings to minimize the overall moving envelope. Its brushless linear servo motor allows high speeds with smooth positioning, making it ideal for use in high throughput applications.

Two types of linear motors are available; the SAS-IC stages incorporate ironcore motors while the SAS-IL stages use ironless motors. Each one provides characteristics that are optimal depending on the application. Iron core motors, which have their coils wound on steel laminates, maximize force with a single-sided magnet way. Their high thrust force makes them ideal for accelerating and moving large masses and maintaining position during process forces. Ironless motors have no ferrous material in their coil assemblies, therefore, these motors have zero cogging and no attractive forces between the coil and the magnetic way. These motor characteristics make them ideal for applications which require constant velocity control.

A linear encoder is standard and available in two resolutions. The bearings and lubricants have been optimized for a low and uniform coefficient of friction. Standard units include flexible bellows. The unit's cabling terminates on a static base plate, simplifying external wiring for convenient integration.

Vacuum and signal lines can also be made available on the stationary base plate, and routed to the top plate. These units can be stacked into an X-Y configuration with 15 arc-second orthogonality.

[mm] in



Model	Travel	Length	N	A
SAS-800	8.00	22	8	
SAS-1200	12.00	26	8	
SAS-1800	18.00	32.5	8	7.375
SAS-2400	24.00	39.5	12	9.125
SAS-3600	36.00	53	12	12.5

SPECIFICATIONS

	SAS-IC-800	SAS-IC-1200	SAS-IC-1800	SAS-IC-2400	SAS-IC-3600	SAS-IL-800	SAS-IL-1200	SAS-IL-1800	SAS-IL-2400	SAS-IL-3600
Travel (in)	8	12	18	24	36	8	12	18	24	36
Overall Height (in)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Positional Accuracy (microns)	6	9	11	13	21	6	9	11	13	21
Resolution (microns)	1.0, 0.5	1.0, 0.5	1.0, 0.5	1.0, 0.5	1.0, 0.5	1.0, 0.5	1.0, 0.5	1.0, 0.5	1.0, 0.5	1.0, 0.5
Bi-directional Repeatability	±1 count	±1 count	±1 count	±1 count	±1 count	±1 count	±1 count	±1 count	±1 count	±1 count
Load Capacity (kg)	75	75	75	75	75	75	75	75	75	75
Moment Load Capacity (N·m) ^①	90	90	90	90	90	90	90	90	90	90
Maximum Acceleration (m/s ²) ^②	50	50	50	50	50	40	40	40	40	40
Maximum Velocity (m/s) ^②	3	3	3	3	3	3	3	3	3	3
Moving Mass (kg)	6.6	6.6	6.6	6.6	6.6	5.2	5.2	5.2	5.2	5.2
Total Mass (kg)	20	23	27	32	38	18	21	25	30	36
Pitch & Yaw (arc-seconds)	15	20	25	30	50	15	20	25	30	50
Flatness & Straightness (microns)	3	5	9	13	30	3	5	9	13	30
Motor Force Constant (N/A)	44.6	44.6	44.6	44.6	44.6	16.9	16.9	16.9	16.9	16.9
Fundamental Motor Constant (N/√W)	20.5	20.5	20.5	20.5	20.5	6.6	6.6	6.6	6.6	6.6
Back-emf Constant (V/m/s)	42.0	42.0	42.0	42.0	42.0	13.8	13.8	13.8	13.8	13.8
Coil Resistance (25°C, ohm)	3.0	3.0	3.0	3.0	3.0	3.1	3.1	3.1	3.1	3.1
Coil Inductance (mH)	9.7	9.7	9.7	9.7	9.7	0.65	0.65	0.65	0.65	0.65
Continuous Current (amps)	2.0	2.0	2.0	2.0	2.0	2.6	2.6	2.6	2.6	2.6
Peak Current (amps)	13.7	13.7	13.7	13.7	13.7	14.2	14.2	14.2	14.2	14.2
Continuous Force (N)	120	120	120	120	120	46	46	46	46	46
Peak Force (N)	560	560	560	560	560	240	240	240	240	240
Continuous Power Rating (watts)	35	35	35	35	35	65	65	65	65	65

① Calculated from centerline of stage table.

② Maximum speed and acceleration are load and encoder dependent.

IDC MAG

STAGES



IDC MAG LINEAR MOTOR STAGE

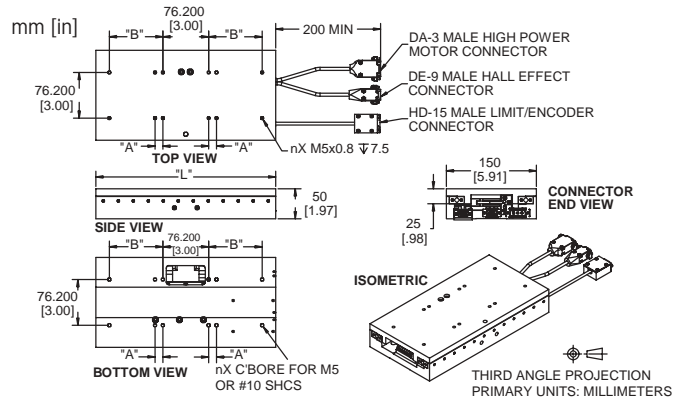
The MAG linear motor stage is a very compact, high performance, direct drive table suitable for use in applications that require high accelerations as well as high performance scanning. The product line has been designed in two versions, the MAG-IC stage, which is best suited for high acceleration point-to-point type moves, and the MAG-IL stage, which is suited for constant velocity applications.

Cross-sections for both MAG-IC and MAG-IL stages are identical at 50 mm tall x 150 mm wide. Any two versions will bolt directly together to form a very stiff, compact X-Y assembly, without the need of adapter plates. MAG stages employ a moving magnet design, which locates all cables and connectors in the stationary base. The absence of any moving cables eliminates motion errors due to cable forces. The precision ground cross roller ways provide high stiffness together with smooth motion, and are capable of supporting torques due to offset loads. Cage creep is eliminated through the use of geared anti-creep cage assemblies.

Two types of linear motors are available; the MAG-IC stages incorporate iron core motors while the MAG-IL stages use ironless motors. Each one

provides characteristics that are optimal depending on the application. Iron core motors, which have their coils wound on steel laminates, maximize force with a single-sided magnet way. Their high thrust force makes them ideal for accelerating and moving large masses and maintaining position during process forces. Ironless motors have no ferrous material in their coil assemblies, therefore, these motors have zero cogging and no attractive forces between the coil and the magnetic way. These motor characteristics make them ideal for applications which require constant velocity control.

The built-in non-contact encoder is available with resolutions of 1.0 micron and 0.5 micron. This encoder plugs directly into Kollmorgen CD and PD products for a complete staging and controller solution, and are available in standard travels of 50 through 250 millimeter in 50 millimeter increments.



