

The logo for Allied Motion, featuring the company name in a bold, blue, sans-serif font. A blue swoosh underline is positioned above the letters 'l' and 'i' in 'Allied'.

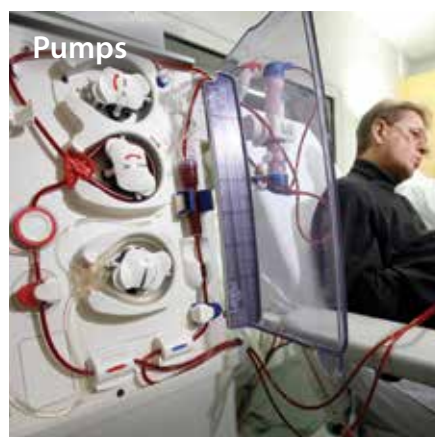
Motion Solutions That Change the Game

*High-Performance Specialty Motors
& Application-Specific Motion Systems*

Aerospace & Defense
Automation
Commercial-Consumer
Industrial
Medical
Pumps
Robotics
Vehicles

A World of Solutions

Allied Motion products are in use around the globe in a wide range of demanding applications. Our companies possess the expertise, products, and global presence to provide you with the motion solutions you need in today's globally competitive world.





The Allied Motion Culture

“VIA” – Value, Integrity, AST – encapsulates the Allied Motion culture. It means we work to create tangible Value for our customers and stakeholders; we maintain the highest Integrity in all of our business relationships; and we utilize Allied Systematic Tools to continuously improve Quality, Delivery, Cost and Innovation.

Why Choose Allied Motion to be Your Motion Solution Provider?

Global Reach Solution Centers

Three strategically located Solution Centers – North America, Europe, Asia – offer local application engineering and sales support to make it easy to do business with us. “We speak your language.”

Advanced Technology Products

Allied Motion develops advanced-technology products that enable our customers to “change the game.” We strive to produce the most compact, innovative products with the highest performance at a competitive price.

Lean Enterprise: Allied Systematic Tools (AST)

Allied Systematic Tools (AST) is our set of lean enterprise business tools that drive continuous improvement. AST insures that our customers receive the highest quality products and service at the best possible price.

Quality

Our commitment to continuous quality improvement by applying Lean Six Sigma principles and by achieving ISO and AS certifications is a way of life at Allied Motion.

Allied Motion Solutions

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Brushless Torque Motors

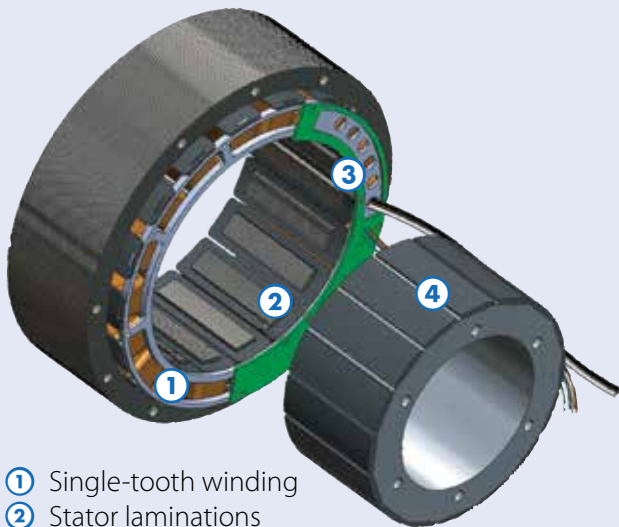


Allied Motion offers both housed and frameless families of brushless torque motors. These motors are among the highest performance torque motors available.

Frameless diameters range from 19 through 792 mm with stall torque ranging up to 2020 Nm. All housed torque motors are available with integrated encoder and the MFH models include an integrated servo drive.

Custom-engineered models that meet specific design requirements are our specialty.

Megaflux Brushless Torque Motor Technology



- ① Single-tooth winding
- ② Stator laminations
- ③ Hall sensor
- ④ Magnet

Torque motors are large diameter, axially short (thin) servo motors intended to run at low to moderate speed and output a large torque. Typically frameless, they are usually integrated directly into the driven axis. The large open center aperture of the rotor permits passage of cables or light beams in this type of motor.

The stators in Allied Motion's **Megaflux** torque motors are laminated, and wound with either a distributed or concentrated single-tooth type winding. Single-tooth windings have the advantage of lower phase resistance for lower power loss. Megaflux motors have optimized magnetics designs to maximize performance and minimize cogging torque.

Technology Advantages & Benefits

- High output torque at low speed for direct drive applications—no mechanical backlash or lost motion of geared solutions
- Low cogging torque ratio for smooth precise rotation
- Large clear hollow shaft for passage of signal cabling, laser beam, or piping
- Thin axial dimension means a more compact solution and smaller overhung load

Typical Applications

- Semiconductor manufacturing equipment
- Robot base, shoulder and joint axes
- Machine tool spindle drive
- Stabilized gimbal instrumentation platform for telescopes and antenna pointing
- Specialized winch drives

Frameless Brushless Torque Motors

HT and **Megaflux** series brushless torque motors are offered in 21 standard sizes. Recognizing that applications for frameless torque motors usually have special size and/or performance requirements, Allied Motion welcomes the opportunity to work with our customers to engineer custom torque motors that meet the exact needs of their applications.

HT Series

- 9 high torque density frame sizes with clear I.D. apertures up to 63.5 mm
- Equipped standard with a Hall commutation switch assembly

Megaflux Series

- 12 frame sizes with multiple stack lengths and clear I.D. apertures up to 582 mm



| Performance | | HT | Megaflux |
|---------------|-----|-------------|--------------|
| Nominal O.D. | mm | 19.3 - 127 | 60.4 - 792 |
| Nominal I.D. | mm | 5.08 - 63.5 | 36.2 - 582 |
| Stall Torque | Nm | 0.008 - 9.0 | 0.29 - 1875 |
| Voltage | VDC | 24 - 100 | 48, 150, 300 |
| No-load Speed | RPM | 419 - 18298 | 17 - 7100 |

Housed Brushless Torque Motors

CM and **Megaflux** series housed brushless torque motors feature rugged machined aluminum housings with robust duplex bearings — ready to mount into your application.

Need something special? Allied Motion engineers can custom-design a version to meet your specific application requirements.

CM Series

- Available with eight different optical encoder versions, including absolute formats
- Ultra low distortion incremental sine/cosine encoder, a digital incremental encoder with up to 1,250,000 CPR or a 17-bit absolute Gray code encoder.

