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KOLLMORGEN

**PACIFIC
SCIENTIFIC**



Servo & Step Motors and Drives

Solutions by
**DANAHER
MOTION**

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New Name, Established Brands

Danaher Motion's wide range of motion control systems and components offer customers an unprecedented choice in selecting the right solution to match their particular application requirements. Our product innovations have been improving the efficiency and productivity of complex manufacturing operations for over 80 years through trusted brand names such as Dover, Kollmorgen, Pacific Scientific, Portescap and Thomson in industries as diverse as semiconductor, aerospace and defense, mobile-off-highway, packaging, medical and robotics.

In addition, Danaher Motion, through Motion Engineering (MEI), offers powerful integrated motion control solutions with its industry-leading, multi-axis motion platforms and SynqNet™ communications network for ultra-reliable machine performance. From software and controller, through the communications network to drives and I/O devices, to mechanical and electro-mechanical products, Danaher Motion differentiates itself in the marketplace by designing standard and custom solutions to satisfy the most demanding application requirements.

Our growing family of leading motion control products and application expertise tells only half the story. With a worldwide service and support infrastructure, our field service engineers and support teams are available to assist whenever they are needed. It is part of Danaher Corporation's unrelenting focus on its customer. That's why more and more design engineers are turning to Danaher Motion to meet their motion control requirements.

Danaher Motion Values

- Application Expertise
- Broad & Innovative Motion Control Products and Systems
- Customer Focus
- Customizable Products and Services
- Motion Control Pioneers with Global Staying Power
- Operational Excellence



Industrial and Commercial Servo & Step Motors and Drives

Danaher Motion brings together the strongest names in servo and step technologies with Kollmorgen and Pacific Scientific branded products. These brands have earned a reputation for being the world's most innovative, cost-effective, high-performance motion control products and systems. The combination results in the most complete, best-in-class, line-up of standard and custom motors and drives from one source . . . Danaher Motion.

One of our key differentiators is our ability to satisfy your most demanding application requirements with cost-effective custom products. We accomplish this by leveraging our strengths in electromagnetic and electronic design with application design expertise. If your application requirements are beyond the scope of our standard or modified standard products, our application engineers are ready to assist you in developing a custom product that meets your needs. Examples of our customized solutions appear below.

Applications - Custom Motors & Assemblies

- Elevator motor - custom brushless DC
- Implantable heart pump - frameless brushless DC
- Injection molding - frameless brushless DC
- Wing trim actuator - DC motor actuator assembly
- Gun turret/loader - custom brushless motor actuator
- Painting robot - explosion proof brushless linear motor
- Coil winding - custom brushless motor
- Train brake - DC actuator
- Flight simulator - frameless brushless DC
- Wafer handling robot - 3 axis concentric brushless DC

Applications - Specialty Electronics Products

- Automotive manufacturing robot - 5-axis position controller and brushless actuators
- Anthropomorphic robots - multi-axis rack mount servo drive
- Machine tools - power block amplifier having PWM input command



Servo Motors and Drives



Conventional Servomotors

Danaher Motion's industry leading family of servomotors provides unprecedented quality, flexibility and performance allowing you to select the best servomotor optimized for your specifications. They deliver smooth performance, extremely high torque/density, and high acceleration to fit any number of high performance applications.



Newest Technology

Kollmorgen AKM (Advanced Kollmorgen Motors) – With over 12,000 standard models, AKM high performance motors offer a wide range of mounting, connectivity, speed, feedback and other options to fit your specific application needs. AKM motors are available in a variety of windings designed for virtually any global voltage. Windings are optimized for use with the S600, S200, and S300 Series of high performance servo drives.

