

# Pump Application Solutions



**Allied Motion**  
*Motion Solutions That Raise The Bar*  
[www.alliedmotion.com](http://www.alliedmotion.com)



## A World of Motion Solutions from Allied Motion Technologies

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.



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• EUROPE: +31

# Pump Application Solutions

This application solutions catalog presents a selection of pump applications in which Allied Motion products helped our customers "raise the bar."

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# Why choose Allied Motion to be your motion solutions provider...

There are reasons our customers do business with Allied Motion, and why they have come to rely on us more as a partner than just a vendor. Here are a few of those reasons:



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## **LEAN ENTERPRISE USING ALLIED SYSTEMATIC TOOLS (AST)**

AST is our set of lean enterprise business tools that drive continuous improvement. AST insures our customers of quality products and service at the best possible price.



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## **QUALITY SYSTEMS**

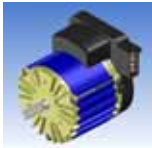
Our commitment to apply Six Sigma principles and achieve ISO and AS certification are a way of life and a continuous journey at Allied Motion.



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## **GLOBAL MANUFACTURING + LOCAL ENGINEERING**

- Consistent product performance, reliability, and quality whether we produce our products in Asia, Europe, or North America
- Regional Application and Design Engineering teams close to our customers to insure we always **“Speak Your Language.”**



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## **ADVANCED TECHNOLOGY PRODUCTS**

Allied Motion develops products that “raise the bar” for our customers. We use our eXtreme design process to insure superior performance and quality in our products.



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## **OUTSTANDING CUSTOMER SERVICE**

We continuously strive to improve our customer service so that your interactions with Allied Motion personnel always exceed expectations.

# New Products From Allied Motion

## RAF 30 SERIES RIGHT-ANGLE BRUSHLESS DC GEARMOTORS

A complete drive solution, the RAF 30 right-angle **brushless DC gearmotor** includes integral drive electronics, and optional encoder. These rugged units were designed for industrial and commercial battery-powered applications.

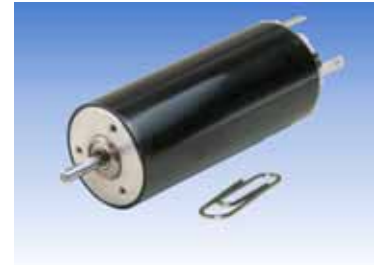
- 57 lb-in (6.4 Nm) output torque, 150 RPM no load speed
- Ground worm and oil bath lubrication for longer life and quiet operation
- Brushless DC Enduramax motor with integral drive and optional encoder



## CL25 CORELESS DC SMALL PRECISION MOTOR

A unique coil technology, together with a 4-pole high performance magnet system, gives the 25 mm diameter **CL25 coreless DC motor** extremely high starting and continuous torque for its size.

- 28 Watt rated output power
- High 400 mNm (57 oz-in) starting torque
- 35 mNm (5 oz-in) continuous torque
- Copper-graphite commutation ensures long operating life



## ENDURAMAX INTEGRATED-DRIVE BRUSHLESS DC MOTORS

Enduramax 3-inch (75 mm) **integrated brushless DC motor-drives** are a cost-effective solution for many commercial-duty applications. They are ideal for mobile HVAC fans and blowers, condenser units, pumps, and actuators.

- Up to 120 oz-in (846 mNm), 220 W shaft power, 6000 RPM
- Single- and dual-shaft versions
- Environmental protection options



## BL 30 BRUSHLESS MOTOR WITH INTEGRATED ELECTRONICS

The powerful and compact **BL 30 32 mm diameter brushless DC motor** is specially designed for small pump applications with heavy-duty bearing system and an integrated drive with speed control loop.

- Standard voltages from 12 to 48 VDC, custom voltages available
- Brushless DC versions with integrated drive electronics
- Peak output up to 1000 W to handle vehicle weight up to 1500 lb (680 kg)
- Options include class H winding insulation, weather-proof (IP65) design, holding brake, and custom leads and/or connectors



## BL 48 BRUSHLESS INTEGRATED MOTOR-DRIVE WITH ENCODER

The proven 1.2-inch (58 mm) **BL 48 EE brushless motor with integrated drive** electronics is now available with encoder for precision speed control applications.

- 30 mNm (4.3 oz-in) continuous torque, 7.2 Watt output power at 2300 RPM
- High load bearing system — 30 N at 10 mm from the mounting flange
- Integrated speed loop with 200 to 5000 RPM speed range
- Thermal overload, reverse polarity, and IP54 sealing protection, plus EMI standards compliance



# Allied Motion Pump Application Solutions

## MEDICAL & LIFE SCIENCES EQUIPMENT



### Dialysis System Pump Motors & Drives

Hemodialysis (HD) therapy systems require reliable peristaltic pumps to accurately control patient's blood and the dialysis solution through the machine's dialyzer.