Megaflux Series

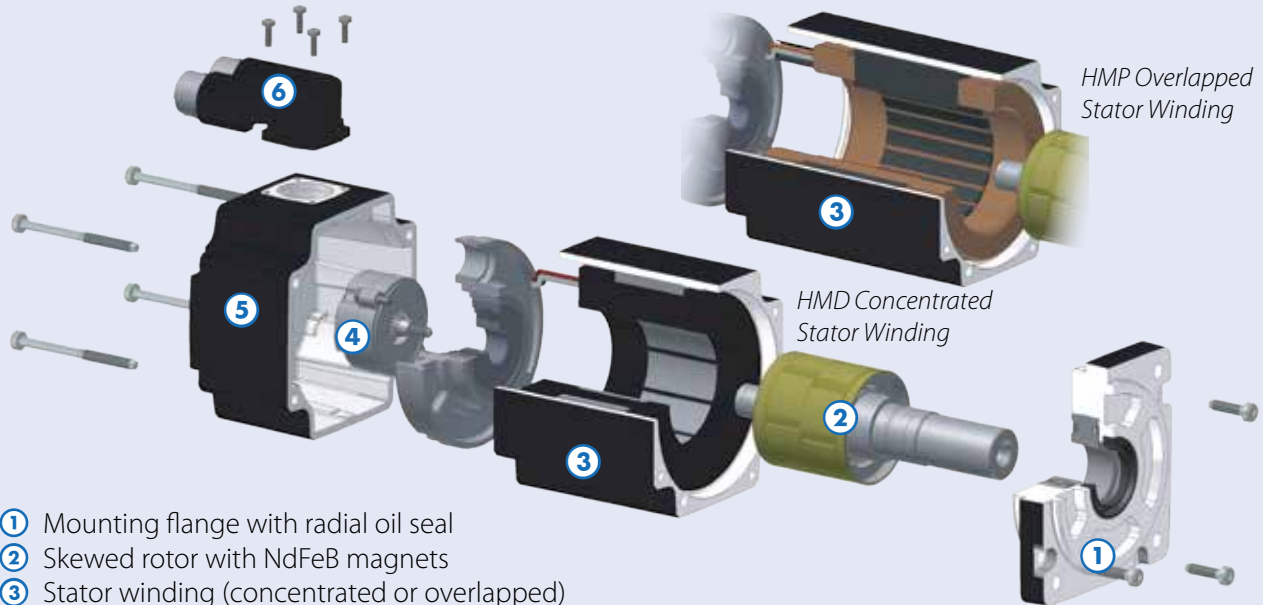
- Available with or without an integrated electronic drive and optical encoder for an extremely compact complete direct-drive solution
- Fully integrated units include high performance brushless torque motor, digital servo drive, and a programmable, high resolution optical encoder



| Performance | | CM | Megaflux w/Drive |
|---------------|-----|--------------|------------------|
| Nominal O.D. | mm | 66 - 140 | 110 - 170 |
| Nominal I.D. | mm | 15 - 63.5 | 50.8 - 63.5 |
| Rated Torque | Nm | 0.215 - 8.41 | 1.0 - 2.9 |
| Voltage | VDC | 24 - 100 | 48 |
| No-load Speed | RPM | 44 - 2027 | 2450 - 4900 |

Brushless Servo Motors

HeiMotion Dynamic and Premium Brushless Servo Motor Technology



- ① Mounting flange with radial oil seal
- ② Skewed rotor with NdFeB magnets
- ③ Stator winding (concentrated or overlapped)
- ④ Feedback (resolver or encoder)
- ⑤ Motor end cap
- ⑥ Y-Tec connection technology

HeiMotion are permanent magnet, three-phase synchronous high performance servo motors with neodymium-iron-boron (NdFeB) rotor magnets.

The primary technology differences between the **HMD (Dynamic)** and **HMP (Premium)** series are (i) the HMD has a special rotor lamination geometry for lower inertia and higher dynamic performance, and the HMP has higher inertia for better inertia matching in larger load applications. And, (ii) the HMD uses concentrated winding technology (item 3) to minimize end turns for optimum efficiency and shortest length, whereas the HMP uses a proven distributed stator winding technology to realize a more compact, highly efficient motor than similar products on the market.

HeiMotion Dynamic and Premium motors are engineered to be highly modular in order to reduce manufacturing time and take advantage of a common-component platform of feedback devices (including high-resolution HIPERFACE®-DSL), connector types and other selectable options. The result is well over a million possible models, any of which can be delivered in an industry-leading short lead time. All HeiMotion motors have cURus recognition to comply with Canadian and U.S. safety standards.

Technology Advantages & Benefits

- Minimized inertia for very high acceleration capability (HMD)
- 35% shorter motor compared to other servo motors (HMD)
- Winding voltage choices for use with DC- or AC-fed controllers
- Integrated KTY sensor for easy implementation of motor over temperature sensing
- Rotatable double- and single-cable connector arrangements for ease of installation
- Optimization of windings and rotor designs results in high efficiency and extremely low cogging and torque ripple (<2%)
- Optimized bearing system for low noise and very long life even at elevated temperatures

Typical Applications

- Base, shoulder and joint axes on industrial assembly, welding, and machine loading robots
- CNC machine tool axis and spindle drives
- Telescope and antenna pointing and tracking
- Printing and converting machines
- Multi-axis positioning and gantry systems
- Pick-and-place PCB assembly machines
- Labeling and packaging machinery
- Machinery in the textile, food, rubber and testing system industries

Metric Brushless Servo Motors

HeiMotion Dynamic and **Premium** are permanent magnet, three-phase synchronous servo motors with neodymium-iron-boron (NdFeB) rotor magnets. The **HeiMotion Dynamic** and the **Premium** series are high performance metric dimension AC brushless servo motors. The lower inertia Dynamic **HMD** series is best where highly dynamic performance is required, while the Premium **HMP** series is ideal where higher torque and/or higher inertia loading is specified.

Multiple frame sizes and stack heights plus options for feedback devices, connectors and other motor features

results in over a million different configurations from which to choose.

Available feedback options include resolver (standard), incremental encoder, SSI absolute encoder (up to 32-bit), Hiperface®, or Hiperface® DSL. Other options include dual or single connector types, shaft key and a holding brake.



| Performance | | HMD | HMP |
|--------------|-----|------------------|--------------------------------|
| Frame | mm | 60, 80 | 40, 60, 80, 100, 130, 150, 190 |
| Stall Torque | Nm | 0.5 - 6.0 | 0.18 - 110 |
| Power | W | 150 - 1950 | 50 - 14,000 |
| Voltage | VDC | 24, 48, 320, 560 | 48, 320, 560 |
| Rated Speed | RPM | 3000 - 6000 | 2000 - 9000 |

Brushless Servo Motors

Quantum high performance brushless servo motors are available as housed NEMA frame or as frameless versions.