AKM Features

- 7 frame sizes, 25 frame/stack combinations and 77 standard windings = 12,000 standard models
- 0.16 to 53 N-m (1.4 to 470 lb-in) continuous torque accommodates a wide range of application requirements
- Speeds to 8,000 RPM meet high speed application requirements
- Full range of voltage selections to meet global standards up to 480 VAC or 640 VDC
- Choice of resolver, commutating encoder, or smart feedback device (SFD) provide feedback to meet broad drive and system requirements
- Compact footprint (high torque/volume ratio) for maximum torque in minimum space
- Multiple frame sizes for the same torque value optimizes mounting and inertia matching capabilities
- CE compliant and UL recognition for global acceptance
- Used with SERVOSTAR® S600, S300 and S200 Series drives
- Mounting variations, fail-safe brake, resolver, commutating encoder, smart feedback device (SFD), shaft seal, flying lead and motor mounted connectors

CONVENTIONAL SERVOMOTOR PRODUCT OVERVIEW

Servomotor Model	Frame Sizes	Voltage Operation (VAC)	Continuous Torque (N-m)	Inertia	Key Differentiators
NEW! Advanced Kollmorgen Motor (AKM)	7	50 to 480	0.18-53	Low to medium	Ideal for most apps below 53 N-m continuous torque
Kollmorgen GOLDLINE ® B, M	5	120 to 230	0.84-149	B - Low M - Medium	Systems requiring >53 N-m at 240 VAC or inertia matching
Kollmorgen GOLDLINE ® EB	5	120 to 230	0.84-111	Low	Explosion-proof applications
Kollmorgen GOLDLINE ® BH, MH	5	230 to 480	0.70-124	BH - Low MH - Medium	Systems requiring >53 N-m @ 480 VAC or inertia matching



Direct Drive Servomotors

Danaher Motion's lineup of innovative, high-performance, direct drive motion control solutions, including DDR (Direct Drive Rotary) and DDL (Direct Drive Linear) motor products, are equipped to meet your most demanding machine design requirements. Direct drive motors are directly coupled to the driven load. With this configuration, all mechanical transmissions and gearboxes are eliminated. This, in turn, eliminates backlash, compliance, and other problems associated with mechanical transmissions.

Direct drive designs, in either DDR or DDL configurations, deliver high performance, high stiffness, high positional accuracy, higher throughput, compact mechanical assembly, smooth velocity, zero maintenance, and quiet operation. This all means increased cost-effectiveness, increased productivity, and more design freedom for your application. When combined with our SERVOSTAR® Series Digital Drives, the Kollmorgen Direct Drive products become an easy-to-set-up, high performance motion control solution.

Direct Drive Rotary Products

- Kollmorgen **GOLDLINE®** DDR is a housed motor assembly featuring a factory aligned high-resolution feedback device and precision bearings that allow it to function as the core of rotary indexing and rate table applications.
- Kollmorgen F Series Frameless DDR motors include a rotor and stator as separate components which are integrated into, ride on the bearings of, and become a part of the driven load. Frameless motors offer the most compact and lightweight DDR solution available.

Direct Drive Linear Products

- Kollmorgen **PLATINUM®** DDL Ironless motors are ideal for applications requiring very low bearing friction, high acceleration of lighter loads, and maximum constant velocity, even at ultra-slow speeds.
- Kollmorgen **PLATINUM®** DDL Ironcore motors are ideal for accelerating and moving high masses, maintaining stiffness during machining or process forces, and replacing mechanical transmissions.



Newest Technology

The Kollmorgen **CARTRIDGE DDR™** motor is the first in the industry to combine the space-saving and performance advantages of Frameless DDR technology with the ease of installation of a full frame motor. Consisting of a rotor, stator, and factory-aligned, high-resolution feedback device, the **CARTRIDGE DDR™** motor uses the machine's bearings to support the rotor through the use of an innovative compression coupling that engages the rotor to the load.