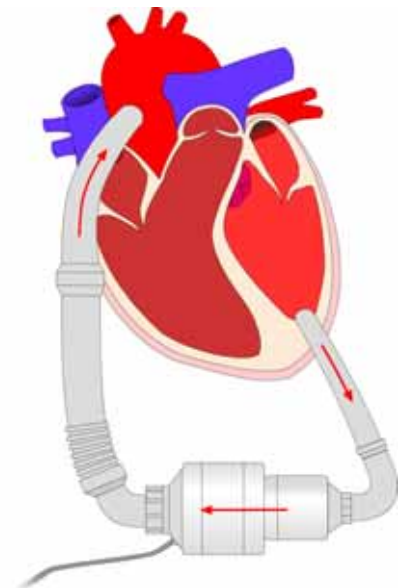
HD system manufacturers rely on Allied Motion's precision brushless motors with on-board drive electronics to provide reliable, quiet, long-service life solutions for their HD pump subsystems



### Left Ventricular Heart Assist Device (LVAD) Motor

Left ventricular heart assist devices (LVAD) were developed to help heart transplant candidates while they await the availability of a heart, and also for permanent support for end stage heart failure patients.

Advanced LVAD pumps are implanted in the patient, and use an axial flow pump powered by a compact, highly efficient brushless DC torque motor such as those designed by Allied Motion for LVAD applications.



### PAP Respiratory Ventilation Air Pump Motor

Sleep apnea treatment often involves the assistance of Positive Airway Pressure (PAP) respirators. All PAP systems (APAP, IPAP/EPAP) control a stream of compressed air (4 to 20 cm H<sub>2</sub>O) to keep the patient's airway open so to assist breathing.

Allied Motion's small, precision brushless DC motors like the BL 21 EE are an ideal choice for PAP systems owing to their compactness, long life, and quiet operation.



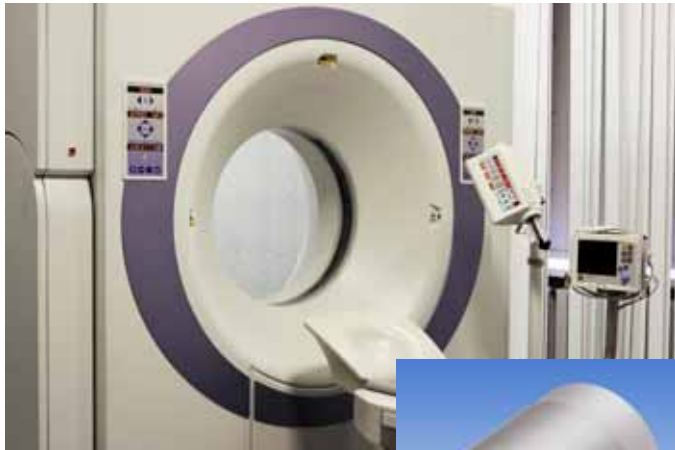
# Allied Motion Pump Application Solutions

## MEDICAL & LIFE SCIENCES EQUIPMENT

### Cardiopulmonary Heart Bypass System Pump Motor

Allied Motion designed a magnetically-coupled brushless pump motor to drive a disposable integrated oxygenator module, the "heart" of this innovative heart bypass system.

The optimized low-voltage winding of the motor, a version of Allied Motion's Megaflux brushless servo torque motor series, is driven by a custom-designed two-quadrant brushless drive module.



### CT Scanner Cooling System Pump Motor

CT scanners have become virtually indispensable as a medical analysis tool. Modern CT scanners, especially newer multi-slice models, allow much faster, higher resolution scanning. This performance boost has helped make possible higher quality coronary artery and 3D imaging.

A major manufacture of CT scanners relies on Allied Motion's reliable BL 70 brushless DC motors with integrated drive to keep the high power X-ray generator cool. The BL 70 powers a centrifugal pump that circulates coolant through the generator.

### Anesthesia Workstation Breathing System Pump Motor

Anesthesia workstations require highly reliable ventilator system components, the most important of which is the bellows subsystem. Modern ventilator subsystems are electrically powered and require no drive gas, which enables them to be more efficient and more precise in pressure and volume delivery than traditional gas-driven bellows ventilators.

Allied Motion answered the call for a longer life, more reliable, lower audible noise, and lower EMI motor solution with its BL 48 brushless DC motors with integrated drive electronics. The BL 48 replaces the typical DC motor that drives the vacuum pump used in the bellows ventilator subsystem.



# Allied Motion Pump Application Solutions

## MEDICAL & LIFE SCIENCES EQUIPMENT



### Angiographic CT Contrast Injector Syringe Pump Motor

Contrast injectors are essential accessories for modern CT scanners. They inject X-ray contrast fluid intravenously, which provides dramatic improvement in the overall quality of CT images of the circulatory system and organs. The enhanced images enable more accurate diagnoses to be made.



Allied Motion brushless servo motors and drives are used to precisely drive the injector piston to achieve smooth, accurate contrast fluid delivery.

### Precision Peristaltic Pump Motors

Positive displacement peristaltic pumps are a simple yet efficient means of handling liquids or gases in medical, laboratory, and industrial applications. The bench-top, multi-channel laboratory type of pump shown here can provide fluid flows from  $\mu\text{l}/\text{minute}$  up to 2.0 liters per minute.

The heart of this pump is a precision brushless DC motor developed by Allied Motion engineers to be compact, efficient and quiet while providing long trouble-free service.



### Dental Instrument Pump Motors

From dental treatment centers to denture fabrication labs, small reliable and efficient pumps to supply gases and liquids are a necessity.