Model	Travel	Length	A	B	N
MAG-50	50 (1.97)	200 (7.87)			8
MAG-100	100 (3.94)	250 (9.80)			8
MAG-150	150 (5.91)	300 (11.81)			8
MAG-200	200 (7.87)	350 (13.78)	55.95 (2.20)	114.3 (4.5)	12
MAG-250	250 (9.84)	400 (15.75)	68.75 (2.71)	125.0 (4.92)	12

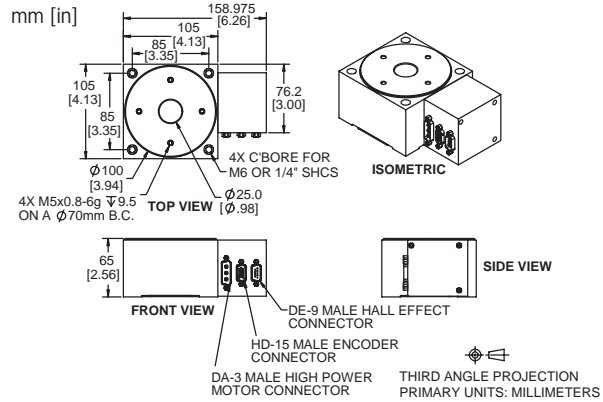
SPECIFICATIONS

	MAG-IC-50	MAG-IC-100	MAG-IC-150	MAG-IC-200	MAG-IC-250	MAG-IL-50	MAG-IL-100	MAG-IL-150	MAG-IL-200	MAG-IL-250
Travel (in)	50	100	150	200	250	50	100	150	200	250
Overall Height (in)	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Accuracy (microns)	3	5	8	10	12	3	5	8	10	12
Resolution (microns)	1.0, 0.5	1.0, 0.5	1.0, 0.5	1.0, 0.5	1.0, 0.5	1.0, 0.5	1.0, 0.5	1.0, 0.5	1.0, 0.5	1.0, 0.5
Bi-directional Repeatability	±1 count	±1 count	±1 count	±1 count	±1 count	±1 count	±1 count	±1 count	±1 count	±1 count
Load Capacity (kg)	35	40	50	65	75	35	40	50	65	75
Moment Load Capacity										
Pitch (N-m) ^①	25	36	47	58	67	25	36	47	58	67
Roll (N-m) ^①	67	73	79	85	92	67	73	79	85	92
Maximum Acceleration (m/s ²) ^②	50	50	50	40	30	30	25	20	18	15
Maximum Velocity (m/s) ^②	3	3	3	3	3	3	3	3	3	3
Moving Mass (kg)	2.4	2.7	3.0	4.0	5.0	3.3	4.1	5.0	5.8	6.6
Total Mass (kg)	3.8	4.8	5.5	6.5	9.0	4.9	5.7	7.2	8.4	9.5
Pitch & Yaw (arc-seconds)	10	15	20	25	25	10	15	20	25	25
Flatness & Straightness (microns)	4	5	7	9	11	4	5	7	9	11
Motor Force Constant (N/A)	26.7	26.7	26.7	26.7	26.7	16.8	16.8	16.8	16.8	16.8
Fundamental Motor Constant (N/√W)	10.0	10.0	10.0	10.0	10.0	4.7	4.7	4.7	4.7	4.7
Back-emf Constant (V/m/s)	22	22	22	22	22	13.7	13.7	13.7	13.7	13.7
Coil Resistance (25°C, ohm)	3.2	3.2	3.2	3.2	3.2	6.1	6.1	6.1	6.1	6.1
Coil Inductance (mH)	9.1	9.1	9.1	9.1	9.1	1.3	1.3	1.3	1.3	1.3
Continuous Current (amps)	2.0	2.0	2.0	2.0	2.0	1.3	1.3	1.3	1.3	1.3
Peak Current (amps)	7.9	7.9	7.9	7.9	7.9	7.1	7.1	7.1	7.1	7.1
Continuous Force (N)	40	40	40	40	40	27	27	27	27	27
Peak Force (N)	170	170	170	170	170	120	120	120	120	120
Continuous Power Rating (watts)	15	15	15	15	15	32.5	32.5	32.5	32.5	32.5

① Calculated from centerline of stage table.

② Maximum speed and acceleration are load and encoder dependent.

IDC DRT-100



IDC DRT-100 DIRECT DRIVE ROTARY STAGE

IDC's DRT-100 Rotary Stage is a compact, direct drive rotary table that establishes a new level of price, performance, and compactness. Its direct drive technology eliminates the gear wear, torque variations, and backlash conventional rotary tables encounter. Speed, resolution, and repeatability are also increased by a factor of ten or more over gear driven rotary tables. Despite its high level of performance, the DRT-100 Stage is very compact, with body dimensions of 105 mm x 105 mm x 65 mm. Its 25 mm through-bore allows convenient routing of optical beam paths or vacuum/pneumatic lines.

The DRT-100 Table offers a standard resolution of 20 micro-radians (~4 arc-seconds, or 0.0011°); due to its direct drive technology, the repeatability is +/- 1 count, or +/- 20 micro-radians. Speeds to 10 revolutions per second, and accelerations to 400 revolutions per second², permit rapid point-to-point moves. Settling times are minimized due to the direct drive design, which allows high servo bandwidths. Unlike other direct drive rotary tables, the electronic interface is completely standard, with digital A Quad B encoder outputs, a standard three phase brushless motor, and three digital Hall commutation sensors. This allows the DRT-100 Stage to be driven by any commercial motion controller/amplifier that can drive standard three phase brushless motors. The 4 point contact ball bearing provides a high degree of axial and torsional stiffness, and a once per revolution index sensor allows a unique home location to be defined.

SPECIFICATIONS

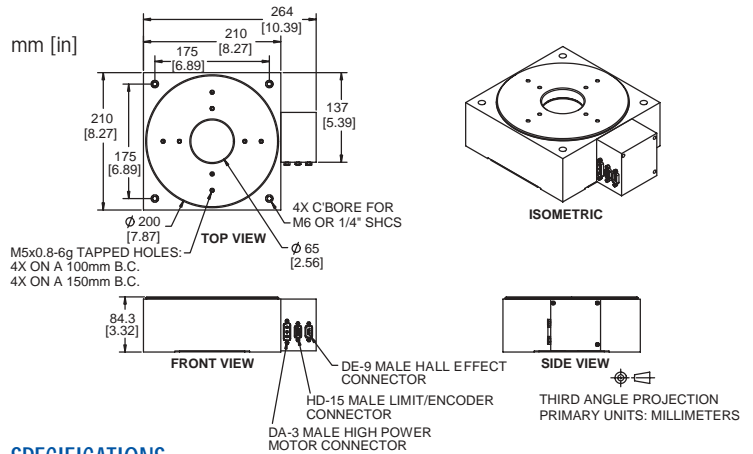
Table Diameter (mm)	100
Through-bore Diameter (mm)	25
Accuracy - uncompensated (micro-radians (arc-seconds))	± 875 (± 180)
Accuracy - compensated (micro-radians (arc-seconds))	± 88 (± 18)
Resolution (micro-radians (arc-seconds))	20 (4)
Bi-directional Repeatability (micro-radians)	± 20
Maximum Speed (rev/sec (MHz))	10 (3.15)
Maximum Acceleration (rev/sec ²) ^①	400
Axial Motion (microns)	< 5
Radial Motion (microns)	< 5
Tilt Motion (micro-radians)	< 100
Axial Load Capacity (N)	400
Radial Load Capacity (N)	200
Moment Load Capacity (N-m) ^②	5
Axial Stiffness (N/m)	0.9 x 10 ⁷
Radial Stiffness (N/m)	0.9 x 10 ⁷
Torsional Stiffness (N-m/radian)	8.0 x 10 ⁴
Total Mass (kg)	2.3
Rotational Inertia (kg-m ²)	8.85 x 10 ⁻⁴
Torque Constant (N-m/amp)	0.49
Motor Constant (N-m/√watt)	0.16
Back-emf Constant (V/rev/sec)	0.42
Coil Resistance (ohms)	6.92
Coil Inductance (mH)	7.5
Continuous Current (amps)	2.4
Peak Current (amps)	6.5
Motor Continuous Torque (N-m)	1.00
Motor Peak Torque (N-m)	2.73
Bearing Torque (N-m)	0.23
Available Continuous Torque (N-m)	0.77
Available Peak Torque (N-m)	2.5

① Maximum speed and acceleration are load and encoder dependent.

② Calculated from centerline of stage table.

IDC DRT-200

STAGES



IDC DRT-200 DIRECT DRIVE ROTARY STAGE

IDC's DRT-200 stage is a high torque, direct drive rotary table that establishes a new level of price, performance, and compactness. Its direct drive technology eliminates the gear wear, torque variations, and backlash found in conventional rotary tables. Speed, resolution, and repeatability are also increased by a factor of ten or more over gear driven tables. Despite its high level of performance, the DRT-200 stage has a lower profile than competing tables, with body dimensions of 210 mm x 210 mm x 84.3 mm. Its 65 mm through-bore allows convenient routing of optical beam paths or vacuum/pneumatic lines. In comparison to our popular DRT-100 rotary table, the DRT-200 stage offers substantially higher peak and continuous torque. Its large diameter, four-point contact main bearing provides increased load capacity and increased axial and torsional stiffness.

