

# Miniature Motors for Medical Applications



**Portescap**

MOTORS THAT SAVE, IMPROVE AND ENHANCE LIVES



# Turn Your Ideas into Reality

## **We're your miniature motion partner.**

When you need to put the most power and precision in the smallest spaces, you can depend on the engineering experience, application support and manufacturing excellence of Portescap.

**Selection.** Choose the best motion technologies for your application, including miniature brush and brushless DC motors, stepper motors, linear actuators, gearheads, encoders and drives. Our online MotionCompass™ tool provides engineering expertise 24 hours a day!

**Quality.** Count on low vibration and noise level and reduced EMI/RFI emissions, while at the same time expecting consistency and repeatability in motors designed to deliver more power in a smaller space.

**Reliability.** Get reliable performance across a long lifecycle with motors designed and built using the industry's most advanced technologies and materials.

**Efficiency.** Build a more compact, precise and energy-efficient solution using motors that generate all the torque and acceleration you need while consuming less energy.

**Customization.** Need a custom fit? Our motors are designed for quick and easy modification, so you can get exactly what you need with the pricing and delivery you might expect from an off-the-shelf solution.

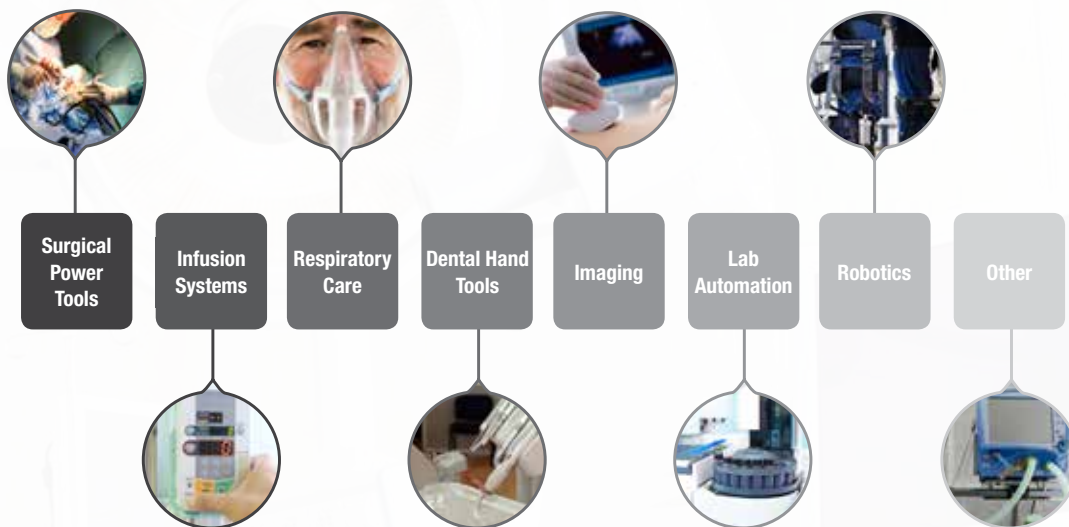
**Rapid Prototyping.** Take delivery of your custom prototype in as little as two weeks, or take advantage of our MotionCompass E-store for faster standard solution sampling.\*

*\*E-store not available in all countries.*



# Engineering Expertise Across Applications

We provide customized solutions for the most demanding applications, across virtually every medical industry that depends on precise miniaturized motion.



## Compact, powerful motors for any performance-critical requirement

Ideal for compact machines, portable equipment and small devices, Portescap's motor technologies reduce size and weight while increasing efficiency and reliability. With maximum performance in a smaller package, our motors let you design compact machines and devices that are easier and more comfortable to use.

**Brush DC Motors:** Ironless rotor, high acceleration and efficiency, low noise, linear speed/torque relationship, superior power-to-size ratio, low EMI/RFI

**Brushless DC Motors:** High speed, low inertia, improved heat dissipation, smooth operation with zero cogging, maintenance-free and longer life

**Stepper Motors:** High continuous torque, excellent open loop control, cost-effective, maintenance-free

**Linear Actuators:** Easy to use, fewer total machine components, powerful and precise positioning

**Gearheads:** Spur gears for high efficiency and low noise level, planetary gears for high torque and compact size

**Encoders:** Magnetic and optical, 1 through 1024 line counts

**Drives:** High performance servo drives and digital amplifiers for brush and brushless DC motors

# Global Reach



- Application Support
- Global Manufacturing
- Design & Engineering

**Certifications**  
RoHS: available as required

**USA**  
ISO 9001:2008

**India**  
ISO 9001:2008  
ISO 13485:2003  
ISO 14001:2004  
OHSAS 18001:2007

# Portescap: Your Partner in Miniature Medical Motion Solutions

We turn your ideas into reality. Portescap has the industry's broadest product offering, including brush DC coreless, brushless DC, stepper, gearheads, encoders and electronics. Additionally, we provide dedicated engineering support, regional application support, quick turnaround time on prototypes, tools for rapid motor selection and custom-engineered solutions.