NEMA housed versions are supplied standard with Hall-effect commutation sensors. Customization options include an encoder, holding brake, flange and shaft modification, and sealing level.



| Performance | | QB017 | QB023 | QB034 | QB056 | |
|-------------|-------------------------|-------|---------------|---------------|---------------|--------------|
| Housed | NEMA Frame | 17 | 23 | 34 | 56 | |
| | Rated Torque | Nm | 0.05 - 0.28 | 0.22 - 1.25 | 0.56 - 3.05 | 2.8 - 11.1 |
| | Power | W | 68 - 213 | 154 - 460 | 148 - 897 | 957 - 2551 |
| | Voltage | VDC | 24, 40, 130 | 24, 40, 130 | 24, 40, 130 | 40, 130, 300 |
| | Rated Speed | RPM | 3850 - 13800 | 1700 - 7900 | 878 - 6600 | 1911 - 4360 |
| Frameless | Frame Size | mm | 35.81 | 55.37 | 81.28 | 127.00 |
| | Rotor Length | mm | 25.40 - 63.50 | 31.75 - 88.90 | 31.75 - 88.90 | 45.2 - 174.5 |
| | Continuous Stall Torque | Nm | 0.069 - 0.320 | 0.348 - 1.328 | 0.835 - 3.202 | 4.22 - 15.04 |
| | Voltage | VDC | 24, 40, 130 | 24, 40, 130 | 24, 40, 130 | 40, 130, 300 |
| | No-load Speed | RPM | 3850 - 13800 | 1700 - 7900 | 878 - 6600 | 1911 - 4360 |

Brushless Servo & DC Gear Motors



Allied Motion offers a variety of both brushless DC and brush DC gear motors to meet the demands of commercial, industrial and mil-aero applications.

We offer the following types of gear motors:

- Right-angle shaft
- Parallel-shaft
- Planetary (epicyclic)

A wide range of gearing types, output torques and speeds are available from Allied Motion's families of gear motors. If, however, your application demands differ from our standard offerings in winding voltages, gear ratios, or other requirements, keep in mind that Allied Motion welcomes the opportunity to provide a custom gear motor to match your specific requirements.

Brushless Servo Gear Motors

The **HeiMotion** series of servo gear motors combine a **HMD** or **HMP** brushless servo motor with a directly integrated planetary gearhead. The combination is engineered to minimize overall length and audible noise.

Any of the HMD or HMP servo motors may be specified with one of four types of gearhead. The four gearhead types allow tailoring of the gear motor's radial and axial force capability, backlash, stiffness and mechanical interface to suit the application.

Reduction ratios ranging from 3:1 to 10:1 (single-stage) and 9:1 to 64:1 (two-stage) are offered. These economical gear motors boost HMD and HMP output torque levels to match the load requirements of the application.



| Performance | | HMD | | HMP | |
|--------------|-----|------------------|------------|----------------------|------------|
| | | 1 | 2 | 1 | 2 |
| Stages | qty | 1 | 2 | 1 | 2 |
| Frame | mm | 60, 80 | | 40, 60, 80, 100, 130 | |
| Ratio Range | n:1 | 3 - 10 | 9 - 64 | 3 - 10 | 9 - 64 |
| Stall Torque | Nm | 1.44 - 48 | 4.28 - 176 | 0.53 - 152 | 1.56 - 416 |
| Voltage | VDC | 24, 48, 320, 560 | | 24, 48, 320, 560 | |
| Rated Speed | RPM | 300 - 2000 | 47 - 667 | 300 - 2000 | 47 - 667 |

Industrial PMDC Gear Motors

Allied Motion offers **PMDC gear motors** in right-angle and parallel shaft versions.

These rugged gear motors are ideal for use in battery-fed commercial or industrial applications like medical mobility, material handling, linear actuators and similar applications.



| Performance | | Right Angle Shaft | | | | Parallel Shaft | | | | |
|--------------|-----|-------------------|----------|----------|------------|----------------|--------------|------|----------|-----------|
| | | RAA | RAB | RAC | RAD | IM-13 | IM-15 | PLA | PLB | PLC |
| Frame Size | mm | 76.2 | 76.2 | 82.6 | 91.4 | 30.2 | 40.1 | 63.5 | 73 | 82, 92 |
| Length | mm | 185.4 | 225.3 | 195.6 | 327.7 | 71 – 82.1 | 93.4 – 103.9 | 160 | 115 | 268, 277 |
| Gear Ratio | n:1 | 35 | 58 | 47, 30 | 18 – 29 | 6.3 – 1803.6 | 5.9 – 4732.5 | 208 | 16.8, 29 | 20.4 |
| Rated Torque | Nm | 2.3 | 4.1, 8.7 | 1.0, 6.2 | 8.5 – 17.5 | 0.06 – 1.13 | 0.134 – 2.12 | 11.3 | 3.0, 5.9 | 6.2, 14.0 |
| Power | W | 22 | 33, 37 | 48, 78 | 96 – 254 | 2.72 – 4.18 | 8.17 – 15.7 | 27 | 82 | 144, 297 |
| Voltage | VDC | 12 | 12 | 12, 115 | 24 | 12, 24 | 12, 24 | 12 | 24 | 24, 120 |
| Rated Speed | RPM | 100 | 37, 77, | 34, 119 | 108 – 170 | 2.88 – 825.4 | 1.1 – 881.36 | 23 | 130, 255 | 202, 221 |

Industrial & Mil-Aero Planetary Gear Motors

Allied Motion offers a full line-up of **Globe** small-frame fractional horsepower planetary gear motors. The **CLL, CMM, IM** and **NB** series are suitable for industrial applications.

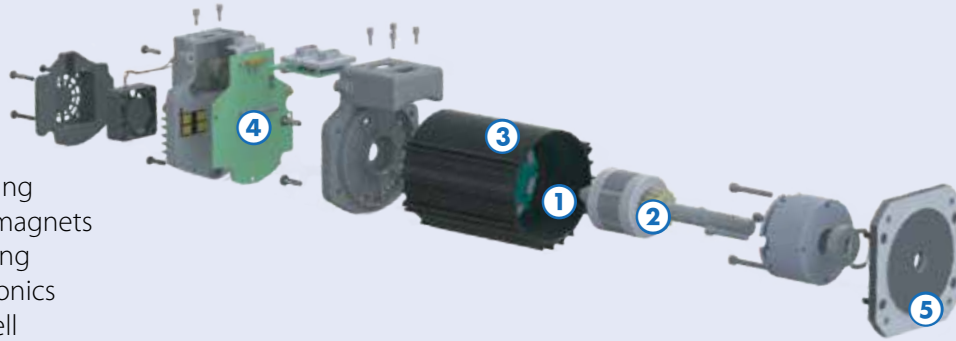
The **BD, BL, CM, LL, MM, NB, SD** and **SS** are specifically tailored for mil-aero (mil-spec) applications. All units are equipped with PMDC motors or brushless DC motors. Custom versions of the standard models are available.