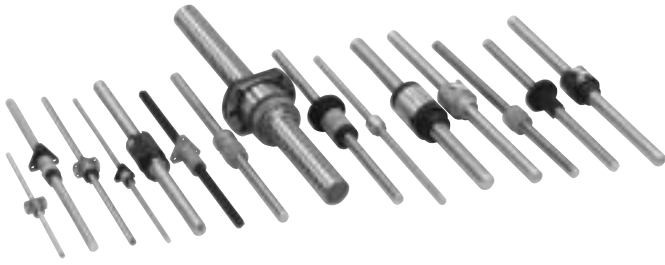
The DRT-200 table offers a standard resolution of 10 micro-radians (~2 arc-seconds, or 0.00051°); due to its direct drive technology, the repeatability is +/- 1 count, or +/- 10 micro-radians. Speeds to 6 revolutions per second, and accelerations to 400 revolutions per second², permit rapid point-to-point moves. Settling times are minimized due to the direct drive design, which allows high servo bandwidths. Unlike many commercial direct drive rotary tables, the electronic interface is completely standard, with digital A Quad B encoder outputs, a standard three phase brushless motor, and three digital Hall commutation sensors. This allows the DRT-200 stage to be driven by any commercial motion controller/amplifier that can drive standard three phase brushless motors. The DRT-200 table is an excellent match for our SERVOSTAR® CD amplifiers, which close fully digital position, velocity, and current loops, and extract maximum performance from this direct drive rotary table.

SPECIFICATIONS

Table Diameter (mm)	200
Through-bore Diameter (mm)	65
Accuracy - uncompensated (micro-radians (arc-seconds))	± 875 (± 180)
Accuracy - compensated (micro-radians (arc-seconds))	± 88 (± 18)
Resolution (micro-radians (arc-seconds))	10 (2)
Bi-directional Repeatability (micro-radians)	± 10
Maximum Speed (rev/sec (MHz))	6 (3.15)
Maximum Acceleration (rev/sec ²) ^①	400
Axial Motion (microns)	< 5
Radial Motion (microns)	< 5
Tilt Motion (micro-radians)	< 100
Axial Load Capacity (N)	980
Radial Load Capacity (N)	490
Moment Load Capacity (N-m) ^②	145.0
Axial Stiffness (N/m)	2.0 x 10 ⁶
Radial Stiffness (N/m)	3.2 x 10 ⁷
Torsional Stiffness (N-m/radian)	5.0 x 10 ⁴
Total Mass (kg)	7.9
Rotational Inertia (kg-m ²)	9.44 x 10 ⁻³
Torque Constant (N-m/amp)	1.09
Motor Constant (N-m/√watt)	0.66
Back-emf Constant (V/rev/sec)	0.14
Coil Resistance (ohms)	2.8
Coil Inductance (mH)	13.0
Continuous Current (amps)	6.2
Peak Current (amps)	48.0
Motor Continuous Torque (N-m)	6.5
Motor Peak Torque (N-m)	27.7
Bearing Torque (N-m)	0.79
Available Continuous Torque (N-m)	5.7
Available Peak Torque (N-m)	26.9

① Maximum speed and acceleration are load and encoder dependent.

② Calculated from centerline of stage table.



PRECISION LEAD SCREWS & SUPERNUTS

Features/Advantages

- Low Cost
 - Considerable savings when compared to ball screw assemblies.
- Variety
 - Largest range of leads and diameters 3/16" to 4" to match your requirements.
- Lubrication
 - Internally lubricated plastic nuts will operate without lubrication. However, additional lubrication or PTFE coating of the screw is recommended. Refer to product selection materials.
- Vibration and Noise
 - No ball recirculating vibration and often less audible noise compared to ball screws.
- Custom
 - Option of custom designs to fit into your design envelope.
- Non-Corrosive (Other materials available on a custom basis.)
 - Stainless Steel and internally lubricated Acetal.
- Environment
 - Less susceptible to particulate contamination compared to ball screws.
- Lightweight
 - Less mass to move.

Design Considerations

- Load
 - Supernuts provide a cost effective solution for moderate to light loads. For vertical applications, anti-backlash supernuts should be mounted with thread/flange on the bottom.
- Cantilevered Loads
 - Cantilevered loads that might cause a moment on the nut will cause premature failure. Refer to Precision Linear Rails in the product selection materials.
- Column Loading
 - Refer to product selection materials.
- Critical Speed
 - Refer to product selection materials.
- Self-Locking
 - Lead screws can be self locking at low leads. Generally, the lead of the screw should be more than 1/3 of the diameter to satisfactorily backdrive.
- Temperature
 - Ambient and friction generated heat are the primary causes of premature plastic nut failure. Observe the temperature limits below and discuss your design with our application engineers for continuous duty, high load and high speed applications. BS&A recommends bronze nuts for very high temperature environments or can aid in your selection of high temperature plastic for a custom assembly.

- Efficiency
 - Except at very high leads, efficiency increases as lead increases. Although the internally lubricated Acetal provides excellent lubricity, Ball Screw Assemblies remain significantly more efficient than any Acme design.
- Length Limitations

3/16" to 1/4"	3'
5/16" to 10 mm	4'
7/16" to 5/8"	6'
>5/8"	12'
- Lead Accuracy

Standard Grade (SRA)	0.010 in/ft
Precision Grade (SPR)	0.003 in/ft

MATERIAL PROPERTIES

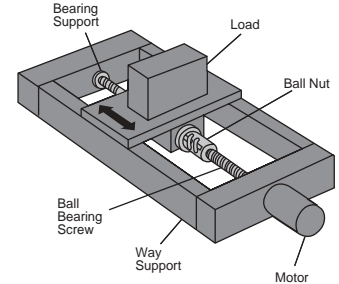
ASSEMBLY		SCREWS	NUTS ^①			
Maximum Temperature	Friction Coefficient	Material	Material	Tensile Strength	Water Absorption (24 hrs %)	Thermal Expansion Coefficient
180°F	0.08-0.14	Stainless Steel	Acetal with PTFE	8,000psi	0.15	5.4 x 10 ⁻⁵ in/in/°F

① Plastic nuts only.

BALL BEARING SCREW SELECTION PROCESS

For the selection of ball bearing screws, BS&A has developed a simplified process. By applying the four steps which follow, the proper size ball bearing screw can readily be selected for most applications. This four step process includes:

1. Determine the load
2. Determine the design life objective
3. Verify safe speed
4. Verify safe compression load

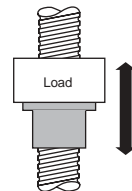


If unique design considerations are encountered in your application, consult the factory for in-depth technical assistance.

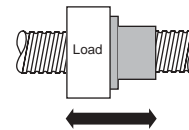
STEP 1. DETERMINE THE LOAD

The key step here is to determine the load "as seen by the screw." Essentially the load applied in a vertical application, such as lifting or jacking, is the same as the weight of the load.

Vertical Application



Horizontal Application



Lifting or pushing an automobile is a good analogy for explaining this relationship. It may be impossible to lift a 3,000 pound automobile, but it is possible to push it. The "load seen" in pushing the auto is the weight of the auto times the coefficient of the friction of the wheels.

The load seen by a ball bearing screw is the weight of the load times the coefficient of the friction of the bearing supports. For example, take a 3,000 pound load supported on way bearings with a coefficient of friction of 0.2. The force required to move the load would be 3,000 lb X 0.2 = 600 lbs This is the load as seen by the screw.