## Brushless Slotted



### Features

- Diameter: 12.7mm to 50.8mm (0.5" to 2")
- Speed: up to 100,000 rpm
- Autoclavable design available
- Commutation: Hall Sensor/ Sensorless (available on request)
- Slotted stator
- Gearheads available
- Drive options

### Benefits

- Sensored solutions designed to withstand up to 3,000 autoclave cycles
- Custom solution available to withstand harsh saline and dish washer environments
- High torque and speed for increased hand tool power
- High efficiency for optimized thermal performance at high speeds and high loads
- Standard application specific design can be used in production or modified for specific performance needs

## Brushless Slotless



### Features

- Diameter: 16mm to 26mm (0.51" to 1")
- Speed: up to 73,000 rpm
- Slotless stator design
- Hall sensor included
- Gearheads available

### Benefits

- Smooth rotation, high efficiency and cooler operation
- High throughput due to high speed
- High acceleration from low inertia design
- Extremely long life

## Brush DC Coreless



### Features

- Diameter: 8mm to 35mm (0.31" to 1.4")
- Commutation: precious metal or copper graphite brushes
- Coil: ironless, multi-layer REE technology available
- Bearings: sleeve or ball
- Gearheads available

### Benefits

- High efficiency for battery-powered portable applications
- High power density: reduced size and weight
- Simple control: linear speed-to-torque relationship
- Optimized coil: tailored to supply voltage, reduce inductance
- Low EMI/RFI
- Low inertia for positioning accuracy
- Low noise

## Stepper

Can Stack, Disc Magnet  
& Linear Actuator



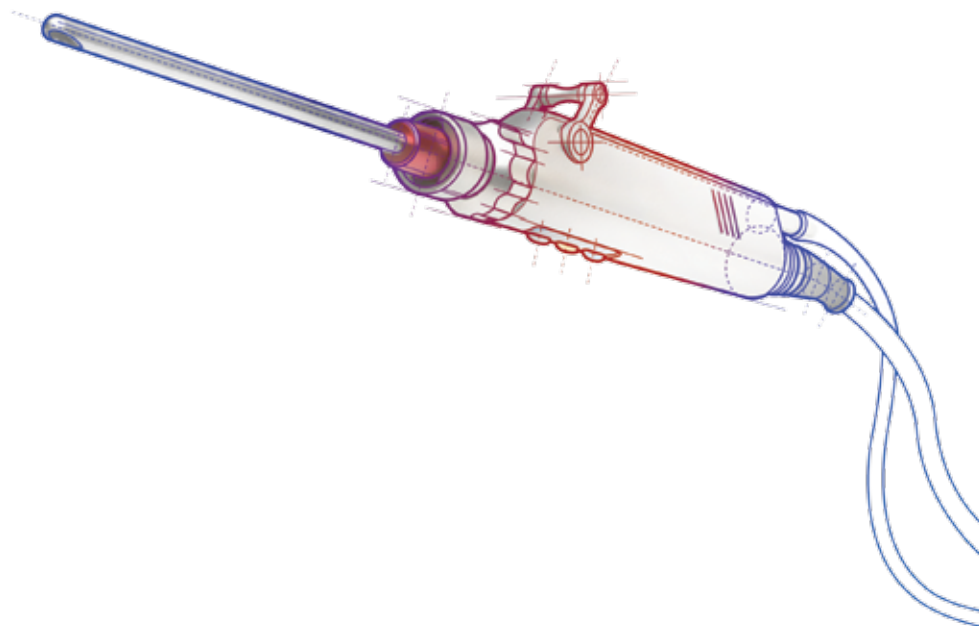
### Features

- Diameter size: 10mm to 85mm (0.4" to 3.35")
- Step angle: 3.6-18
- High energy magnets
- Multi-toothed/pole stator/rotor design
- Disc magnet rotor available
- Linear actuator: direct linear force
- Gearheads available

### Benefits

- Increased torque density in small packages
- High acceleration from low inertia option
- High throughput with high-speed disc magnet products
- Ease of open-loop control without requiring feedback
- Simplified designs with linear actuators
- Smoother motion with low-detent torque option

# Arthroscopic Shavers



Today's most challenging arthroscopic procedures require power, speed and efficiency. Additionally, they need to be able to withstand repeated saline exposure. Portescap motors provide high torque in a lightweight package, quickly responding to variations in patient tissue and bone to maintain optimum speed for precise cutting without stalling.