Allied Motion's engineers work with pump and dental equipment manufacturers to provide them the specialized motors they need. Excellent reliability, long service life, low audible noise, and two-wire simplicity are just a few of the attractive features of Allied's small precision motors, such as our BL 48 brushless DC motor with integrated drive, used to power a coolant pump in a denture fabrication system.

# Allied Motion Pump Application Solutions

## "GREEN" VEHICLES

### CO<sub>2</sub> & NO<sub>x</sub> Emission Reduction Pump Motors

Strict emission regulations like Euro 6 and US Tier 2 Bin 5 have lead to the deployment of Selective Catalytic Reduction (SCR) technology for heavy duty, and even passenger, diesel-powered vehicles. SCR dramatically reduces CO<sub>2</sub>, NO<sub>x</sub> and particulate matter in exhaust gases. SCR technology transforms harmful vehicle exhaust gases into harmless nitrogen and water.

Allied Motion engineers worked closely with pump manufacturers to develop specialized compact brushless DC motors like the one shown here to drive the highly integrated motor-pumps used in SCR systems.



### Fuel Cell Cooling System Pump Motor & Drive

Allied Motion is helping to develop advanced vehicle propulsion systems, such as Ford's Focus FCV (Fuel Cell Vehicle) shown here. The Focus FCV uses our digital drives and brushless motors in the cooling pump and fan systems.

Allied Motion companies are also involved in a number of other next-generation automotive applications including drive-by-wire and hybrid vehicle systems.



### Automotive LPG System Pump Motors

As environmental concerns rise and the use of alternative fuels is encouraged, Liquid Petroleum Gas (LPG) systems are increasingly being deployed in taxis, transit buses, and similar fleet vehicles. The pump, internal to the LPG tank, is a key element in LPG (Autogas) systems.

Allied Motion engineers developed custom versions of our small brushless DC motors with integrated drive electronics specifically to meet the unique demands of Autogas systems. These systems are deployed widely around the globe helping to reduce vehicle emissions.



# Allied Motion Pump Application Solutions

## MARINE & SPECIALTY PUMPS



### Boat Hydraulic Steering Pump Motors

Manual steering of power boats becomes difficult the larger and more powerful the boat, especially those outfitted with multiple engines. That's when helm hydraulic assist systems become a necessity for good control and safe boating.

Allied Motion supplies reliable, sealed hydraulic DC pump motors engineered to meet the demands of steering assist applications in the marine recreational boat industry.



### Vessel Engine Oil Change System Pump Motors

Changing crankcase oil for inboard mounted marine power plants, whether in a large yacht or smaller pleasure boats, is a difficult, dirty job. But closed-loop engine oil change systems that both remove old oil and add new reduce this task to the activation of some switches and valves.

Allied Motion supplies our Endurance 30 pump motors for this gear pump-based oil change system, providing the superior performance and dependability the marine industry demands.



### Diaphragm Pump Motors

Compact, rugged, and mechanically simple diaphragm pumps handle either fluids or gases with equal efficiency and reliability. Precision versions, powered by electric motors, are employed in numerous commercial and industrial feeding and metering applications. Smaller models are popular in instrumentation and medical uses.

Allied Motion's BL30 with integrated drive electronics are popular for powering diaphragm pumps in a variety of medical fluid pumping and gas compressor applications. And our Enduramax brushless DC motors are used to drive precision diaphragm pumps in industrial applications.



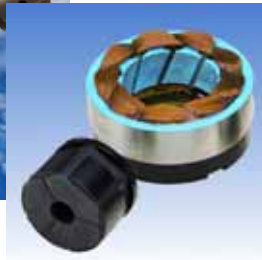
# Allied Motion Pump Application Solutions

## AEROSPACE & DEFENSE

### Pilot Cooling System Pump Motors

Pilots in military helicopters wear special flight suits with microclimate cooling. Cooling fluid is pumped through the suits by a special pump system driven by a brushless DC motor.

Allied Motion helped the pump and cooling unit manufacturers achieve required system reliability with a custom BL48 brushless DC motor solution. Integrated drive electronics keep connections to the motor-drive to a minimum, and the special designed housing has a high IP54 protection level rating.



### Auxiliary Power Unit Fuel Pump Motor

In the control of gas turbine engines used in aircraft auxiliary power units that must operate at tens-of-thousands of rpm, fuel pump frequency response and reliability are two key design parameters.

Allied Motion engineers, working with the manufacturer of this gerotor-type turbine fuel pump, optimized the parameters of the pump motor, an Allied Motion Megaflux brushless torque motor, resulting in an economical solution that exceeded performance and reliability goals.

### Aircraft Emergency Fuel Boost Pump Motors

Small propeller-driven aircraft can benefit from a two-speed pump that can maintain fuel pressure while cruising and be able to boost fuel delivery for takeoff and landing.

Weldon Pump came to Allied Motion for such a two-speed fuel pump motor solution. Allied's design team developed a unique design in which a standard PE platform brush DC motor is modified to accept two different voltages. This enabled Weldon to supply a reliable two-speed pump that doesn't stall, as was the case with some other motors used in the same application.



## INDUSTRIAL AUTOMATION



### Industrial Inkjet Printer Gearpump Motor

Industrial on-the-fly case/carton marking and package coding/labeling is increasingly done by high speed inkjet marking systems that can produce highly legible characters and graphics at the high line speeds needed for today's production lines.