| Performance | | Industrial | | | | Mil-Aero | | | | | | | |
|-----------------|-----|--------------|--------------|--------------|-----------------|--------------|--------------|---------------|---------------|---------------|---------------|--------------|--------------|
| | | CLL | CMM | IM | INB | BD | BL | CM | LL | MM | NB | SD | SS |
| Frame Size | mm | 32 | 32 | 30.2 – 40.1 | 20.3 – 38.1 sq. | 38.1 | 38.1 | 19.2 sq. | 31.8 | 31.8 | 38.1 sq. | 19.1 | 22.23 |
| Length | mm | 81 – 111.5 | 72.7 – 102.4 | 79.9 – 131.2 | 76.4 – 115.3 | 84.8 – 141.0 | 94.5 – 150.4 | 34.87 – 41.63 | 70.9 – 105.2 | 62 – 96.5 | 67.87 – 133.6 | 62.2 – 84.6 | 57.7 – 87.63 |
| Gear Ratio | n:1 | 4 – 46656 | 4 – 46656 | 4 – 46656 | 3.82 – 46656 | 3.81 – 5211 | 3.81 – 5211 | 18.78 – 780.6 | 18.78 – 21808 | 18.78 – 21808 | 3.81 – 21808 | 3.82 – 36873 | 3.82 – 36873 |
| Rated Torque | Nm | 0.036 – 8.83 | 0.036 – 8.83 | 0.03 – 8.83 | 0.007 – 8.83 | 0.12 – 62.2 | 0.12 – 62.2 | 0.07 – 2.17 | 0.14 – 8.8 | 0.08 – 8.8 | 0.12 – 62.2 | 0.005 – 2.12 | 0.007 – 2.12 |
| Power | W | 0.9 – 14.6 | 0.9 – 14.6 | 2.7 – 15.7 | 7.2 – 66 | 2.1 – 21.9 | 3.9 – 34.2 | 0.77 – 1.0 | 0.2 – 12.4 | 0.186 – 8.8 | 9.8 – 64.2 | 0.036 – 1.5 | 0.03 – 3.5 |
| Winding Voltage | VDC | 6 – 75 | 6 – 50 | 12, 24 | 24, 27 | 6 – 115 | 6 – 115 | 6, 12, 24 | 6 – 75 | 6 – 50 | 27 | 6 – 50 | 6 – 50 |
| Rated Speed | RPM | 0.1 – 3860 | 0.1 – 4120 | 0.1 – 1300 | 0.2 – 6283 | 0.864 – 3412 | 0.576 – 2625 | 3.08 – 129 | 0.22 – 830 | 0.2 – 984 | 0.41 – 3281 | 0.16 – 3627 | 0.13 – 4495 |

Brushless Motors with Integrated Controllers

EnduraMax Brushless DC Motor-Drives Technology



- ① Stator winding
- ② Rotor with magnets
- ③ Outer housing
- ④ Drive electronics
- ⑤ Front endbell

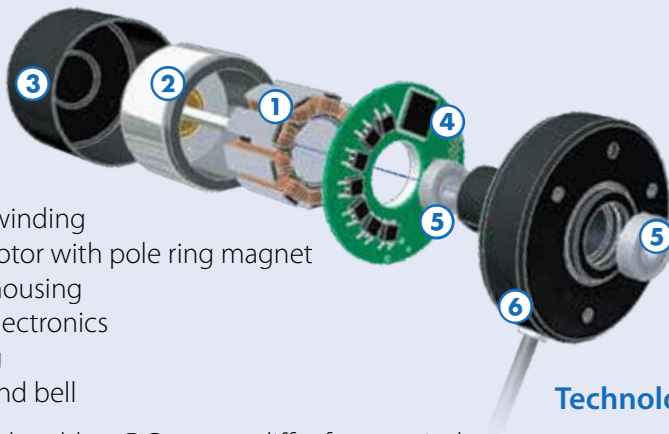
Integrated brushless DC motors combine a brushless DC motor and an electronic drive controller in a single compact package. This eliminates the wiring/cabling between these two elements as is normal in traditional, separate motor and drive combinations.

Allied Motion's **EnduraMax** brushless DC motor technology combines a segmented stator and shaped-magnet rotor to cost-effectively deliver high power and high torque density. The drive section includes a novel cold-plate design to enable better heat management.

Technology Advantages & Benefits

- Integration of motor with controller provides compactness and reduced wiring
- Torque and power density up to 40% better than brush DC motors, and even better if resistor packs are used to control motor speed
- Quieter than brush motors and no brush maintenance
- Control networks like CAN can be directly integrated into the motor (iDrive and sDrive models)

KinetiMax Brushless DC Motor-Drives Technology



- ① Stator winding
- ② Outer rotor with pole ring magnet
- ③ Outer housing
- ④ Drive electronics
- ⑤ Bearing
- ⑥ Front end bell

Outer-rotor brushless DC motors differ from typical brushless DC motors in that the rotor revolves around the outside of the stator. The rotor is basically a steel cup with permanent magnet segments on its inside. The laminated core, multiphase stator is coupled to a controller board, and this assembly is fixed to the housing of the motor.

The sophistication of the integral controller can range from a simple unidirectional fixed speed drive to one with bidirectional, variable speed characteristics.

Technology Advantages & Benefits

- Higher inertia that helps "ride through" torque variations in pump applications and the optimized magnetic design minimizes cogging
- The larger air gap radius boosts output torque compared to inner-rotor designs
- Ability to direct mount scanner mirrors to the rotor results in a more compact scanner
- Higher pole count and inertia result in better low speed stability without feedback
- Lower audible noise for use in "quiet" applications

Brushless DC Motor with Integrated Controller

EnduraMax brushless DC motor-drives with integrated drive electronics are a cost-effective solution for torque, speed and/or position control in a broad range of applications such as mobile HVAC, pumps, valves, linear actuators, mobile robots, conveyors and similar systems.

EnduraMax i series include an integral 4096 CPR encoder and are designed for closed-loop control. Options include CANopen, a holding brake and IP-67 sealing.

EnduraMax S series employ patented sensorless brushless technology, and are engineered for speed control. They start reliably under load and offer better than a 20:1 speed range.



| Performance | Torque, Speed, Position Control | | Bi-Directional Speed Control | |
|------------------------------------|---------------------------------|-------------|------------------------------|-------------|
| | 75I | 95I | 75S | 95S |
| Frame Size (NEMA and/or O.D. – mm) | 75 | NEMA 34, 95 | 75 | NEMA 34, 95 |
| Length (max) mm | 102 | 127.3 | 96 | 123 |
| Rated Torque Nm | 0.47 - 1.36 | 0.64 - 2.4 | 0.45 - 1.32 | 0.61 - 2.28 |
| Power W | 150 - 375 | 250 - 750 | 143 - 356 | 238 - 712 |
| Voltage VDC | 12, 24, 48 | 12, 24, 48 | 12, 24, 48 | 12, 24, 48 |
| Rated Speed RPM | 1900 - 5000 | 1550 - 4800 | 1900 - 5000 | 1550 - 4800 |

Outer-Rotor Brushless DC Motors

The **KinettiMax** series are precision outer-rotor brushless DC motors with integrated drive electronics.

With the outer-rotor design, the rotor revolves around an inner iron core stator, which minimizes cogging and maximizes output torque.

The outer-rotor design is particularly well suited for precision pumps,

especially in medical equipment, where they help overcome torque variations.