Typical coefficients of friction for various bearing surfaces are:

- Slides/Ways
 - Bronze on steel (lubricated) = 0.16
 - Steel on steel (lubricated) = 0.18
- Bearings
 - Ball bushings = .001
 - Rollerway bushings = 0.005
 - Ball bearing spines = 0.005

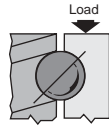
Another practical way to determine the load in an actual application is to attach a spring scale to the load and pull it. Base the load on the moving force required, not on the higher starting (breakaway) force.

STEP 2. DETERMINE THE DESIGN LIFE OBJECTIVE.

The design life objective is the number of inches that a ball bearing nut will travel during the desired life of the machine.

Vertical Application

Example of calculating life in a vertical application:
 Length of stroke: 8 inches
 Cycle rate of machine: 25 strokes/hr.
 Estimated machine operation/day: 16 hrs/day
 Number of working days/year: 225 days
 Number of years machine is designed for: 10 years



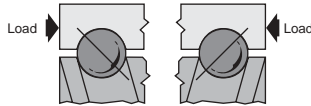
Counting one trip up (8 inches) and one trip down (8 inches) for each cycle the design life objective in this example is:

$$8 \times 2 \times 25 \times 16 \times 225 \times 1 = 14,400,000 \text{ inches}$$

It should be noted that the stroke length must be multiplied by two because the load is always on the same side of the ball groove during both extend and retract strokes.

Horizontal Application

Using the vertical application example it would not be necessary to multiply the 8 inch stroke length by 2 in a horizontal application. The calculation is:



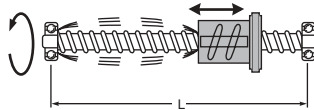
$$8 \times 25 \times 16 \times 225 \times 10 = 7,200,000 \text{ inches}$$

Once the load and design life objective have been determined, refer to the load/life relationship formula on the BS&A website, www.DanaherMotion.com to select the correct unit.

STEP 3. VERIFY SAFE SPEED.

The three factors that determine the safe speed of a ball bearing screw are:

1. Screw diameter
2. Screw length
3. Rigidity of end mountings



A small diameter, long length screw operating at very high speed could develop severe vibrations. Normally, this is not a problem, but should always be checked.

$$\text{rpm} = \frac{\text{travel rate (inches/minute)}}{\text{lead (inches/revolution)}}$$

If safe speed is a concern, first use the most rigid end mounting arrangement. Secondly, use a larger diameter screw.

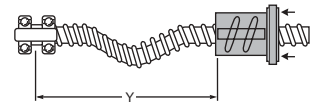
Engineering curves for critical speed comparisons of all models can be found on the BS&A website, www.DanaherMotion.com.

STEP 4. VERIFY SAFE COMPRESSION LOAD

The three factors that determine the safe compression load of a given diameter ball bearing screw are:

1. Length between load point and end bearing
2. Load
3. Rigidity of end mountings

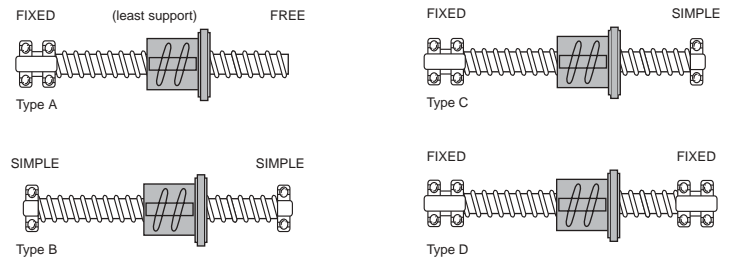
If a sufficiently heavy load is applied to a long ball bearing screw it could buckle. The easiest solution to this problem is to use the most rigid end mounting. The next step is to select the diameter screw.



Engineering curves for compression load comparisons of all models can be found on the BS&A website, www.DanaherMotion.com.

END MOUNTING BEARING SUPPORTS

Four combinations of bearing supports are used throughout this catalog for selection purposes. They are:



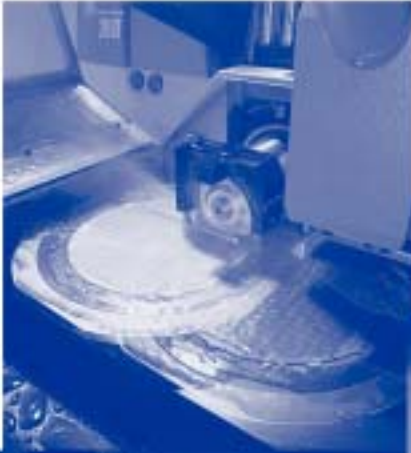
OTHER CONSIDERATIONS

In selecting a ball screw, many factors such as load, length, bearing supports, life, speed, etc., are interrelated. Changing one factor often forces the designer to change another. The selection process consists largely of balancing these factors to arrive at the optimum design.

An example of the interrelationship of design factors is fine lead vs. coarse lead. A fine lead provides better positioning sensitivity and a lower drive torque, but it also results in higher rotary speed. A coarse lead results in a lower rotary speed, but required a higher drive torque which may require a larger motor and related drive components. The chart below presents the effect of change in parameters on common ball bearing screw characteristics.

INCREASE	RESULT
Screw Length	Critical speed decreases Compression load decreases
Screw Diameter	Critical speed increases Inertia increases Compression load increases
Lead	Drive torque increases Angular velocity decreases
End Mounting Rigidity	Critical speed increases Compression load increases
Load	Life decreases
Preload	Positioning accuracy increases System stiffness increases Drag torque increases

WHERE TO APPLY OUR PRODUCTS



As you can see from the breadth of products presented in this catalog, Danaher Motion products work wherever there is motion. From the simple to complex, large to small; from components to complete systems – whatever your machine, we can handle your motion requirements.

On the next few pages you can view where Danaher Motion products fit for a host of machines used in a number of the key markets we serve. Although we've listed four industries here, Danaher Motion products are found in machines in many other industries, including yours.

www.DanaherMotion.com • 815-226-2222

SEMICONDUCTOR APPLICATION SELECTION CHART

	Wafer Handling Robots	Ion Implanters	Deposition - CVD, PVD	CMP Equipment	Wafer Exposure Equipment	Mask Exposure Equipment	Electro-Copper Deposition	Wet Processing	Dry Processing - Etch	Material Handling Systems	Wafer Probers	Dicing Equipment	Die-Bonding	Wire Bonding	Flip-chip Assembly	Packaging Equipment	Assembly Inspection Equipment	IC Test Systems & Handlers
BS&A																		
BS&A Ballscrew Products	•		•	•					•	•							•	•
BS&A Leadscrew Products	•		•						•	•	•						•	•
IDC/NEAT																		
Impulse Microstepping Drive	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
NextStep® Microstepping Drive	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SmartStep Microstepping Drive	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
IDC Electric Cylinder																		
IDC Rodless Actuator																		
IDC Cartesian Systems																		
IDC Stages																		
NEAT XYRB Crossed Roller Ball Stage		•							•	•	•		•	•	•	•	•	•
NEAT RBS Ballscrew Shuttle Stage		•							•	•	•		•	•	•	•	•	•
NEAT FM Heavy-Duty Ballscrew Stage		•							•	•	•		•	•	•	•	•	•
NEAT LMB Ballscrew Stage		•							•	•	•		•	•	•	•	•	•
NEAT SAS Linear Motor Shuttle Stage		•							•	•	•		•	•	•	•	•	•
NEAT MAG Linear Motor Stage		•							•	•	•		•	•	•	•	•	•
NEAT DRT100 Direct Drive Rotary Stage		•							•	•	•		•	•	•	•	•	•
NEAT DRT-200 Direct Drive Rotary Stage		•							•	•	•		•	•	•	•	•	•
Kollmorgen																		
SERVOSTAR® PD Brushless Servo Drives	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Kollmorgen GOLDLINE® XT Brushless Servo Motors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SERVOSTAR CD Brushless Servo Drives	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Kollmorgen GOLDLINE BH Brushless Servo Motors				•					•	•	•						•	
SERVOSTAR 600 Brushless Servo Drives	•			•													•	
Kollmorgen GOLDLINE B Brushless Servo Motors	•	•							•	•	•							
SERVOSTAR S Brushless Servo Drives	•	•							•	•	•							
Kollmorgen GOLDLINE DDR Direct Drive Brushless Servo Motors	•	•		•					•	•	•		•	•	•	•	•	•
PLATINUM® DDL Series Ironless Linear Servo Motors									•	•			•	•	•	•	•	•
PLATINUM DDL Series Ironcore Linear Servo Motors									•	•			•	•	•	•	•	•
PLATINUM DDL ICD Series Ironcore Linear Servo Motor									•	•			•	•	•	•	•	•
Direct Drive Frameless Rotary and Custom Motors and Actuators	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SERVOSTAR SC Single-Axis Control Brushless Servo Drives	•			•					•	•			•	•	•	•	•	•
Custom Controls and Electronics	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
ServoDisc™ Pancake Servo Motors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Pacific Scientific																		
PMA Brushless Servo Motors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
PC800 Brushless Servo Drives	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
PCE800 Brushless Servo Drives	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
PMB Brushless Servo Motors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SC/SCE950 Single-Axis Control Brushless Servo Drives	•			•				•									•	•
6210 Microstepping Drives												•	•	•	•	•	•	•
6215 Microstepping Drives												•	•	•	•	•	•	•
6410 Microstepping Drives												•	•	•	•	•	•	•
6415 Microstepping Drives												•	•	•	•	•	•	•
POWERMAX II Step Motors												•	•	•	•	•	•	•
T Series NEMA 23 Step Motors												•	•	•	•	•	•	•
N & K Series NEMA 34 Step Motors												•	•	•	•	•	•	•
N & K Series NEMA 42 Step Motors												•	•	•	•	•	•	•
AC Synchronous Motors		•	•															
PMDC Motors																		
Portescap																		
Portescap escap DC Servomotors																		
Portescap Small DC Brushless Motors																	•	•
Portescap Turbo Disc Stepper Motors																	•	•
Portescap Precision Gearboxes																	•	•