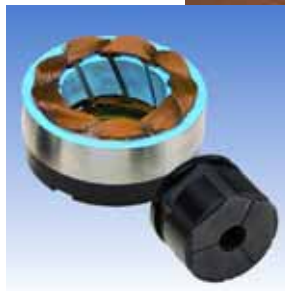


Allied Motion's motors help provide ink delivery to the inkjet print heads by powering the system's fluid pumps. Reliability and long life are key criteria satisfied by Allied's small precision brushless DC motors.

### Industrial Laser Cooling System Pump Motor

Industrial laser machining systems are used in many industries from metal cutting and drilling to precision micromachining of semiconductor wafers.

Allied Motion helped solve a critical cooling requirement in several micromachining laser systems with the QS series of high speed, brushless, frameless motors that power the closed-loop cooling system pumps in those systems.



### Industrial Torque Wrench Hydraulic Pump Motor

Heavy bolted joints require torque levels only available with hydraulics. Electrically powered portable hydraulic torque wrenches offer the power needed for this application along with the convenience of a compact, portable unit.

Allied Motion's powerful 5070 series universal motors increase productivity in portable hydraulic tool pumps through their high speed capability, excellent low voltage operation, heavy duty bearings, and precision balancing. The result is a smooth running pump with the ruggedness and reliability demanded of portable field tools.



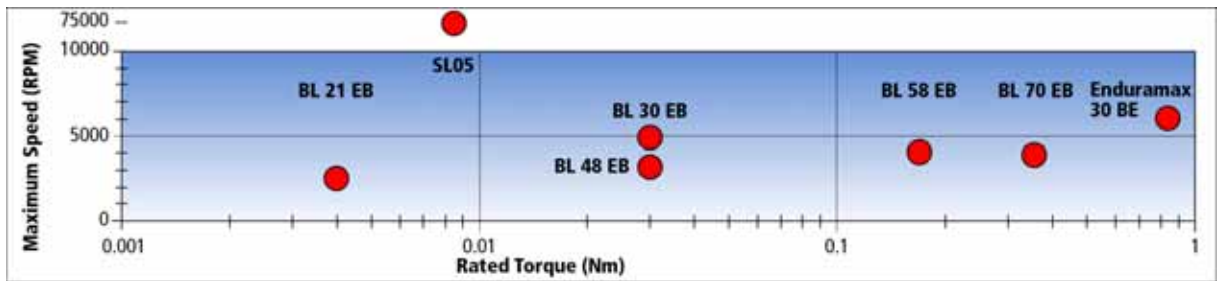
# Allied Motion Motors: With or Without Electronic Drives...



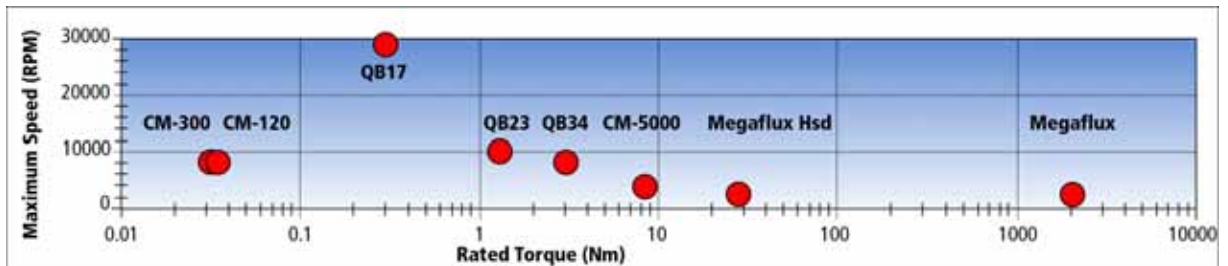
Allied Motion's know-how, experience, and products have been meeting the motion challenges of Industry for over 50 years.