Capable of providing maximum power at output speeds from 500 to 15,000 rpm, our motors are designed to efficiently dissipate heat and minimize vibration, thus enhancing the surgeon's comfort.

Available with shaft-sealing features, Portescap sterilizable solutions are designed with medical washdown conditions in mind, tested to well over 3,000 autoclave cycles, providing field-proven, class-leading longevity.

## Product Selection

Motor	Diam. (in)	Leng. (in)	Technology	Max Cont. Torque (oz-in)	Peak Torque (oz-in)	No Load Speed (rpm)	Positioning Control
ENT Microdebrider (24V) B0512N4080	0.50	2.51	Sterilizable BLDC	5.6	64.6	12,240	Hall sensors
ENT Microdebrider (48V) B0512N4081	0.50	2.51	Sterilizable BLDC	5.9	69.5	11,910	Hall sensors
Arthroscopic Joint Shaver B0614H4041	0.65	3.1	Sterilizable BLDC	16.7	264.1	7,277	Hall sensors
Arthroscopic Joint Shaver B0614H4042	0.65	3.1	Sterilizable BLDC	16.9	157.2	4,233	Hall sensors

## Recommended Solutions

- 0.5" diameter brushless slotted motors for micro shavers and soft tissue removal
- 0.65" diameter brushless slotted motors for shavers and bone resection

## Benefits

- Reduced surgery case time and cleaner cuts with higher oscillation speeds
- 3,000+ autoclave cycle reliability for increased instrument life and reduced service cost
- Improved ergonomics and reduced surgeon's effort for increased procedural accuracy with higher efficiency and power density motors
- Low vibration for a responsive surgical feel
- Increased resistance to medical dishwasher environment

## Typical Options

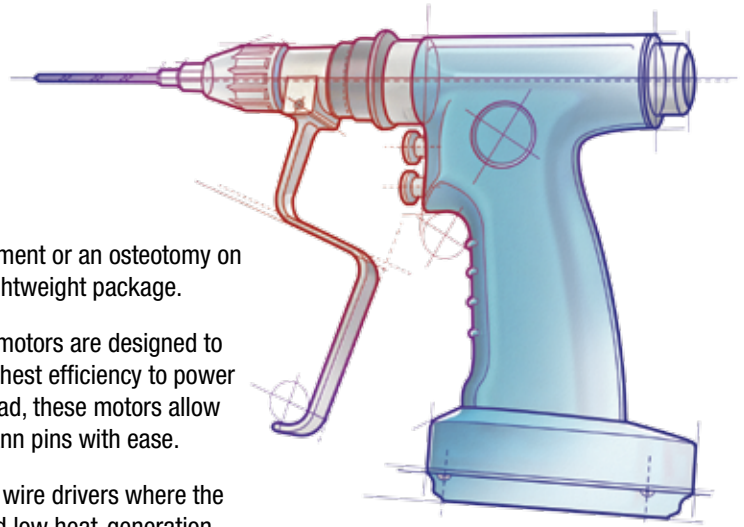
- Custom output shaft and interface features
- Integrated housing for added reliability and lower costs
- Pin-out connection design for easy plug-in
- Custom shafts and housing seals for added reliability
- Ceramic bearings for increased life at high speeds

# Surgical Saws/ Drills/Reamers

Whether it's a partial knee-joint reconstruction, a total hip replacement or an osteotomy on a large bone, orthopaedic applications demand high power in a lightweight package.

Portescap custom-wound 9.6v-14.4v battery-powered brushless motors are designed to maximize torque for the toughest cases, while maintaining the highest efficiency to power through surgeries on a single battery charge. Coupled to a gearhead, these motors allow surgeons to drive reaming attachments, large K-wire and Steinmann pins with ease.

Custom hollow-shaft geared motor designs enable the creation of wire drivers where the motor sits in the top of the hand tool. Alternatively, bevel gears and low heat-generation features allow motors to be installed vertically in the top of the hand tool and allow passage of larger K-wires and pins.