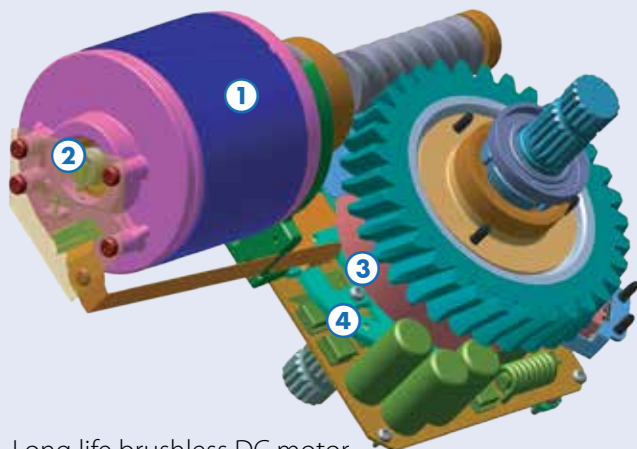
KinettiMax motors are also ideal for use in scanners where smooth constant speed rotation is a must, or for many types of small pumps, fans, blowers and instruments. KinettiMax are also available as motor-only models with Hall sensors.



| Performance | | KMX24 | KMX32 | KMX42 | KMX54 | KMX68 |
|-------------------|-----|-----------|------------|--------|-------------|--------------|
| Frame Size – O.D. | mm | 24 | 31.7 | 42 | 54 | 68 |
| Length (max) | mm | 26.3 | 42.3 | 53 | 30.4, 37.25 | 49.1, 62.1 |
| Rated Torque | mNm | 6 | 32 | 65, 70 | 30, 40 | 70, 110, 170 |
| Power | W | 2.2, 2.7 | 12, 16 | 29, 32 | 10, 12, 16 | 35, 50 |
| Voltage | VDC | 6, 12, 24 | 12, 24 | 12, 24 | 12, 24 | 24 |
| Rated Speed | RPM | 4250 | 3450, 4750 | 4300 | 2700 - 3750 | 2400 - 3750 |

Electric Power Assisted Steering

Electric Power Assisted Steering Technology



- ① Long life brushless DC motor
- ② High resolution encoder for sinusoidal motor control
- ③ Contactless magnetic torque sensor
- ④ Integrated power electronics with CAN communication

Allied Motion's **POW-R STEER®** Electric Power-Assisted Steering (EPAS) actuator is a high performance, programmable steering assist system intended for application in off-road recreational as well as many types of utility vehicles.

The unit consists of a brushless DC permanent-magnet electric motor (item 1) designed for low cogging torque and high torque density. Low inductance windings and high energy magnets enable very fast response times, high steering torque assist and greater power density. The motor is fitted with a high-resolution encoder (item 2) to enable smooth sinusoidal motor control.

A contactless torque sensor (item 3) senses applied steering shaft torque. It, the motor, and the encoder interface to the integrated intelligent controller and motor power electronics package (item 4). The controller uses Space Vector Pulse Width Modulation (SVPWM) technology to efficiently control the motor.

The controller includes a CAN port to enable the POW-R STEER's factory settings to be developed and tested, and then permanently stored in the controller. Feature selections and steering response refinements are easily made using a graphical PC-based, development application supplied by Allied Motion to the OEM. Torque control parameters include: basic assist as a function of vehicle speed, assist as a function of steering speed, and kickback damping control.

Helical worm reduction is incorporated to deliver steering torque assistance smoothly and quietly. The complete assembly is built into a robust, sealed die-cast aluminum housing to withstand the vagaries of harsh outdoor conditions.

Technology Advantages & Benefits

- Long life brushless low-cog, low torque ripple motor driven by an efficient, on-board space-vector PWM controller
- Long life non-contacting steering torque sensor
- Integrated motor control assembly minimizes wiring
- Programmable controller with CAN port enables easy set-up and monitoring
- PC-based, graphical application facilitates easy actuator characterization during development
- Splined shafts and piloted mount with retained bolts for ease of assembly and maintenance
- Kickback damping feature and worm drive reduction for sure, quiet operation
- Aluminum die-cast housing for robustness and mechanical protection

Typical Applications

Electric power steering assist for marine, agricultural, and recreational sport vehicles, construction equipment, material handling equipment, and autonomous transporter vehicles.



Allied Motion EPAS actuators are used on a wide range of ATV, off-road sport vehicles, lawn and garden utility products, and more.

Integrated Electric Power Assist Steering Actuator

POW-R STEER®, our Electric Power Assisted Steering (EPAS) actuator, comes complete with a low-cog, PM brushless DC motor, non-contacting torque sensor and integrated controller.

A PC-based, graphical user interface (GUI) enables easy function programming during the OEM development process. Worm reduction and Space Vector Pulse Width Modulation (SVPWM) motor control means that operation will be smooth and quiet.

Applications include marine, agricultural, and power sport vehicles, construction equipment, material handling and autonomous (AGV) vehicles.

Features

- EPAS Actuator with motor, worm drive gearing, non-contact torque sensor, and integral controller electronics
- Settable speed-dependent performance
- CAN programming and diagnostics
- PC-based GUI for development
- Splined input and output shafts
- Kickback damping
- Piloted mounting with bolt retention
- Rugged aluminum die-cast housing



Specifications

| | |
|-----------------------------|---------------|
| Operating supply voltage | 9-16 VDC |
| Operating temperature range | -40 to +85 °C |
| Protection rating | IP-67 |
| Total weight | 5.9 kg |
| Assist torque ratio | 0.88 Nm/A |
| Max assisted output speed | 650°/sec |
| Max battery current | 50 A |
| Quiescent current | < 100 µA |
| Two integral connectors | CAN and power |

Brushless Hydraulic Pump Motors and Electric Steering Motors with Integrated Drive Electronics

Allied Motion's **EHS** brushless electrohydraulic drive motors are specifically designed for demanding applications such as electro-hydraulic steering of buses and trucks, and lift- or auxiliary applications on fork lift trucks. Directly connected to hydraulic pumps they provide an intelligent node in a modern vehicle network. The EHS's robust construction is designed for long life, even in extreme conditions.

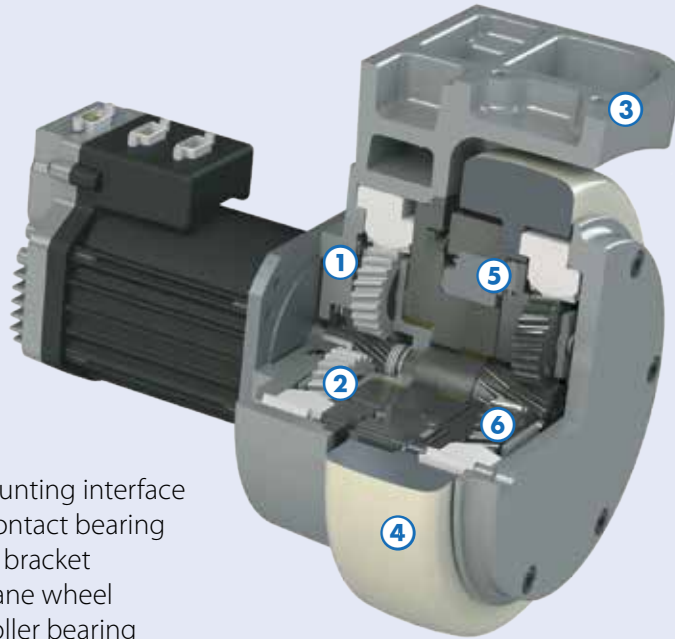
Our **EPS** series of brushless electric steer-by-wire motors offers compact, versatile, long-life, trouble-free steering for all common warehouse truck sizes, from the smallest pallet lifter to multi-ton reach trucks or three-wheel counter balance trucks.