CARTRIDGE DDR™ Features

- Two frame sizes, 9 inch and 13 inch
- Three stack lengths in each frame size
- Continuous torque from 50 to 504 N-m
- Peak torque from 120 to 1016 N-m
- UL and CE agency certifications are standard
- Absolute position sine encoder with maximum resolution of 2,097,152 counts per revolution
- One drive amplifier, the SERVOSTAR® S620, drives the standard **CARTRIDGE DDR™** product line
- High energy permanent magnet brushless DC configuration utilizing a proprietary electromagnetic design for more torque per volume than conventional DDR technology

DIRECT DRIVE SERVOMOTOR PRODUCT OVERVIEW

Rotary Servomotor Model Linear Servomotor Model	Maximum Speed	Continuous Torque Continuous Force	Peak Torque Peak Force	Housed/Frameless	Feedback Options
NEW! CARTRIDGE DDR™ (C-DDR)	Up to 1500 RPM	50 to 504 N-m	120 to 1016 N-m	Housed	Sine Encoder
F Series Frameless DDR	Up to 500 RPM	5.48 to 369 N-m	16.9 to 1340 N-m	Frameless	Sine Encoder
Kollmorgen GOLDLINE® DDR	Up to 800 RPM	5.3 to 339 N-m	16.9 to 1340 N-m	Housed	Resolver or Sine Encoder
RBE Frameless	Up to 35000 RPM	0.011 to 38.4 N-m	0.025 to 197 N-m	Housed or Frameless	Hall Effect Sensor
DDL (Direct Drive Linear) - Ironless	DDL's determined by machine factors	21 to 450 N	60 to 1600 N	Frameless	Hall Effect Sensor
DDL (Direct Drive Linear) - Ironcore		73 to 12023 N	190 to 15625 N	Frameless	Hall Effect Sensor



Servo Positioning Drives

Danaher Motion's family of servo drives brings you advanced control technology combined with compact packaging and simplified commissioning. Offered in a wide selection of voltage and power ranges, these drives and controls power our complete range of precision servomotors from traditional housed rotary models to DDR (Direct Drive Rotary), DDL (Direct Drive Linear), and frameless models. These advanced systems are engineered for ease of installation and will have your application up and running quickly and efficiently.



Newest Technologies

Kollmorgen S200 Series Brushless Servo Drives - The S200 Series Drives push high performance servo technology into lower power applications without compromising on reliability or package size. S200 Series Drives are the first all-digital industrial drives with a velocity loop bandwidth up to 800 Hz offering unmatched system throughput and simplified tuning and configurations. The S200 provides smooth motion and rapid start and stop action to optimize machine performance. Couple an S200 drive with an AKM Servomotor for a complete servo control solution optimized to meet your specific application needs.



Kollmorgen SERVOSTAR® S300 & S600 Series Brushless Servo Drives – The advanced Kollmorgen S300 and S600 high performance servo drive series offers a broad power range for support of the extensive selection of Kollmorgen servomotors. With a wide array of feedback options, field bus connectivity and control capability from torque to fully programmable single axis control, the S300 & S600 servo drive family offers a standard product to solve most high performance application needs.

SERVO DRIVE PRODUCT OVERVIEW

Model	DC Input Voltage	AC Input Voltage	Continuous Output Current (RMS)	Compact	w/ Integrated Power Supply	Options ^①	Positioning ^②
NEW! S200 (S20x30) Series Brushless Servo Drives	20-90	-	3, 6	✓	-	M, C	4
NEW! S200 (S20x60) Series Brushless Servo Drives	-	120-240	1.5, 3	✓	✓	M, C	4
NEW! S300 & S600 Series Digital Brushless Servo Drives	-	115-480	1.5, 3, 6, 10, 14, 20, 40, 70	✓	✓	M, S, P, D, C	1, 2, 3*, 4
SERVOSTAR® CD Series Digital Brushless Servo Drives	-	115-230	3, 6, 10	✓	✓	S, D	1
PC 800 Series Digital Brushless Servo Drives	-	120-240	2.7, 3.6, 7.1	✓	✓	S (840)	1
PCE800 Series Digital Brushless Servo Drives	-	240-480	3.5, 7.5, 11.2	✓	✓	S	1

① Options : M - Motion Controller S - SERCOS interface™ P - PROFIBUS D - DeviceNet C - CANOpen

② Positioning : 1 - Indexing 2 - Multitasking Indexing 3 - Programmable 4 - Step and Direction

* With Single Axis Controller (SAC) option card



Step Motors and Drives

Danaher Motion's step motors and drives are designed with versatility, ease-of-use, and cost-effectiveness in mind. Choose from a broad range of high-performance, brushless, maintenance-free motors and advanced drives including full, half, and microstepping models in both modular and packaged designs.