ELECTRONIC ASSEMBLY APPLICATION SELECTION CHART

	Board Routing Machines	PCB Drilling Machines	Component Placement Machines	Odd-form Component Placement Machines	Screen Printing Equipment	Cleaning Equipment	Lead Forming & Bending Equipment	Conveying Equipment	Pick-and-Place Equipment	Soldering Equipment
BS&A										
BS&A Ballscrew Products									*	*
BS&A Leadscrew Products			*	*	*	*		*	*	
IDC/NEAT										
Impulse Microstepping Drive	*	*	*	*	*			*	*	
NextStep® Microstepping Drive	*	*	*	*	*			*	*	
SmartStep Microstepping Drive	*	*	*	*	*			*	*	
IDC Electric Cylinder									*	
IDC Rodless Actuator			*	*					*	
IDC Cartesian Systems			*	*					*	
IDC Stages		*	*	*					*	
NEAT XYRB Crossed Roller Ball Stage		*	*	*					*	
NEAT RBS Ballscrew Shuttle Stage		*	*	*					*	
NEAT FM Heavy-Duty Ballscrew Stage		*	*	*					*	
NEAT LMB Ballscrew Stage		*	*	*					*	
NEAT SAS Linear Motor Shuttle Stage		*	*	*					*	
NEAT MAG Linear Motor Stage		*	*	*					*	
NEAT DRT100 Direct Drive Rotary Stage		*	*	*					*	
NEAT DRT-200 Direct Drive Rotary Stage		*	*	*					*	
Kollmorgen										
SERVOSTAR® PD Brushless Servo Drives	*	*	*	*	*	*	*	*	*	*
Kollmorgen GOLDLINE® XT Brushless Servo Motors	*	*				*		*		
SERVOSTAR CD Brushless Servo Drives	*	*				*		*		
Kollmorgen GOLDLINE BH Brushless Servo Motors										
SERVOSTAR 600 Brushless Servo Drives										
Kollmorgen GOLDLINE B Brushless Servo Motors										
SERVOSTAR S Brushless Servo Drives										
Kollmorgen GOLDLINE DDR Direct Drive Brushless Servo Motors										
PLATINUM® DDL Series Ironless Linear Servo Motors			*	*				*	*	
PLATINUM DDL Series Ironcore Linear Servo Motors			*	*				*	*	
PLATINUM DDL ICD Series Ironcore Linear Servo Motor			*	*				*	*	
Direct Drive Frameless Rotary and Custom Motors and Actuators	*	*	*	*	*	*	*	*	*	*
SERVOSTAR SC Single-Axis Control Brushless Servo Drives	*	*						*	*	
Custom Controls and Electronics	*	*	*	*	*	*	*	*	*	*
ServoDisc™ Pancake Servo Motors	*	*	*	*			*		*	
Pacific Scientific										
PMA Brushless Servo Motors	*	*	*			*		*		
PC800 Brushless Servo Drives	*	*	*			*		*		
PCE800 Brushless Servo Drives										
PMB Brushless Servo Motors	*	*	*			*		*	*	
SC/SCE950 Single-Axis Control Brushless Servo Drives	*	*						*	*	
6210 Microstepping Drives					*	*	*	*	*	*
6215 Microstepping Drives					*	*	*	*	*	*
6410 Microstepping Drives					*	*	*	*	*	*
6415 Microstepping Drives					*	*	*	*	*	*
POWERMAX II Step Motors					*	*	*	*	*	*
T Series NEMA 23 Step Motors					*	*	*	*	*	*
N & K Series NEMA 34 Step Motors					*	*	*	*	*	*
N & K Series NEMA 42 Step Motors								*		
AC Synchronous Motors										
PMDC Motors										
Portescap										
Portescap escap DC Servomotors									*	
Portescap Small DC Brushless Motors			*	*					*	
Portescap Turbo Disc Stepper Motors			*	*					*	
Portescap Precision Gearboxes			*	*					*	

www.DanaherMotion.com • 815-226-2222

PACKAGING APPLICATION SELECTION CHART

	Adhesive Applicators	Bagging/Sealing Equipment	Blister Equipment	Capping Equipment	Cartoners	Case Packers/Unpackers	Check Weighing Equipment	Coding/Marking Equipment	Conveyers	Accumulators/Unscramblers	Fillers, Dry	Fillers, Liquid	Flow Wrappers	Form/Fill/Seal Equipment	Inductin Sealing Equipment	Labelling Equipment	Palletizing/Depalletizing Equipment	Shrink Wrappers	Stretch Wrappers
BS&A																			
BS&A Ballscrew Products																			
BS&A Leadscrew Products																			
IDC/NEAT																			
Impulse Microstepping Drive	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
NextStep® Microstepping Drive	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SmartStep Microstepping Drive	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
IDC Electric Cylinder									•								•	•	•
IDC Rodless Actuator	•																		
IDC Cartesian Systems	•																		
IDC Stages	•																		
NEAT XYRB Crossed Roller Ball Stage																			
NEAT RBS Ballscrew Shuttle Stage																			
NEAT FM Heavy-Duty Ballscrew Stage																			
NEAT LMB Ballscrew Stage																			
NEAT SAS Linear Motor Shuttle Stage																			
NEAT MAG Linear Motor Stage																			
NEAT DRT100 Direct Drive Rotary Stage																			
NEAT DRT-200 Direct Drive Rotary Stage																			
Kollmorgen																			
SERVOSTAR® PD Brushless Servo Drives	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Kollmorgen GOLDLINE® XT Brushless Servo Motors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SERVOSTAR CD Brushless Servo Drives	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Kollmorgen GOLDLINE BH Brushless Servo Motors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SERVOSTAR 600 Brushless Servo Drives	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Kollmorgen GOLDLINE B Brushless Servo Motors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SERVOSTAR S Brushless Servo Drives	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Kollmorgen GOLDLINE DDR Direct Drive Brushless Servo Motors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
PLATINUM® DDL Series Ironless Linear Servo Motors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
PLATINUM DDL Series Ironcore Linear Servo Motors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
PLATINUM DDL ICD Series Ironcore Linear Servo Motor	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Direct Drive Frameless Rotary and Custom Motors and Actuators	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SERVOSTAR SC Single-Axis Control Brushless Servo Drives	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Custom Controls and Electronics	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
ServoDisc™ Pancake Servo Motors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Pacific Scientific																			
PMA Brushless Servo Motors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
PC800 Brushless Servo Drives	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
PCE800 Brushless Servo Drives	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
PMB Brushless Servo Motors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SC/SCE950 Single-Axis Control Brushless Servo Drives	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6210 Microstepping Drives	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6215 Microstepping Drives	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6410 Microstepping Drives	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6415 Microstepping Drives	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
POWERMAX II Step Motors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
T Series NEMA 23 Step Motors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
N & K Series NEMA 34 Step Motors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
N & K Series NEMA 42 Step Motors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
AC Synchronous Motors																			
PMDC Motors									•				•					•	•
Portescap																			
Portescap escap DC Servomotors																			
Portescap Small DC Brushless Motors									•								•		
Portescap Turbo Disc Stepper Motors									•								•		
Portescap Precision Gearboxes									•								•		