EHS (above) electrohydraulic drive motors; EPS brushless electric steering motor (left) for all-electric power-assisted steering applications

Mobile Power Drive Systems

WheelMax™ Integrated Wheel Drive Technology



- ① Motor mounting interface
- ② Angular contact bearing
- ③ Mounting bracket
- ④ Polyurethane wheel
- ⑤ Tapered roller bearing
- ⑥ Helical gear

Electrically powered wheel drive assemblies are increasingly used in automated as well as manually-guided vehicles for the transport of material and persons in a variety of settings from factories to hospitals.

Allied Motion's family of wheel drives has been specifically designed for electric vehicles. The wheel consists of an integrated two-stage epicyclic or single-stage cycloidal gear train that offers a high reduction in a small compact package. Gear geometry is optimized to reduce noise and vibration, while improving gear life. Helical gearing (item 6) increases load carrying capacity and further reduces noise.

An input stage angular contact bearing (item 2) supports large axial loads, enhancing bearing life when operating at peak torque. The wheel's single tapered roller bearing (item 5) ensures true axis rotation, and is sized to maximize load carrying capacity. The bearing system is designed so it is exposed solely to the radial loads of the vehicle, extending its life.

Allied Motion complements the wheel drive with either a brush or a brushless motor with a variety of options, including integrated drive electronics and releasable holding brake.

Technology Advantages & Benefits

- Choice of either a PMDC brush or a brushless DC motor (with or without integrated drive electronics)
- Customized mounting bracket (item 3) for ease of assembly to vehicle
- Modular motor mounting interface accommodates a range of motors
- Epicyclic or cycloidal in-wheel gearing enables high gear reduction
- Optimized gear geometry to maximize life and minimize noise and vibration
- Helical gears to increase load carrying capacity
- Lifetime lubrication reduces service maintenance and vehicle downtime
- Tapered roller bearing increases load carrying capacity, bearing life, and rotational accuracy
- Angular contact bearing handles large axial loads

Typical Applications

- Patient handling beds
- Automated/autonomous medical supplies delivery carts
- Service robots for delivery and fetching applications
- Factory automation AGVs and powered pusher/tow/tugger assist vehicles
- Electric fork and scissor lifts

Powered Traction Wheels

Our new **WheelMax™** series are compact integrated traction wheel drives complete with wheel, tire, mounting bracket, and motor. A choice of a brushless motor with on-board power drive electronics or a brush DC motor is available to complete the WheelMax.

WheelMax is specifically designed to provide traction in autonomous electric vehicles in a broad range of applications in factories, warehouses, hospitals, and military robots, to name a few.

An optional add-on electric steering module is available to complement the WheelMax and provide a complete, steerable electric wheel drive.



| Performance | | WM6 | WM8 |
|-----------------------|---------------|-----------|-------------------------|
| Nominal Tire Diameter | mm | 150 | 200, 250 |
| Rated Load | kg (lb) | 227 (500) | 227 (500) 454 (1000) |
| Rated Torque | Nm | 10.4 | 10.4, 18.1 |
| Power | W | 152 | 152, 190 |
| Voltage | VDC | 24, 48 | 24, 48 |
| Rated Speed | km/h (MPH) | 5.3 (3.3) | 5.7 (3.5) |

Brushless & Brush DC Transaxles

Allied Motion offers three series of power differentiating **Transaxles** for use in mobile electric utility vehicles, AGVs and robots:

DDA series dual-drive enables zero turn radius

GTA series is our standard-duty transaxle with up to 3/8 HP output shaft power

GTB series is our heavy-duty transaxle with over 1 HP output shaft power

Models with either brushless or brush DC motors are available. Custom variations can be engineered to exactly meet requirements.



| Performance | | DDA | GTA | GTB |
|--------------|-----|------|----------|------------|
| Rated Load | kg | 454 | 544 | 907 |
| Rated Torque | Nm | 19.8 | 11.3, 14 | 94.5, 22.6 |
| Power | W | 250 | 187, 224 | 769, 552 |
| Voltage | VDC | 24 | 24 | 36 |
| Rated Speed | RPM | 121 | 155 | 78, 233 |

DC Motors

PMDC Motors

Allied Motion's **Endurance** series are permanent-magnet brush DC motors that satisfy the needs of commercial and industrial applications that require continuous duty at fixed or variable speed.

Four frame sizes are offered, from 2.0 up to 4.0 inches in diameter. Designed especially for mobile applications, winding choices are 12 and 24 VDC. Power output ranges from 56 up to 373 W continuous.



| Performance | | Endurance 20 | Endurance 25 | Endurance 30 | Endurance 40 |
|--------------|-----|---------------|--------------|---------------|---------------|
| Frame Size | mm | 50.8 | 64 | 76 | 102 |
| Length | mm | 97.3 – 122.7 | 75.4 – 113.5 | 76.02 – 151.7 | 118.2 – 156.3 |
| Rated Torque | Nm | 0.113 – 0.226 | 0.07 – 0.42 | 0.14 – 0.99 | 0.56 – 1.69 |
| Power | W | 56 – 87 | 22 – 150 | 44 – 200 | 186.5 – 373 |
| Voltage | VDC | 12, 24 | Up to 170 | Up to 170 | 12 |
| Rated Speed | RPM | 3267 – 6200 | 2600 – 3500 | 1750 – 3000 | 1300 – 4800 |

Globe Line PMDC Motors

Our **Globe** line of PMDC motors are available for applications that require smaller diameter, lower power motors. The Globe line is offered in industrial (**CLL**, **CMM** and **IM** series) and numerous mil-spec rated designs (**BD**, **BL**, **GRP**, **LL**, **MM**, **SD** and **SS**). Some series are available with brakes, tachometers, and gearheads for greater torque output.



| Performance | | Industrial | | | Mil/Aero | | | | | | |
|-----------------|-----|--------------|--------------|---------------|---------------|---------------|-------------|--------------|--------------|--------------|--------------|
| | | CLL | CMM | IM | BD | BL | GRP | LL | MM | SD | SS |
| Frame Size | mm | 32.0 | 32.0 | 30.18, – 54.0 | 38.1 | 38.1 | 57.2 | 30.2, 31.8 | 30.2, 31.8 | 19.1 | 22.23 |
| Length | mm | 53.1 | 44.5 | 48.18 – 125.8 | 65.02 – 109.2 | 74.68 – 118.6 | 95.3 | 53.1, 60.5 | 44.5, 51.6 | 36.9 | 35.1, 42.2 |
| Rated Torque | mNm | 5.3 – 12.7 | 2.47 – 7.06 | 10.6 – 247 | 9.9 – 26.1 | 17.7 – 53 | 56.5 – 113 | 5.3 – 12.7 | 2.5 – 7.06 | 0.71 – 2.6 | 1.2 – 3.2 |
| Power | W | 11.2 | 7.5 | 3.7 – 74.6 | 7.5, 16.4 | 14.9, 24.6 | 61.9 | 11.2 | 7.5 | 1.9 | 3 |
| Winding Voltage | VDC | 6 – 75 | 6 – 50 | 12 – 30.3 | 6 – 115 | 6 – 115 | 6 – 115 | 6 – 75 | 6 – 50 | 6 – 50 | 6 – 50 |
| Rated Speed | RPM | 4500 – 16000 | 4600 – 19200 | 3100 – 6400 | 4500 – 14000 | 3000 – 11500 | 2400 – 8500 | 4500 – 16000 | 4600 – 19200 | 6500 – 14500 | 5500 – 17000 |

Specialty Brushless & DC Motors

Coreless Brush DC Motors

The **CL** series are compact coreless rotor DC motors exhibiting low inertia and maximized performance through the use of high performance permanent magnets and a uniquely wound and formed coreless rotor. In the CL29 and CL40 a precious-metal commutation system is used.