Step Motors

Our step motors provide high torque in a small package. They offer a wide range of standard sizes, constructions, windings and options. Custom leads, shafts and connectors are routinely provided to effectively solve your application needs.

Step Motor Features

- 7 series in 3 frame sizes: NEMA 23, 34, 42
- Models available with SIGMAX technology and high torque construction for maximum torque in the smallest package size
- Holding torques from 42 to 5,700 oz-in (0.3 - 40 Nm) to accommodate a wide range of applications
- Speeds to 3,000 RPM to meet all low and medium speed applications
- Choice of standard connection methods and IP ratings to meet environmental conditions of the application including:
 - integral connector
 - leads
 - terminal box
- All models are CE compliant
- Special modifications readily available: shafts, leads, connectors, etc.



Newest Technology

Pacific Scientific T Series step motors provide the highest torque available in a NEMA size 23 (60mm) step motor and have excellent accuracy. To fit your specific application needs, there are a wide variety of standard and custom configurations available. These motors feature high voltage insulation systems and windings optimized for use with the P7000 series of high performance stepper drives.

STEP MOTOR PRODUCT OVERVIEW

Model	NEMA Frame	Sizes	Holding Torque (oz-in)	SIGMAX® Technology	Standard Options *
NEW! T2 Series	23	4	56 - 380		L, T, MS, E, RS
P2 Series	23	3	42 - 214		IC, L, E, RS
M2 Series	23	2	95 - 253	✓	IC, L, E, RS
N3 Series	34	4	454 - 2,180		L, T, MS, E, RS
K3 Series	34	4	578 - 2,790	✓	L, T, MS, E, RS
N4 Series	42	3	1,150 - 4,365		L, T, MS, E, RS
K4 Series	42	3	1,470 - 5,700	✓	L, T, MS, E, RS

* Options : IC - Integral Connector L- Leaded T - Terminal Box MS - MS Connector E - Encoders RS - Rear Shaft



Step Positioning Drives

Danaher Motion's step drives are designed with versatility, ease-of-use, and cost-effectiveness in mind. Choose from a broad range of advanced drives and controls including full, half, and microstepping models in both modular and packaged designs.

Modular drives are open-frame units or have small enclosures, and require an external DC power source. They are generally used where the drive will become an integral part of the user's system or in multi-axis systems utilizing a common power supply. A packaged drive is a stand-alone unit that operates directly from an AC power source and is packaged in a full enclosure.



Newest Technology

Pacific Scientific P7000 Microstepping Drives - The P7000 provides industry-leading, true servo-like performance at a fraction of the cost. The P7000 is the next generation of digital step motor controls. They bring a unique level of system smoothness, functionality, high-speed performance, and innovation unmatched in the industry. Available for AC operation, the P7000 is designed to power any 2-phase NEMA step motor. It's unique features make the P7000 an ideal solution for single or multi-axis applications that require high-speed performance or low-speed smoothness.

P7000 Features

- Open Loop Stall Detect™ (OLSD™) allows detection of a stalled motor without using feedback from an encoder or resolver. It can also detect motor position shifts while at rest.
- Multi-Stepping™ allows a low resolution step input to produce a 25,600 microstep output for smooth system performance
- Dynamic Smoothing™ rounds the edges of the move profile (pseudo-S curve) to minimize machine jolt during acceleration
- Xtreme Smoothness™ eliminates the motor's natural resonance speeds and provides more usable torque throughout the speed range
- Motion Node option allows simple indexing up to 63 moves.
- Anti-Resonance, with the best performance and largest range in the industry (7.2°), provides optimum torque and nulls mid-range instability
- Programmable jog function with dual speed settings
- Current reduction modes with programmable time and reduction amount for momentary operation beyond continuous ratings
- Nine programmable inputs, including Jog+, Jog-, Jog Speed, EOT+, EOT-, Move Select, Soft Reset, Start Move, Start/Stop Pulse, and Stop Move, for basic motion control
- Fault Output
- All I/O is user configurable to provide active low operation at 5 VDC or active high operation at 24 VDC.
- Compact size to meet tight mounting constraints