SPECIALTY EQUIPMENT APPLICATION SELECTION CHART

	Assembly Equipment	Cardboard Making Equipment	Carpet Tufting Machines	Document Handling Equipment	Film Processing Equipment	Fitness Equipment	Injection Molding Machines	Medical Imaging Equipment	Medical Monitoring Equipment	Metal Cutting & Forming Machines	Paper Converting Equipment	Printing Machines	Textile Machines	Tire Making Machines
BS&A														
BS&A Ballscrew Products	•	•					•	•		•			•	•
BS&A Leadscrew Products	•	•		•		•		•						
IDC/NEAT														
Impulse Microstepping Drive	•							•		•	•			•
NextStep® Microstepping Drive	•							•		•	•			•
SmartStep Microstepping Drive	•							•		•				•
IDC Electric Cylinder	•									•				•
IDC Rodless Actuator	•									•				
IDC Cartesian Systems	•									•				
IDC Stages	•									•				
NEAT XYRB Crossed Roller Ball Stage	•							•						
NEAT RBS Ballscrew Shuttle Stage	•													
NEAT FM Heavy-Duty Ballscrew Stage	•													
NEAT LMB Ballscrew Stage	•							•						
NEAT SAS Linear Motor Shuttle Stage	•													
NEAT MAG Linear Motor Stage	•							•						
NEAT DRT100 Direct Drive Rotary Stage	•													
NEAT DRT-200 Direct Drive Rotary Stage	•													
Kollmorgen														
SERVOSTAR® PD Brushless Servo Drives	•	•	•		•		•			•	•	•	•	•
Kollmorgen GOLDLINE® XT Brushless Servo Motors	•	•	•		•		•	•		•	•	•	•	•
SERVOSTAR CD Brushless Servo Drives	•	•	•		•		•	•		•	•	•	•	•
Kollmorgen GOLDLINE BH Brushless Servo Motors	•	•	•		•		•			•	•	•	•	•
SERVOSTAR 600 Brushless Servo Drives	•	•	•		•		•			•	•	•	•	•
Kollmorgen GOLDLINE B Brushless Servo Motors	•	•	•		•		•			•	•	•	•	•
SERVOSTAR S Brushless Servo Drives	•	•	•		•		•			•	•	•	•	•
Kollmorgen GOLDLINE DDR Direct Drive Brushless Servo Motors	•						•	•			•	•	•	•
PLATINUM® DDL Series Ironless Linear Servo Motors	•			•	•		•	•						
PLATINUM DDL Series Ironcore Linear Servo Motors	•			•	•		•	•						
PLATINUM DDL ICD Series Ironcore Linear Servo Motor	•			•	•		•	•						
Direct Drive Frameless Rotary and Custom Motors and Actuators	•	•	•	•	•		•	•	•	•	•	•	•	•
SERVOSTAR SC Single-Axis Control Brushless Servo Drives	•	•	•		•		•	•		•	•	•	•	•
Custom Controls and Electronics	•	•	•	•	•	•	•	•	•	•	•	•	•	•
ServoDisc™ Pancake Servo Motors	•	•	•	•	•	•						•	•	•
Pacific Scientific														
PMA Brushless Servo Motors	•	•	•		•		•	•		•	•	•	•	•
PC800 Brushless Servo Drives	•	•	•		•		•	•		•	•	•	•	•
PCE800 Brushless Servo Drives	•	•	•		•		•	•		•	•	•	•	•
PMB Brushless Servo Motors	•	•	•		•		•	•		•	•	•	•	•
SC/SCE950 Single-Axis Control Brushless Servo Drives	•	•	•		•		•	•		•	•	•	•	•
6210 Microstepping Drives	•	•	•	•	•		•	•		•	•	•	•	•
6215 Microstepping Drives	•	•	•	•	•		•	•		•	•	•	•	•
6410 Microstepping Drives	•	•	•	•	•		•	•		•	•	•	•	•
6415 Microstepping Drives	•	•	•	•	•		•	•		•	•	•	•	•
POWERMAX II Step Motors	•	•	•	•	•		•	•		•	•	•	•	•
T Series NEMA 23 Step Motors	•	•	•	•	•		•	•		•	•	•	•	•
N & K Series NEMA 34 Step Motors	•	•	•	•	•		•	•		•	•	•	•	•
N & K Series NEMA 42 Step Motors	•	•	•	•	•		•	•		•	•	•	•	•
AC Synchronous Motors												•		
PMDC Motors	•					•		•		•				
Portescap														
Portescap escap DC Servomotors														
Portescap Small DC Brushless Motors	•			•				•					•	
Portescap Turbo Disc Stepper Motors	•			•				•					•	
Portescap Precision Gearboxes	•			•				•					•	

THE COMPLETE WORLD OF DANAHER MOTION

BORN TO RUN.

Danaher Motion has designed and manufactured precision electromechanical positioning systems for a multitude of motion control applications. Our engineers are uniquely capable of combining servo and stepper technologies with precision mechanics to deliver solutions to a variety of positioning system challenges.

By incorporating the latest in design and manufacturing techniques we have been able to deliver unsurpassed performance to a broad range of applications. Expertise in high precision environments combined with worldwide manufacturing efficiencies position Danaher Motion to provide the optimal motion control solutions.

And while we offer a world-class stepper and servo product portfolio, we also produce many special motors designed for unique applications. The following pages describe more best-in-class specialty motors available from Danaher Motion for your particular requirements. For further detail, please visit www.DanaherMotion.com





Portescap

A WORLD OF PRECISION – IN MINIATURE



Think small. Then think very, very versatile. That's precisely the driving force behind the high performance miniature motors manufactured by Portescap. Wherever motors of small size, high efficiency, and/or exceptional dynamic motion are required, you'll find the electromagnetic and micro mechanics competencies of Portescap.