CL motors are efficient, having zero iron loss, and, being coreless, they have no preferred rotor position (cog-free) and minimal torque ripple.

Available in three diameters (29, 40, and 66 mm), CL series motors are ideal for medical devices, small pumps, mirror/prism drives, and ticket and money dispensers.

Planetary and spur gearboxes are available for the CL series in ratios from 4:1 up to 1100:1.



| Performance | | CL29 | CL40 | CL66 |
|--------------|-----|-----------|-------------|-------------|
| Frame Size | mm | 29 | 40 | 66 |
| Length | mm | 39.5 | 39.6, 42 | 64 |
| Rated Torque | mNm | 10 | 22, 26 | 100 |
| Power | W | 3 | 7, 12 | 25 |
| Voltage | VDC | 6 – 24 | 6 – 30 | 12 – 36 |
| Rated Speed | RPM | 2380-2680 | 2650 – 4170 | 1800 - 2540 |

Small-Frame Brushless DC Motors

Allied Motion’s **Globe** series are small frame, rare-earth brushless DC motors.

The **INB** series are intended for industrial applications and to be paired with external drives such as Allied Motion’s DPFlex or SXD series drives. The **NB** series is mil-spec rated and designed for mil/aero applications.

All models incorporate Hall commutation sensors as standard. Both series can be equipped with gearheads to boost output torque.



| Performance | | INB-08 | INB-15 | NB-15 |
|--------------|-----|--------|-------------|--------------|
| Frame Size | mm | 20.3 | 38.1 sq. | 38.1 sq. |
| Length | mm | 54.4 | 54.4 | 54.4 |
| Rated Torque | mNm | 7.1 | 71 | 60 |
| Power | W | 18 | 70.1 | 70.1 |
| Voltage | VDC | 24 | 27 | 27 |
| Rated Speed | RPM | 24000 | 7500, 10500 | 9000 - 12500 |

Specialty Medical Motors

Brushless Handpiece Motors

Allied Motion's **PerformeX** are rare-earth magnet, inner-rotor, slotless, small-frame brushless motors, designed specifically for medical handpiece applications. Patented technology enables the PerformeX to deliver unprecedented torque and power of more than double that available with competitive motors.

PerformeX motors are capable of very high speed (82,000+ RPM). As an option, these motors can be supplied rated for 1000+ autoclave cycles. Optional gearheads are offered as well in ratios of 5:1 and 25:1.



| Performance | | Size 5 | Size 6.5 | Size 9 |
|------------------|-----|--------------|--------------|--------------|
| Frame O.D. (nom) | mm | 12.7 | 16.5 | 22.2 |
| Length (nom) | mm | 50.3, 54.4 | 44.3, 51.4 | 55.6, 61.7 |
| Rated Torque | mNm | 8.5, 10.5 | 10.9, 18.7 | 23, 30.9 |
| Power | W | 13 - 49 | 35 - 70 | 70 - 140 |
| Voltage | VDC | 24, 48 | 24, 48 | 24, 48 |
| Rated Speed | RPM | Up to 82,700 | Up to 51,600 | Up to 51,600 |

Very High Speed Brushless Ventilator Motors

The **ResMax** is a 28 mm diameter, small 3-phase brushless DC motor capable of very high operating speed, up to 90,000 RPM. A very low inertia rotor design gives the ResMax 28 a low time constant of just 4 milliseconds (0 to 50,000 RPM in just 100 msec), making it ideal for highly dynamic applications like ventilators and respirators.

The ResMax is up to 90% efficient, and cool-running, which helps boost bearing life to 30,000+ hours even at full operating conditions.

Features

- 28 mm diameter low inertia brushless DC motor
- Speed up to 90,000 RPM
- Rated power output of 46 W
- Low time constant of 4 ms
- 24 VDC winding voltage
- Hall sensors for external three-phase controller



The high-speed ResMax brushless DC motor is designed specifically for clinical ventilators and similar applications.

Blowers and Blower Systems

Mil-Aero Blowers

Allied Motion offers the **Globe** line of mil-aero blowers in tubeaxial and vaneaxial versions for aerospace and military applications.

These precision units are available in both DC-powered and AC-powered models in a range of airflow capacities to suit various mil-aero cooling and exhausting applications.



| Performance | | LL | MM | SS | MC | SC | VAX |
|-------------|--------------|--------------|--------------|--------------|--------------------------|--------------------------|---|
| Type | | Tubeaxial | Tubeaxial | Tubeaxial | Tubeaxial | Tubeaxial | Vaneaxial |
| Frame Size | mm | 66.7 sq. | 57.2 | 57.2 sq. | 57.2 sq., 66.7 sq. | 57.2 sq. | 44.5 – 76.2 |
| Length | mm | 99.2 | 89.7 | 50.8 | 85.7 | 50.8 | 38.1 – 98.3 |
| Air Flow | CMM (CFM) | 1.64 (58) | 0.71 (25) | 0.71 (25) | 0.57 – 1.75 (20 – 62) | 0.85 – 1.42 (30 – 50) | 0.28 – 4.73 (10 - 167) |
| Power | W | 16.2 | 10.8 | 5.4 | 11 – 20 | 12 – 30 | 7.5 – 160 |
| Speed | RPM | 11000 | 10000 | 10000 | 3600 – 11800 | 9800 – 15000 | 11000 – 22500 |
| Voltage | | 27 VDC | 27 VDC | 27 VDC | 115 VAC | 27, 115, 200 VAC | 12, 26, 27, 28, 50 VDC 115, 200, 208 VAC |

Mobile HVAC Blower Systems

Allied Motion offers the **EnduraAir** series of centrifugal dual-scroll powered centrifugal blower assemblies. These blowers are engineered specifically for mobile HVAC applications in both on- and off-road vehicles such as transit buses, medium- and heavy-duty trucks, agricultural equipment and construction / mining vehicles.

EnduraAir blowers are available equipped with either a PMDC or BLDC motor. A variety of sizes are offered, along with options for speed control and sealing.