## MOTOR QUICK SELECT GUIDES

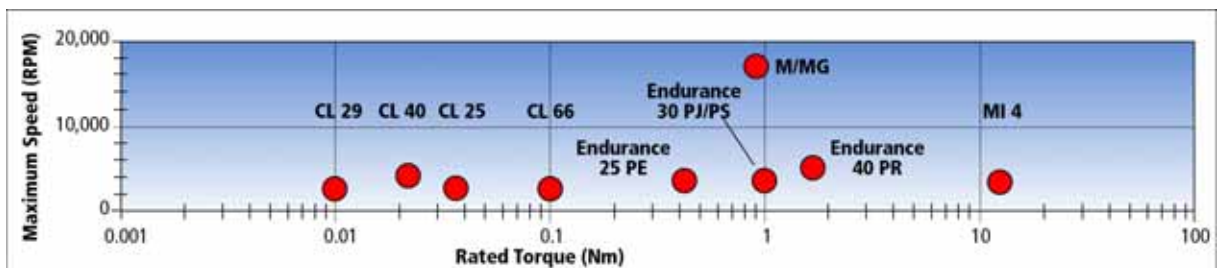
### Brushless DC Motors



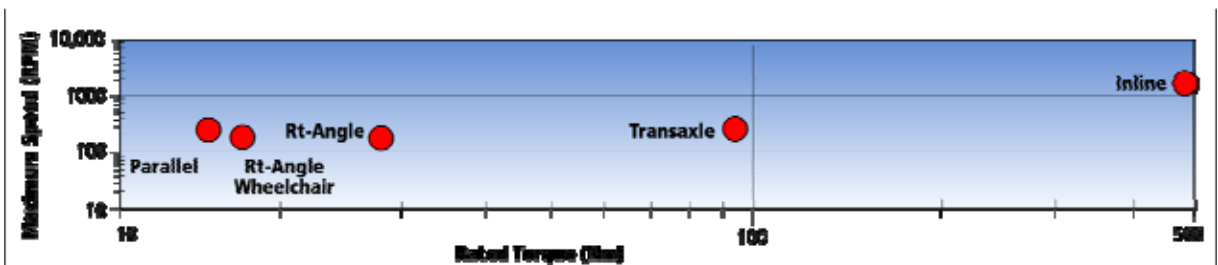
### Brushless Servo & Torque Motors



### PM Brush & Coreless DC Motors



### Gearmotors & Transaxles



\* Charts indicate maximum speed and maximum rated torque points for each motor or motor series.

# Allied Motion Motors: With or Without Electronic Drives...

## BRUSHLESS DC MOTORS

	Torque / Power <sup>1</sup>	Speed	Sizes	Voltages	Description
<b>Miniature High Performance Models</b>					
<b>SL05</b> 	1.2 oz-in (8.45 mNm) Stall: Up to 7.92 oz-in (56 mNm)	Up to 75000 RPM	Size 5 (0.5 in., 12.7 mm) dia.	24, 48 VDC	<ul style="list-style-type: none"> <li>• Size 5 BLDC motors specifically designed for surgical hand pieces</li> <li>• Double the performance of equivalently-sized competitive units</li> <li>• Options include planetary gearhead and autoclavability</li> </ul>
<b>Outer Rotor Small Precision Models</b>					
<b>BL 21 EE/EB</b> 	0.42 oz-in (3 mNm) (EE) 0.57 oz-in (4 mNm) (EB) 1.5 - 2 W	Up to 10000 RPM (EE) Up to 2500 RPM (EB)	0.827 in. (21 mm) (EE); 0.945 in. (24 mm) (EB) dia.	6 to 24 VDC	<ul style="list-style-type: none"> <li>• Small, high performance outer rotor brushless DC motors</li> <li>• <b>EB</b> models <b>with</b> integrated drive electronics</li> <li>• <b>EE</b> models <b>without</b> integrated drive electronics</li> <li>• Custom shaft, flange, and protection class</li> <li>• Ideal for gearpumps, membrane pumps, peristaltic pumps, laser scanners, high performance fans and blowers, and document handling applications</li> </ul>
<b>BL 30 EB</b> 	4.3 oz-in (30 mNm) 7.2 W	5000 RPM	1.26 in. (32 mm) dia.	12, 24 VDC	
<b>BL 48 EB</b> 	3.1, 4.25 oz-in (22, 30 mNm); 8 - 12 W	3200 RPM	2.13 in. (54 mm) dia.	12, 24 VDC	
<b>BL 58 EB</b> 	10.6, 24 oz-in (75, 170 mNm); 35 - 50 W	2800 - 4000 RPM	2.68 in. (68 mm) dia.	12, 24 VDC	
<b>Inner Rotor Models</b>					
<b>BL 70 EE/EB</b> 	30.5, 40.4, 50.3 oz-in (215, 285, 355 mNm); 85, 95, 110 W	3000 - 3800 RPM	2.72 in. (69 mm) dia.	24, 42 VDC	<ul style="list-style-type: none"> <li>• High performance brushless DC motors <b>with or without integrated drive</b></li> <li>• Integrated Hall-effect commutation sensors</li> <li>• Customizable single- or dual-shaft models</li> <li>• Environmental protection options</li> <li>• Ideal motors for pumps, actuators, high performance mobile HVAC fans, blowers, and cooling units</li> </ul>
<b>EnduraMax 30 BE</b> 	120 oz-in (846 mNm); 220 W	600 - 6000 RPM	3 in. (75 mm) dia.	12, 24 VDC	