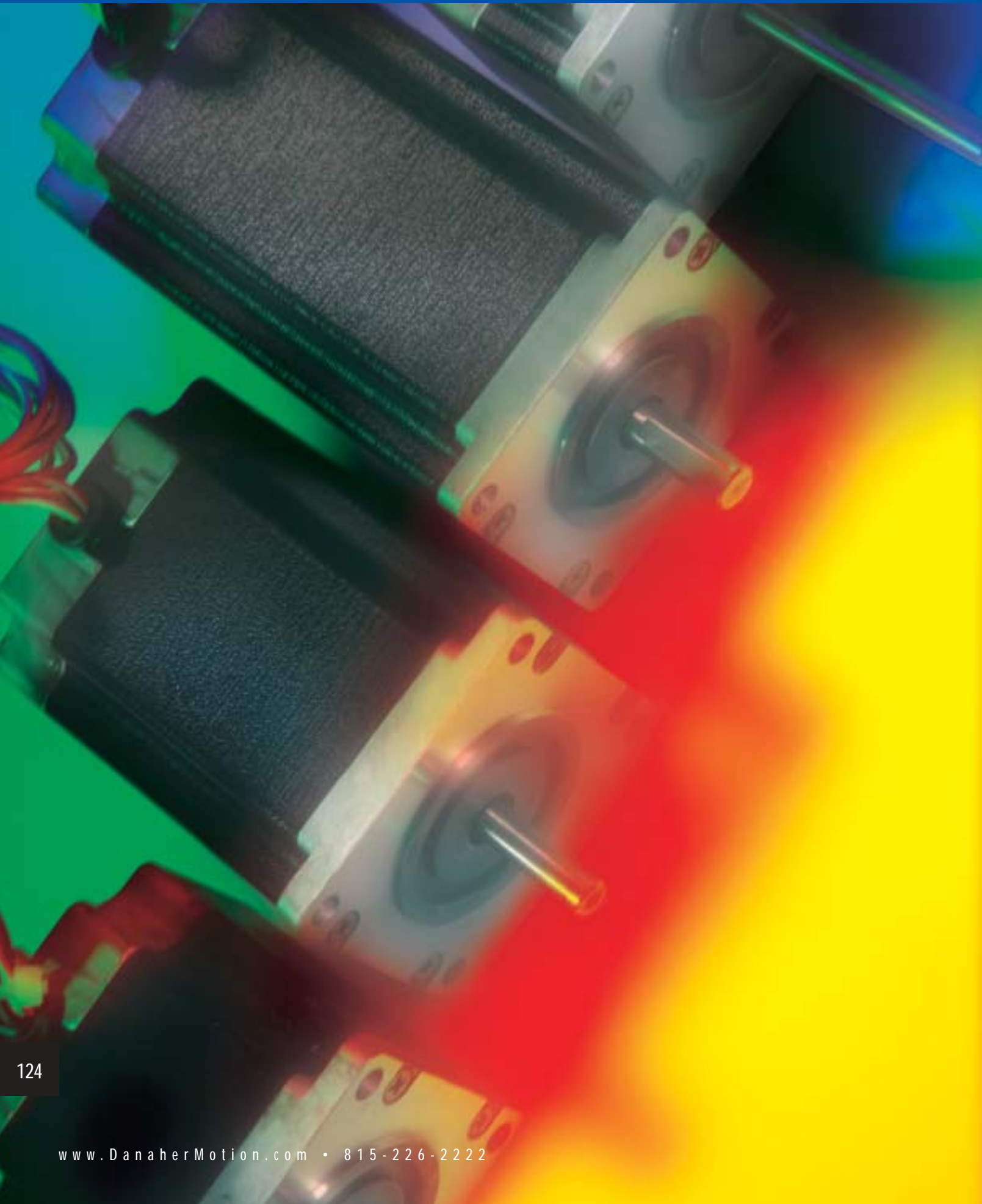
We focus on specific market segments and applications with our design, manufacture, and market differentiated motion solutions that add value and meet the specific requirements of our customers.

We're unique among miniature motor manufacturers with our escap[®] brand precision ironless DC and brushless DC motors as well as our DMM disc magnet step motors.

Our products are used successfully around the world in thousands of applications from medical devices to scientific instruments to factory automation equipment.

Whatever your precision miniature motor requirements might be, Portescap has the solution.







AC SYNCHRONOUS MOTORS

POWER PACKED SYNCHRONOUS PERFORMANCE

Pacific Scientific's Powersync™ line AC synchronous motors actually provide the highest torques per frame size in the industry. Optimal magnetics in a "housingless" frame combine with a large diameter rotor and rotor/stator design to produce exceptionally high rated outputs. And yet these little behemoths run smoother, quieter and cooler than most other AC synchronous motors.



Powersync motors deliver precise and bi-directional motion for low velocity, constant speed applications. These include: scanning, conveying and handling systems, dispensing, labeling, packaging and printing machinery, testing, sorting and metering devices as well as timing belt drives, medical equipment, remote control switches and positioning apparatus.

Compact in size and easy to apply, these Powersync motors are often used rather than a geared AC induction motor. The desired speed is easily accomplished by going up and down from the synchronous speed using gearing or a simple timing belt and pulleys. Conveniently, they are economically operated from standard AC line voltages and synchronous speed is directly related to the line frequency.

Best of all, the Powersync line of AC synchronous motors provide longer, more reliable motor life (fully backed by a two year warranty) while producing the most efficient use of volume for optical magnetic design.



In addition to Powersync motors providing a smooth, quiet operation throughout a lifetime of high powered performance, their single pole, three-position switch can provide complete bi-directional control while attaining basic shaft speeds of 72 and 200 rpm @ 60 hertz. Yet Powersync motors can start, stop or reverse within 1-1/2 inch cycles of the applied frequency while having the ability to stop within 5° for a 72 rpm motor and 14° for a 200 rpm motor.

Powersync motors can be operated from single-phase power sources using a phase shifting network and can be stalled without damage simply because the magnetic field allows the rotor to stop without overheating or physical damage. Powersync motors are rated for continuous duty at ambient temperatures up to 40° (104° F). Minimum ambient temperature is -40° (-40° F). Residual torque helps prevent movement of the load when the motor is de-energized. DC voltage can be applied to increase holding torque. Importantly, there is no significant inrush current when the motor is first energized.



Simply the ultimate in AC synchronous motors - providing synchronous speed for a broad range of applications, the Powersync line is available to fulfill your requirements.



PMDC

RUGGED. DEPENDABLE. EFFICIENT.

There's a very good reason why Pacific Scientific's Permanent Magnet (PMDC) motors are the most specified original equipment in the world! They work. Long and hard. Because they're built rugged. Designed to be highly efficient. And proven to be consistently reliable.

Pacific Scientific's full line of SCR rated motors are specifically designed to provide economical, adjustable speed solutions for a broad selection of industrial and commercial applications. The linear speed/torque characteristics of these motors consistently and efficiently deliver predictable performance and full torque over a wide speed range. Patented anti-cog magnets provide smooth low speed operation with high overcurrent capacity and dynamic braking without demag. The permanent magnet fields make for a motor that is more efficient, smaller, lighter and offer wider speed range than comparable wound field motors.

Value and performance. Rugged, quality construction, backed by a two year warranty. More than 40 standard models from 1/4 to 3 hp. That's the Pacific Scientific difference. A difference unmatched in the industry. And a difference that accounts for a diverse base of satisfied customers who have very successfully applied Pacific Scientific motors in thousands of different applications over the years.

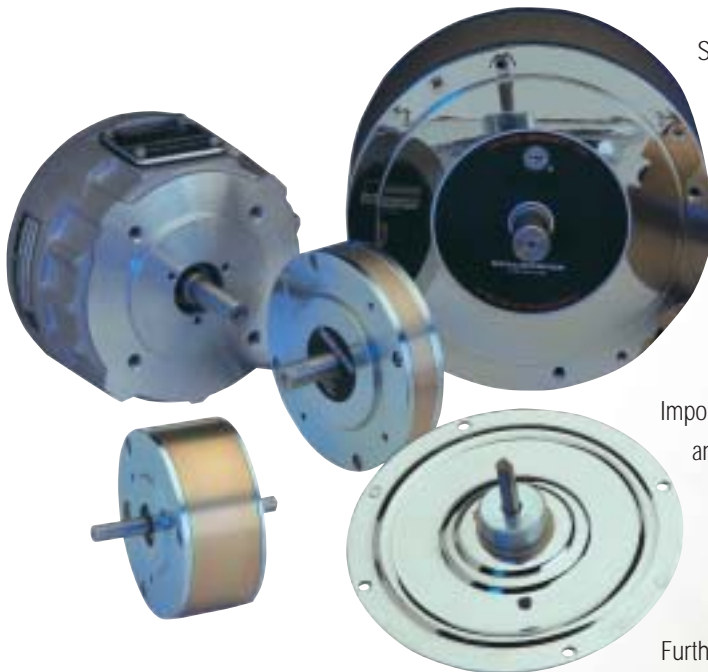
All happily humming along.