STEP DRIVE PRODUCT OVERVIEW

Step Drive Model	Modes of Operation ^①	Input Voltage (VDC)	Input Voltage (VAC)	Output Current (ADC)	Positioning ^②
NEW! P7000 Microstepping Drives	S, M	-	120 or 240	0-3	1
6210 Microstepping Drives	S	24-40	-	1-3.5	4
6215 Microstepping Drives	O	24-40	-	1-3.5	4
6410 Microstepping Drives	S	24-75	-	0.63-5.0	4
6415 Microstepping Drives	O	24-75	-	0.63-5.0	4

① Modes of operation: S - Step and Direction O - Oscillator M - Motion Node Indexing

② Positioning: 1 - Indexing 2 - Multitasking Indexing 3 - Programmable 4 - Step and Direction



Synchronous Motors

Synchronous motors are high torque motors that naturally turn at slower speeds (72 RPM with 60 Hz power). They are extremely cost effective in slow speed applications since gear reducers can be eliminated, and they only need a resistor-capacitor network to operate directly from 120 volt, single phase AC power.

Synchronous Motor Features

- 3 frame sizes: NEMA 23, 34, 42
- 72 RPM motor speed (with 60 Hz voltage)
- Rated Torque: 80 to 1,500 oz-in (0.5 to 10.6 N-m)
- Constant speed does not vary with load
- 120 volt AC models
- Fast starting stopping and reversing
- Can be stalled indefinitely without overheating
- Standard constructions include: leaded, terminal box, MS connectors, rear shaft



Newest Technology

Pacific Scientific ST Series synchronous motors provide high performance in a new smaller frame size. These NEMA size 23 (60 mm) motors are available in three lengths with torque ratings to 185 oz-in (1.31 N-m). Resistor - capacitor kits are also available.

SYNCHRONOUS MOTORS PRODUCT OVERVIEW

Model	NEMA Frame	Sizes	Rated Torque (oz-in)	Max Load Inertia (oz-in-s ²)	Standard Options
NEW! ST Series	23	4	80 - 185	0.02 - 0.15	L, T, MS, RS
SN3 Series	34	4	280 - 900	0.19 - 0.46	L, T, MS, RS
SN4 Series	42	3	715 - 1,500	0.32 - 0.69	L, T, MS, RS