1. Continuous rating unless otherwise stated.

# Allied Motion Motors: With or Without Electronic Drives...

## BRUSHLESS SERVO & TORQUE MOTORS





	Torque <sup>1</sup>	Speed	Sizes	Voltages <sup>2</sup>	Description
<b>Megaflux (Frameless)</b> 	1 oz-in to 1490 lb-ft (7 mNm to 2020 Nm)	Up to 2660 RPM (no load)	6.7 to 31.2 in. (170 to 792 mm) dia.	150, 300 V	<ul style="list-style-type: none"> <li>Design optimization produces motors with industry-leading torque density</li> <li>High pole count maximizes torque output and rotational smoothness</li> <li>Up to 5-times the maximum speed of competitive units</li> <li>Up to twice the power density of competitive motors (measured by <math>K_m</math>) for maximum torque in the minimum space</li> </ul>
<b>Megaflux (Housed)</b> 	2.5 to 20.3 lb-ft (3.4 to 27.5 Nm)	Up to 2663 RPM	7.332 in. (186 mm) dia.; (5.6 / 7.6 / 8.6 in. axial length)	150, 300 V	<ul style="list-style-type: none"> <li>Integrated brushless torque motor, bearings, feedback, and housing</li> <li>Dual bearings for high load capacities: 227 kg (500 lb) normal load at 500 PRM with 5 yr. life</li> <li>Large through bore for air, water, or vacuum lines, optical beams, or electrical/signal wiring</li> <li>Options include up to 8192 PPR encoder, sealed housing to IP65, air bearing system</li> </ul>
<b>CM Series</b> 	<b>CM-120:</b> 1.6 - 4.8 oz-in (12 - 34 mNm)	Up to 8000 RPM	1.1 in. sq. x 1.0 in. (28 mm sq. x 25.4 mm)	12 - 48 V	<ul style="list-style-type: none"> <li>Ultra compact slim brushless DC servo motors with integral encoder</li> <li>Designed for high precision positioning applications</li> <li>Precision direct-drive actuator with BLDC motor, optical encoder and solid or through hollow shaft.</li> <li>Integral digital, sine/cosine, absolute or high resolution encoder</li> <li>Custom designs available</li> </ul>
	<b>CM-300:</b> 3.7 - 4.4 oz-in (26 - 31 mNm)	Up to 8000 RPM	1.5 in. sq x 1.0 in. (38 mm sq. x 32 mm)	12 - 48 V	
	<b>CM-900:</b> 3.7 - 4.4 oz-in (26 - 31 mNm)	Up to 8000 RPM	2.5 in. OD x 2.53 in. (63.5 x 64.26 mm) ID max: 0.39 in. (10mm)	12 - 48 V	
	<b>CM-2600:</b> 7 oz-in (49 mNm)	Up to 4500 RPM	2.625 in. OD x 1.76 in. (66.67 mm x 44.70 mm) ID max: 0.748 in. (19 mm)	12 - 300 V	
	<b>CM-5000:</b> 201 - 1192 oz-in (1.41 - 8.41 Nm)	Up to 4000 RPM	5.5 in. OD x 2.5 in. (140 mm OD x 65 mm) ID max: 2 in. (50.8 mm)	12 - 300 V	
	<b>CM-7000:</b> 240 - 600 oz-in (1.6 - 4.0 Nm)	Up to 3500 RPM	7.2 in. OD x 3.14 in. (182.9 mm x 79.76 mm) ID max: 3.5 in. (88.9 mm)	12 - 300 V	
<b>Quantum</b> 	<b>QB17:</b> 11.5 - 43.5 oz-in (0.08 - 0.3 Nm)	Up to 29000 RPM	1.64 in. (41.7 mm) sq.	24, 40, 130 V	<ul style="list-style-type: none"> <li>Standard NEMA 17, 23 and 34 sizes</li> <li>6-pole high-strength neodymium magnet rotor structure</li> <li>Custom winding, shaft, and connector designs to suit specific needs</li> <li>Frameless versions available for direct-drive applications</li> </ul>
	<b>QB23:</b> 51 - 182 oz-in (0.36 - 1.28 Nm)	Up to 10000 RPM	2.3 in. (58.4 mm) sq.	24, 40, 130 V	
	<b>QB34:</b> 115 - 429 oz-in (0.81 - 3.03 Nm)	Up to 8000 RPM	3.42 in. (86.9 mm) sq.	24, 40, 130 V	

1. Continuous rating unless otherwise stated.

2. Peak winding (bus) voltage

# Allied Motion Motors: With or Without Electronic Drives...

## PERMANENT-MAGNET BRUSH DC MOTORS

	Torque / Power <sup>1</sup>	Speed	Sizes	Voltages	Description
<b>Endurance 25 PE</b> 	10 - 60 oz-in (0.07 - 0.42 Nm); 22 - 150 W (1/4 HP)	Up to 3500 RPM	2.5 in. (64 mm) dia.	12 - 48 VDC (fixed brush); 12 - 115 VDC (replaceable brush)	<ul style="list-style-type: none"> <li>• Cost-effective solution for commercial applications like mobile HVAC systems, pumps, and electric actuators</li> <li>• Reliable, custom-designed 2.5", 3.0", and 4.0" diameter PMDC models rated up to 1 HP</li> <li>• Computer-aided design and testing (environmental, noise, vibration) ensure optimum performance</li> <li>• Long-life fixed brushes or replaceable brushes (PE series)</li> <li>• Self-aligning bronze sleeve bearings or sealed ball bearings</li> <li>• Options include EMI/RFI suppression, thermal overload, stainless shaft, class H winding, wash-down (IP56) rating, special-coated housing</li> <li>• Custom shaft, flange, and mounting</li> </ul>
<b>Endurance 30 PJ / PS</b> 	20 - 140 oz-in (0.14 - 1 Nm); 44 - 181 W (1/3 HP)	Up to 3600 RPM	3.0 in. (76 mm) dia.	12 - 48 VDC	
<b>Endurance 40 PR</b> 	80 - 240 oz-in (0.56 - 1.69 Nm); 186 - 373 W (1/2 HP)	Up to 5000 RPM	4.0 in. (101 mm) dia	12 - 48 VDC	
<b>MI 4</b> 	Up to 110 lb-in (peak) (12.5 Nm)	Up to 3300 RPM	4 in. (102 mm) dia.	Up to 100 V	