Solutions by **DanaherMotion**

ServoDisc™ MOTORS

SMALLER. FASTER. BETTER.

The unique technology found in Kollmorgen's ServoDisc (pancake) motors provides a new dimension in performance - made possible by our exclusive ironless disc armature. This difference enables ServoDisc motors to deliver a level of performance, in both incremental motion and continuous speed applications, which is simply not attainable with conventional ironcore motor designs.



Smaller and lighter than some of the bulky designs of equivalent output, the ServoDisc armature provides significant performance advantages for motion control applications. Primary among them is faster acceleration. Our thin, low-inertia armature design leads to exceptional torque-to-inertia ratios. This translates into blazing speed. This means shorter cycle times, more moves per second and higher throughput. For incremental motion applications, this translates into higher productivity and more profitability.

Importantly, the ServoDisc armature, being ironless, is not attracted by magnets and consequently, has intrinsically zero cogging. The result is ultra smooth rotation at any speed. And, because there is no iron, there is nearly no inductance - which means longer brush life. In fact, depending on the application, it is possible for the brushes to last as long as the bearings.

Furthermore, ServoDisc's low induction properties provide higher speed capabilities (4000 rpm and above) while providing virtually instantaneous torque, a key to fast moves and accurate tracking.

In addition, ServoDisc's unique capabilities actually provide more torque over the entire speed range than any conventional motor. As a result, the torque is almost constant from 0 to 4000 rpm! The non-magnetic ServoDisc armature and axial magnetic field provides extra torque on call - up to ten times the continuous rating.

Best of all, ServoDisc motors have been developed to cover a wide range of package sizes and power levels. Providing a product match for every application. And, to further optimize your mechanical design, the ServoDisc armature design leads to a unique flat motion package, decidedly easier to design in than much longer conventional motors.

All in all, Kollmorgen's ServoDisc motors provide the ultimate in concentrated performance advantages. And their unique compact shape can be an effective alternative in solving tight packaging problems.

Solutions by **DanaherMotion**

www.DanaherMotion.com • 815-226-2222



LET US MAKE ONE FOR YOU

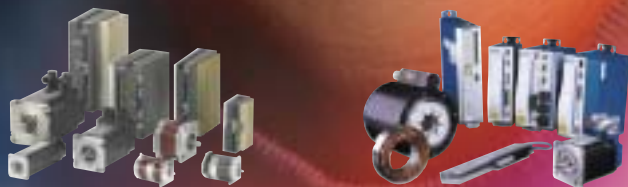
We at Danaher Motion have long recognized the benefits of creating a single entity that is capable of providing customers appropriate combinations of motion control technologies. That's why we've assembled the leading motion control companies into Danaher Motion. Thus providing you with seamless and comprehensive motion and positioning solutions. Solutions which simplify integration of multiple technologies including precision mechanics, motors, amplifiers, controls and user interfaces. And, as technologies advance and applications become more demanding, Danaher Motion will continue to expand its technology base and resources to support the complete success of you, our customer.

We invite you to take advantage of our broad range of expertise. Whether it's one of the world-class products available from Pacific Scientific, the unique customized solutions available only from Kollmorgen, the complementary offerings from IDC, Portescap, and BS&A, we have the engineering, testing and manufacturing resources to develop complete systems for all your requirements. We can provide you solutions in semiconductor, packaging, fiber optics, life sciences, digital imaging or any other precision automation applications. Our creative mechanical designs have resulted in a wide complement of high performance positioning systems from which to select a solution. In addition, our engineers always welcome new challenges. If you don't see the exact product required to enable your application success – just let us know. We'll always be available to work closely with your engineers to help develop custom product solutions designed to accommodate your individual needs. Our years of collective experience combined with our extensive application knowledge will provide you with consistently superior motion control quality and performance in cost-effective products.

It's this basic core of expertise that allows us to provide you with unsurpassed depth of product selection, service and ultimately, lower machine integration costs and increased productivity. In fact, Danaher Motion is the only motion control source you'll ever need. That's because we will provide the expert help necessary in determining the exact products for your specific application.

Quite simply, Danaher Motion has the breadth of system experience and products to help you succeed in your area of enterprise. It's how we fulfill our pledge to you: From initial selection to final execution and throughout the life of your operation Danaher Motion will help you succeed. With every move you make.

Danaher Motion.
The Name Behind Motion.



MOTIONEERING® CD-ROM

Don't let sizing and selection slow down your process. **MOTIONEERING** Application Engine sizing software from Danaher Motion makes it a breeze. **MOTIONEERING** is a Windows®-based program that takes a systems approach to the selection of servo and stepper products. This approach to sizing systems considers not only load and motor parameters in the sizing process but also the amplifier voltage and current parameters including the amplifier time constant to deliver peak current.

A wide variety of mechanisms are accommodated including leadscrew, rack and pinion, conveyor, nip rolls, rotary, and direct data entry. Direct Drive Linear (DDL) motors have their own unique sizing algorithms and product databases to search from. The database consists of over 1500 systems including housed brushless and DC servos, frameless brushless servos, direct drive linear brushless servos, stepper motors, and drives.

A separate tutorial is available on the CD-ROM or from the website to aid first time users in the use of the software.

Also included on the **MOTIONEERING** CD-ROM are over 60 of our latest product catalogs in PDF format for easy viewing. A literature browser allows these PDF documents to be quickly found by product category and brand. In addition, the CD-ROM provides company and general product introductions consistent with those in the catalog, as well as stepper and servo selection diagrams that allow linking to specific product documents. Lastly, there is a software tool included on the CD-ROM called **MOTIONEERING** Toolbar, a general purpose engineering utility that includes a unit converter, inertia calculations, density of materials listing and more.

www.DanaherMotion.com
815-226-2222

www.DanaherMotion.com

Danaher Motion Customer Support Center

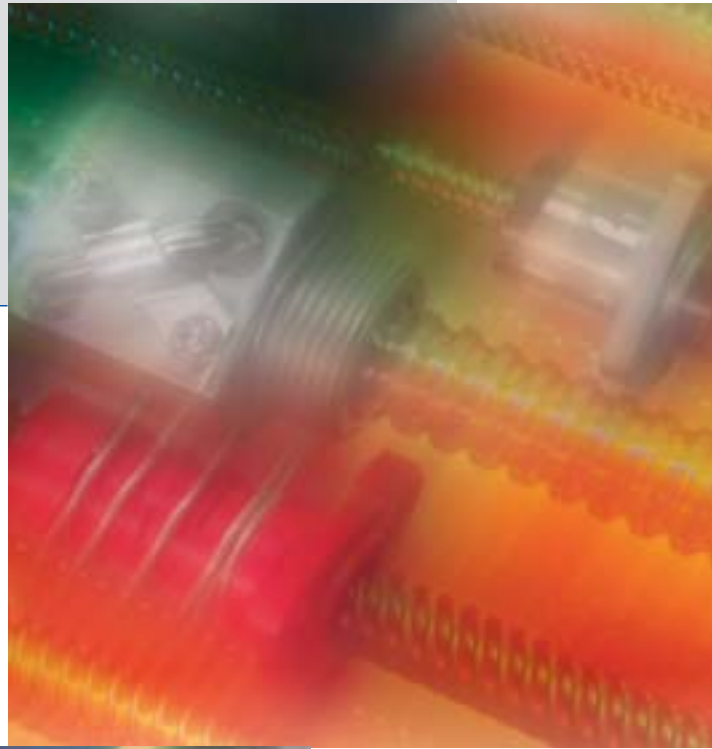
4301 Kishwaukee Street

P.O. Box 106

Rockford, IL 61105-0106

Tel: 815-226-2222

Fax: 815-226-3080



Danaher*Motion*

KOLLMORGEN

PACIFIC
SCIENTIFIC



Portescap