* Options : L - Leaded T - Terminal Box MS - MS Connector RS - Rear Shaft

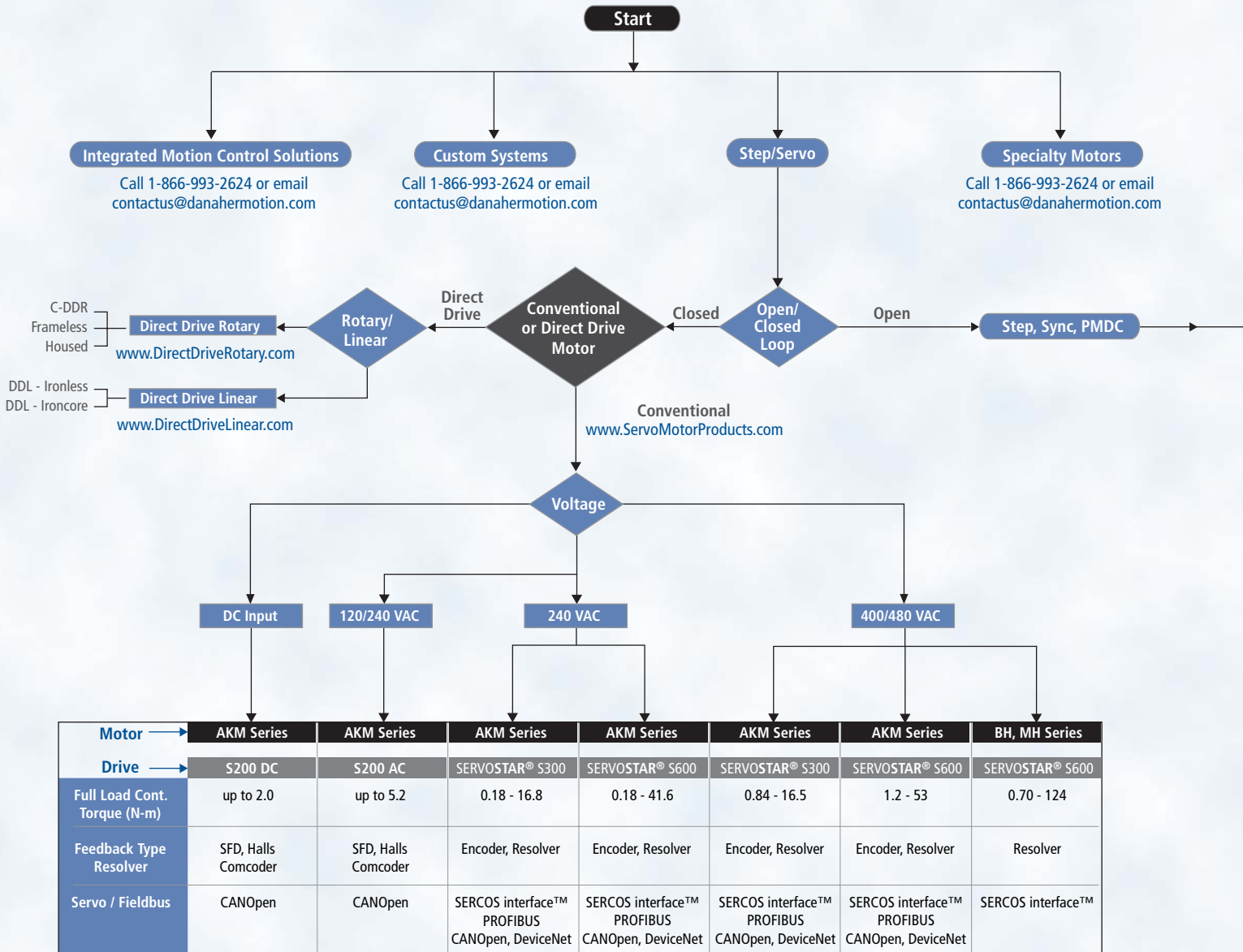
Integrated Motion Control Solutions

Danaher Motion offers powerful integrated control solutions with its industry-leading Motion Engineering (MEI) motion platforms and SynqNet® communications network. Leading OEMs have selected MEI for ultra-reliable machine performance in a wide range of control applications by meeting demands for increased performance, increased machine diagnostic capabilities, increased machine safety, and reduced time to market.

The next generation in motion control demands for motion control to be more closely integrated into mechanical performance. MEI software capabilities allow for mechanical performance to increase based exclusively on better control of computing power. What this means to machine builders is a way of using lighter materials and more innovative designs where a sophisticated control loop compensates for previously problematic mechanical anomalies. Costs can be reduced, machine designs are more easily simulated and tested, and a more proactive model of machine performance emerges.

Customized to meet the demanding needs of OEMs in the semiconductor, electronic assembly, medical, industrial robotics, and packaging markets, Danaher Motion is your total solution provider. Powerful software, innovative motion controllers, SynqNet performance motion network, IO devices, a wide range of drive and motor support, precision staging, and all the mechanics needed to build your next machine put Danaher Motion in a unique position to offer complete motion solutions unlike anyone in the market today.