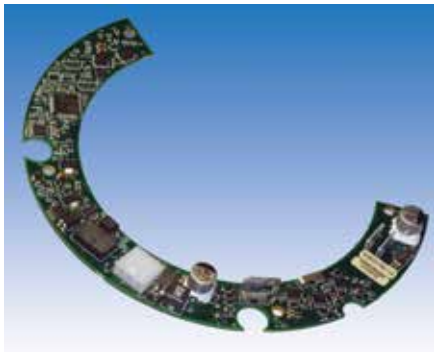


| Performance | | EAB-13.2R | EAB-14.0 | EAB-17.8 |
|-------------|-----|--|---------------------------------|--------------------------------|
| Type | | Centrifugal, Dual scroll | Centrifugal, Dual scroll | Centrifugal, Dual scroll |
| Air Flow | CFM | 260, 375, 475 @ 2.0" H ₂ O | 200 @ 0.48" H ₂ O | 400 @ 1.0" H ₂ O |
| Power | W | (26 v) 177, 252, 432 | (12 v) 86 | (12 V) 165 |
| Voltage | VDC | 12, 24 | 12, 24 | 12, 24 |

Motor Drives & Controllers

Brushless Servo Drives

Allied Motion offers modular brushless drives optimized to mate with our motors. The **SXD** is a modular, single-axis brushless servo drive. Our patented **DPFlex™** series offers robust, patented sensorless speed control of brushless motors that provides performance exceeding even conventional Hall-commutated drives.



Custom-designed brushless drive for integration into a torque motor

Allied Motion also offers our advanced drive technology in both standard and custom-designed drive assemblies that are integrated into our motor-drive series.



| Performance | | DPFlex II | SXD |
|-------------|-----|-----------------------------------|-------------------------|
| Type | | Sensorless Speed (bi-directional) | Single-axis Servo Drive |
| Power* | W | Up to 1200 | Up to 3000 |
| Current* | A | 5, 15, 30 | 15 |
| Voltage | VDC | 12, 24, 48 | 12 - 80 |
| I/O | | 3 IN, 1 OUT | 4 IN, 1 OUT |

* Heat sink temperature dependent

High Voltage AC Servo Motor Drives

Allied Motion's new **H Drive** was developed to be the perfect mate for our HeiMotion servo motors and Megaflux torque motors.

The H Drive can output up to 4800 Watts continuous power. Output voltage with 230 VAC input (single- or three-phase) is 300 V and RMS current values are 21 Arms peak and 12 Arms continuous.

Communication and command interfaces offered range from Ethernet to EtherCAT to traditional ± 10 V. A wide range of motor feedback is accommodated including resolvers, Hall-signals, and

several encoder types including incremental ABZ, sin/cos, BISS, EnDat, and Hiperface DSL. In addition, the H Drive offers six IN and 3 OUT isolated I/O, a programmable analog output, and STO safety I/Os.



| Performance | H Drive (HDA-208-17) |
|----------------|---------------------------------------|
| Type | AC Servo Motor Drive |
| Power* | Up to 4800 W |
| Current* | 12 continuous Arms, 21 peak Arms |
| Input Voltage | 110 – 240 VAC, 24 VDC logic maintain |
| Output Voltage | Up to 300 V |
| I/O | 6 IN, 3 OUT, analog out, STO |
| Communication | EtherCAT, Ethernet, ± 10 V analog |

* Heat sink temperature dependent

Optical Encoders

Incremental & Absolute Optical Encoders

Allied Motion offers **S21** and **CP** series of incremental and absolute rotary optical encoders.

Standard housed and modular units are available in several popular output formats and a wide selection of resolutions.

Custom designs are available and sold separately or integrated with our motors, including large through-bore units for our brushless torque motors.



| Performance | S21 | CP-200 | CP-300/500 | CP-800/900* |
|-------------|---|-------------------------------|--|--|
| Type | Incremental or Absolute | Incremental (modular) | Incremental or Absolute (housed) | Incremental or Absolute (housed) |
| Size mm | 53.3 rd. | 49 x 46 | 39 sq. | 63.5 |
| Formats | Analog sin/cos A/B/Z digital Abs. SSI Abs. parallel Incr. BISS C | Analog sine; A/B/Z digital | Analog sine; A/B/Z digital; parallel bit | Analog sine; A/B/Z digital; parallel bit |
| Resolution | 1024/4096 analog 1024 – 1.25M CPR BLDC commutation 16-bit binary 16-bit Gray Code 13-bit Gray Code | 100 - 1024 cycles/rev | 100 - 2048 cycles/rev 8-bit absolute | 360 - 4096 cycles/rev 12-bit absolute |

*HHC interpolated resolution models offer cycles/rev from 1600 to 1.25M.

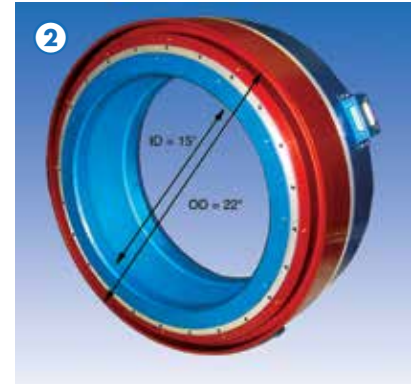
Custom Products

Custom & Specific Purpose Products

As the previous pages show, Allied Motion offers a very wide selection of standard motion control solutions to satisfy the requirements found in the commercial, industrial and aerospace and defense markets. And, we are adding new products every year to meet new demands we find in those markets.

However, a recognized strength of Allied Motion is our willingness and ability to develop custom motion control products and systems to meet the specific needs of customers. We may start with one of our standard products and modify it as needed, or as often is the case we start with a “clean sheet” and develop exactly what is needed when a modified standard will not suffice.

Shown here is just a sampling of some of the custom and specific purpose products we’ve developed for our customers.



- ① *Brushless Torque Motor with Integrated Controller for GPS-guided Steering on Agricultural Field Machinery*
- ② *Large Brushless Torque Motor for Space Station*
- ③ *Brushless Motor with Pump for Fuel-Cell Cooling System*
- ④ *Brushless Motors with Mirrors for Laser Scanner Systems*
- ⑤ *Brushless Gear Motor for Kidney Dialysis Machine*
- ⑥ *Brush DC Gear Motor with Integrated Controller for Agricultural Air Seeder System*
- ⑦ *Agricultural Seeder Actuator with Integrated Drive and Wireless Connectivity*
- ⑧ *Latch Pin Actuator with Integrated Drive for Military Vehicle Door*

Allied Motion Solution Centers

Allied Motion maintains Solution Centers in three geographically strategic locations to assist our customers with all aspects of their product selection and buying decisions. These three facilities assure you of local support no matter your location around the globe.

Each Solution Center is manned by experienced application engineering and customer service teams, which are available to provide:

- Application analysis assistance
- Detailed product information and documentation
- Standard product selection
- Product customization and options guidance
- Specification development assistance for custom-design products
- Price quotations
- Ordering, order status and shipment information
- Logistics assistance



For assistance with all of your motion applications, contact us at one of our continental Allied Motion Solution Centers.

Allied Motion also has a global network of factory trained selling partners to serve you. Visit our website for contact information for the Allied Motion Sales Partner nearest you.



Allied Motion Solution Center NA



Motion Solutions That Change the Game

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*High-Performance Specialty Motors
& Application-Specific Motion Systems*

Aerospace & Defense
Automation
Commercial-Consumer
Industrial
Medical
Pumps
Robotics
Vehicles