1. Continuous rating unless otherwise stated.






## CORELESS DC MOTORS

	Torque / Power <sup>1</sup>	Speed	Sizes	Voltages	Description
<b>CL 25</b> 	5 oz-in (35 mNm); 56.7 oz-in (400 mNm) peak; 28 W	Up to 10000 RPM	1 in. (25 mm) dia.	Up to 36 VDC	<ul style="list-style-type: none"> <li>• Coreless PMDC motors ideal for medical devices, small pumps, mirror/prism drives, and ticket/currency dispensers</li> <li>• Coreless design for smooth, cog-free operation, no iron loss, and high efficiency</li> <li>• Precious metal commutation system in CL29 and CL40 models for low starting voltage</li> <li>• Low inertia rotor for rapid response</li> <li>• Optional spur or planetary gearhead with ratios up to 900:1</li> <li>• Options include incremental or absolute encoder, tachometer, ball bearings (CL29, CL40), custom windings and leads/connectors</li> </ul>
<b>CL 29</b> 	1.42 oz-in (10.1 mNm); 3 W	2400 - 2700 RPM	1.14 in. (29 mm) dia.	6 - 24 VDC	
<b>CL 40</b> 	3.12 oz-in (22 mNm); 7 W 3.68 oz-in (26 mNm); 12 W	2600 - 3050 RPM  4100 RPM	1.57 in. (40 mm) dia.	6 - 30 VDC	
<b>CL 66</b> 	14.2 oz-in (100 mNm); 25 W	1800 - 2540 RPM	2.6 in. (66 mm) dia.	12 - 36 VDC	

1. Continuous rating unless otherwise stated.


# Allied Motion Motors: With or Without Electronic Drives...

## GEARMOTORS & TRANSAXLES

	Torque / Power <sup>1</sup>	Speed	Sizes	Voltages	Description
<b>IL (Inline)</b> 	Up to 350 lb-ft (475 Nm); up to 1.5 kW (2 HP)	Up to 1300 RPM; up to 500:1	4.75 in. (121 mm) dia.	12 - 230 VDC	<ul style="list-style-type: none"> <li>• 2- or 4-pole brush PMDC or universal motor inline planetary gearmotor</li> <li>• Hardened steel gearing capable of handling extreme loads</li> <li>• Replaceable brush design eases field service</li> <li>• Custom mounting plates available to meet specific application needs</li> </ul>
<b>PL (Parallel)</b> 	Up to 124 lb-in (14 Nm); up to 297 W (3/8 HP)	Up to 255 RPM; up to 208:1	3.6 in. (91 mm) dia.	12 - 230 VDC, 230 VAC/VDC (universal)	<ul style="list-style-type: none"> <li>• 2- or 4-pole brush PMDC or universal motor parallel-shaft gearmotor rated up to 3/8 HP</li> <li>• Multi-stage gearbox configurations enable a wide range of gear ratios</li> <li>• Die cast aluminum gearbox maximizes strength, minimizes weight</li> <li>• Custom shaft, leads, connectors to meet specific application needs</li> </ul>
<b>RA (Right Angle)</b> 	Up to 250 lb-in (28 Nm); up to 142 W (3/16 HP)	Up to 119 RPM; up to 62:1	3 in. (76 mm) dia.	12 - 230 VDC, 115 VAC (rect.)	<ul style="list-style-type: none"> <li>• 2- or 4-pole brush PMDC right-angle gearmotor rated up to 3/16 HP</li> <li>• Light weight, high strength die cast gearbox with multiple mounting options</li> <li>• Fully sealed motor and gearbox for leak-free operation</li> </ul>
<b>RA (Wheelchair)</b> 	155 lb-in (17.5 Nm); up to 280 W (3/8 HP)	Up to 170 RPM (177 RPM no-load); up to 12 mph	3.6 in. (91 mm) dia.	Up to 230 VDC	<ul style="list-style-type: none"> <li>• 4-pole PMDC 3/4 HP gearmotor expressly designed for power wheelchairs (2-pole version available)</li> <li>• Fully sealed motor and gearbox for leak-free operation</li> <li>• Designed for long, quiet service life</li> <li>• Holding brake and release, connection, and mounting for specific chair designs</li> </ul>
<b>TA (Transaxle)</b> 	Up to 836 lb-in (94.5 Nm); up to 769 W (1 HP)	Up to 233 RPM (250 RPM no-load); up to 15 mph	Up to 2000 lb (907 kg) axle weight	Up to 230 VDC	<ul style="list-style-type: none"> <li>• 2- or 4-pole brush PMDC transaxle rated up to 1 HP</li> <li>• Die cast aluminum components minimize weight</li> <li>• Hardened steel and powdered metal gears increase durability and life</li> <li>• Differential action insures smooth cornering capability</li> </ul>