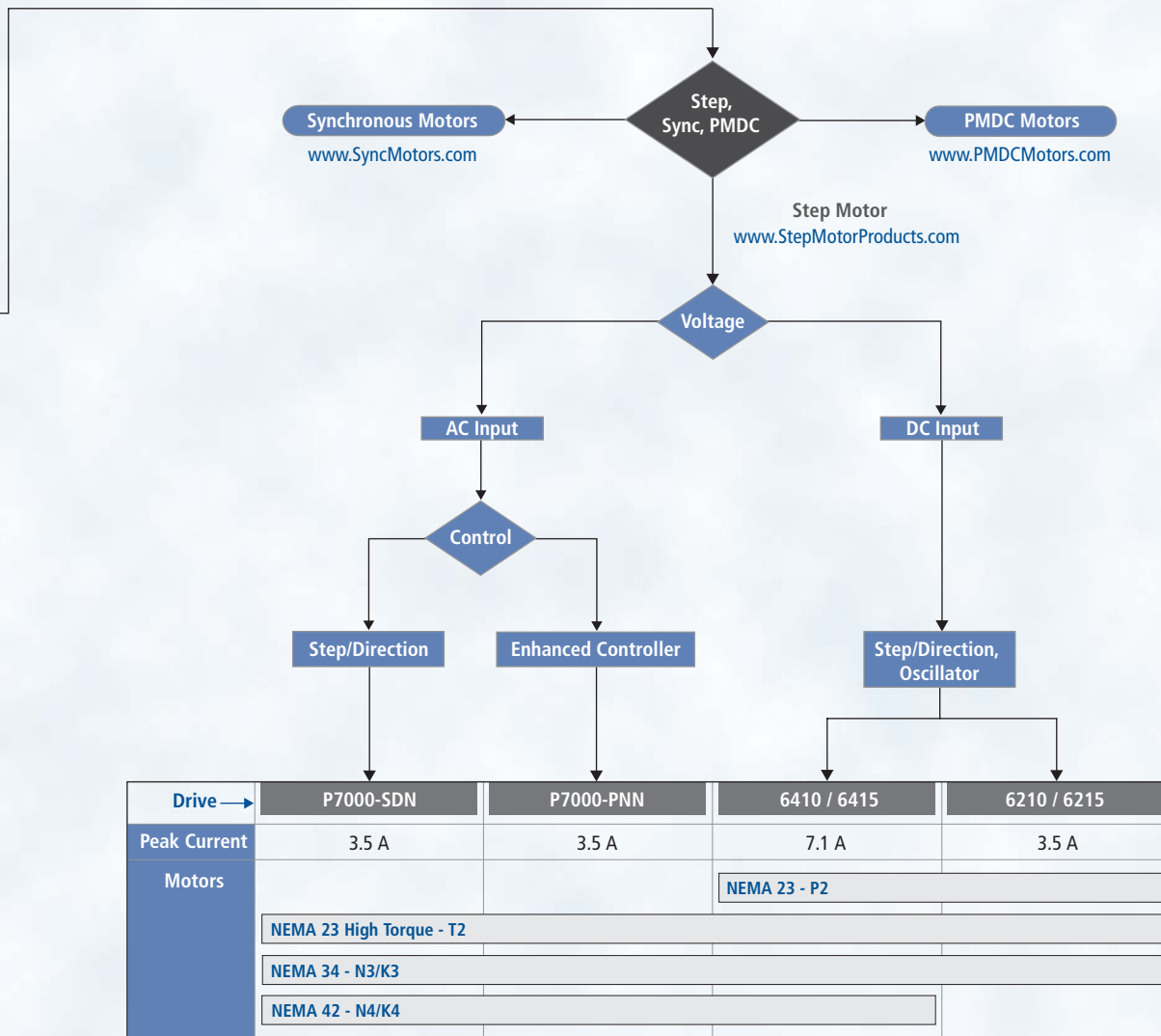
Product Selection Tree



Online Product Selector

Go to www.DanaherMotion.com/advisor to use our intuitive, one-of-a-kind, Online product selector. This product attribute search engine allows you to examine our vast database of products to choose from the many solutions Kollmorgen and Pacific Scientific products offer.





For the latest information on our various motor and drive products or to download / order literature, visit the product-specific URL's below:

- Complete Product Offering www.DanaherMotion.com
- Direct Drive Rotary Servomotors www.DirectDriveRotary.com
- Direct Drive Linear Servomotors www.DirectDriveLinear.com
- PMDC Motors www.PMDCmotors.com
- Servomotors and Drives www.ServoMotorProducts.com
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