1. Continuous rating unless otherwise stated.

## GEARBOX SOLUTIONS

	Gearbox Types	Gear Ratios	Speed Ranges	Description
	Parallel Shaft (spur/helical)	5:1 up to 1103:1	1.5 up to 800 RPM	<ul style="list-style-type: none"> <li>• Custom-designed gearboxes to exactly fit application needs</li> <li>• Up to 10000 lb-in (1130 Nm) output torque</li> </ul>
	Planetary (spur/helical)	3:1 up to 800:1	2 to 1300 RPM	<ul style="list-style-type: none"> <li>• Custom shaft designs including thru shaft</li> <li>• Hardened alloy steel gearing designs insure long service life</li> </ul>
	Right-Angle (precision worm)	5:1 up to 120:1	10 up to 800 RPM	<ul style="list-style-type: none"> <li>• Durable plastic gearing designs for smooth quiet operation</li> <li>• Hardened precision ground worm (right angle models)</li> </ul>

# Allied Motion Drive and Encoder Solutions

## DRIVES

	Power	Current	Voltage	Type	Description
<b>Brushless DC</b> 	Up to 4.4 kW cont., 9.6 kW peak	4, 8, 12 Arms cont, 10, 20, 30 Arms peak	55 up to 330 VDC; 40 up to 240 VAC (BDH series)	<b>BDT:</b> Torque control; <b>BDV:</b> Velocity control; <b>BDE:</b> gear follower up to 4096:1 <b>BDH:</b> Torque or velocity control; VAC fed <b>X-Drive:</b> Fully digital torque or velocity control; VAC or DC fed	<ul style="list-style-type: none"> <li>Four-quadrant, brushless DC (trapezoidal) servo drives for torque, velocity, or (geared) follower control of brushless DC motors</li> <li>High rated bandwidth and conversion efficiency</li> <li>Fully protected</li> <li>Integral regeneration control (33 W)</li> <li>Isolated signal stage (BDH)</li> <li>Fully digital (X-Drive)</li> </ul>
<b>Integrated Motor-Drives</b> 	Up to 220 W cont. (custom designs with power level to requirements)	Up to 15 Arms cont, 20 Arms peak (custom designs with current level to torque/power requirements)	1.5 up to 300 VDC as required by application	Brushless DC; Hall-effect or sensorless commutation	<ul style="list-style-type: none"> <li>Motors with integrated drive electronics minimize application wiring and component count</li> <li>Single- and four-quadrant, brushless DC drive designs</li> <li>Choice of Hall-effect or sensorless commutation</li> <li>Optional encoder for speed and positioning applications</li> </ul>

1. Continuous rating unless otherwise stated.

## ENCODERS

	Model	CPR <sup>1</sup>	Type	Size	Description
<b>Incremental</b> 	CP-200	Up to 1024	Sine-cosine	1.8 in. (45 mm) sq. modular/kit	<ul style="list-style-type: none"> <li>Cost-effective kit encoder with A, B, index in sine or digital formats</li> <li>HHC model extends resolution to as great as to 500000 lines per rev</li> </ul>
	CP-250/270	Up to 1024/2048	Sq. wave		
	CP-250-HHC	Up to 125000	Sq. wave		
	CP-300/500	Up to 2500	Sine-cosine	1.5 in. (39 mm) sq.	<ul style="list-style-type: none"> <li>300 series: shaft + bearing</li> <li>500 series: 0.5 in. (12.7 mm) hollow shaft</li> </ul>
	CP-350/360/550/560	Up to 4096	Sq. wave		
	CP-800/900	Up to 6000	Sine-cosine	2.5 in. (64 mm) dia.	<ul style="list-style-type: none"> <li>800 series: 3/8 in. (9.53 mm) shaft + bearing</li> <li>900 series: 0.5 in. (12.7 mm) hollow shaft</li> </ul>
	CP-850/870/950/970	Up to 16384	Sq. wave		
	CP-850-HHC/950-HHC	Up to 1.25 M	Sq. wave	2.5 in. (64 mm) dia.	<ul style="list-style-type: none"> <li>Large-bore high resolution encoder</li> <li>2.0 in. (50.8 mm) hollow thru shaft</li> </ul>
	CP-3700	Up to 9000 Up to 36000	Sine-cosine Sq. wave		
CP-3750-HHC	Up to 2.250 M	Sq. wave			
<b>Absolute</b> 	CP-350-08/550-08GC	8-bit absolute	Gray code	1.5 in. (39 mm) sq.	<ul style="list-style-type: none"> <li>300 series: shaft + bearing</li> <li>500 series: 0.5 in. (12.7 mm) hollow shaft</li> </ul>
	CP-350-10/550-10GC	10-bit absolute	Gray code		
	CP-850-12GC/ CP-950-12GC	12-bit absolute	Gray code	2.5 in. (64 mm) dia.	<ul style="list-style-type: none"> <li>800 series: 3/8 in. (9.53 mm) shaft + bearing</li> <li>900 series: 0.5 in. (12.7 mm) hollow shaft</li> </ul>
	CP-850-14GC/ CP-950-14GC	14-bit absolute	Gray code		

1. CPR: Cycles Per Revolution; quadrature multiplication can be applied to increase effective line count by 4-times (not applicable to absolute models).

## Customer Assistance – Allied Motion “Speaks Your Language”



**Allied Motion’s** application engineering and customer service teams are available to assist you with all aspects of the selection and purchase of our products, including:

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

For assistance with all of your motion applications, call or email us using the contact information below.

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### **NORTH AMERICA**

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