## Product Selection

Motor	Diam. (in)	Leng. (in)	Technology	Max Cont. Torque (oz-in)	Peak Torque (oz-in)	No Load Speed (rpm)	Positioning Control
Spine Drill B0512N1029	0.50	2.02	Sterilizable BLDC	1.34	24.3	90,612	Hall sensors
Large Bone Drill B1112N4004	1.10	3.85	Sterilizable BLDC	130.8	2005.2	957	Hall sensors
Large Bone Orthopedic Drill (9.6V) B1210N1021	1.24	2.57	Sterilizable BLDC	10.8	202.8	16,928	Hall sensors
Large Bone Orthopedic Drill (12V) B1210N1022	1.24	2.57	Sterilizable BLDC	11.6	221.3	15,887	Hall sensors
Large Bone Orthopedic Drill (14.4V) B1210N1023	1.24	2.57	Sterilizable BLDC	12.5	243.6	15,245	Hall sensors
Large Bone Orthopedic Saw/Reamer (9.6V) B1210N1025	1.24	2.57	Sterilizable BLDC	10.8	202.8	16,928	Hall sensors
Large Bone Orthopedic Saw/Reamer (12V) B1210N1026	1.24	2.57	Sterilizable BLDC	11.6	221.3	15,887	Hall sensors
Large Bone Orthopedic Saw/Reamer (14.4V) B1210N1027	1.24	2.57	Sterilizable BLDC	12.5	243.6	15,245	Hall sensors

## Recommended Solutions

- 0.5" diameter brushless slotted motors for small bone drilling, sawing and wire driving
- 1.10" & 1.24" diameter brushless slotted motors for large bone drilling, sawing, hip/shoulder reaming, and knee reconstruction

## Benefits

- Higher torque to power through the toughest cases
- Customizable voltage to accommodate various battery technology options
- Accurate speed response for applications ranging from sawing to drilling and reaming
- 3,000+ autoclave cycle reliability for increased instrument life/reduced service cost
- Hollow shaft for streamlined hand tool design
- High efficiency for reduced battery size and longer life per charge

## Typical Options

- Custom output shaft and interface features for modular hand tool designs
- Hollow-shaft design for wire drivers
- Front/side lead wire output for ease of assembly in hand tool
- Custom shafts and housing seals for added reliability
- Pin-out connection design for easy plug-in

# Surgical Staplers

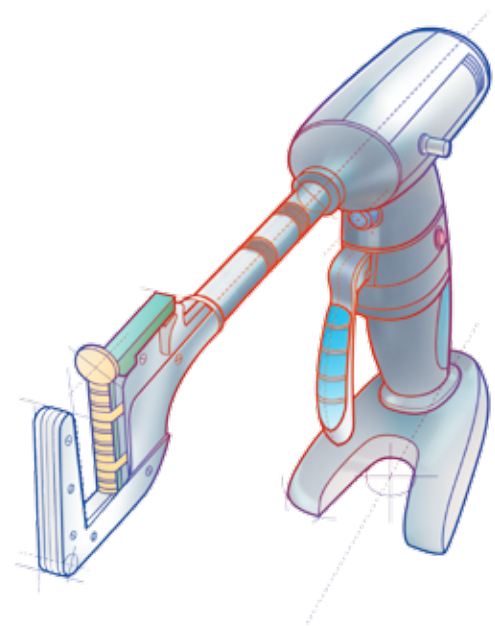
Modern surgical stapling is now powered to allow surgeons to perform smooth, reduced-firing-force, one handed-operations.

Portescap's compact sterilizable brushless motors power the complex sequenced motion of jaw closing, staple engagement and tissue cutting in reusable surgical staplers for minimal impact to surrounding tissue. High-efficiency brushless motors operate on a single battery charge and power through extra thick tissue, while their reduced size allows for a lightweight design and clear visual access to the surgical site. Lower sterilizable cycle brush DC motors are available for disposable and semi-disposable motorized stapler designs.

## Product Selection

Motor	Diam. (in)	Leng. (in)	Technology	Max Cont. Torque (oz-in)	Peak Torque (oz-in)	Max Speed (rpm)	Positioning Control
12G88 Athlonix	0.47	1.1	Brush DC	0.49	2.1	10,000	Magnetic / Optical encoder 512 lines
Surgical Stapler B0512N4101	0.5	2.65	Sterilizable BLDC	20.5	220	3,030	Hall sensors
Surgical Stapler B0512N4102	0.5	2.65	Sterilizable BLDC	23.5	193	1,890	Hall sensors
16DCP Athlonix	0.63	1	Brush DC	0.37	1.42	10,000	Magnetic / Optical encoder 512 lines
16BHS 2-wires	0.63	1.27	Slotless BLDC	1.6	-	10,900	Hall sensors
Surgical Stapler B0614H4042	0.65	3.1	Sterilizable BLDC	16.9	157.2	4,233	Hall sensors

Gear- heads	Diam. (in)	Type	Ratio	Max Cont. Torque (oz-in)	Peak Torque (oz-in)	Option
R13	0.51	Planetary	5.5 to 915:1	35.4	70.8	Ball bearing
B16	0.63	Spur	5 to 2187:1	17	42.5	Ball bearing



## Recommended Solutions

- Brushless slotless and brush DC motors for non-autoclavable designs
- B05 series motors and gearheads for jaw clamping, staple engagement and tissue cutting in a surgical stapler

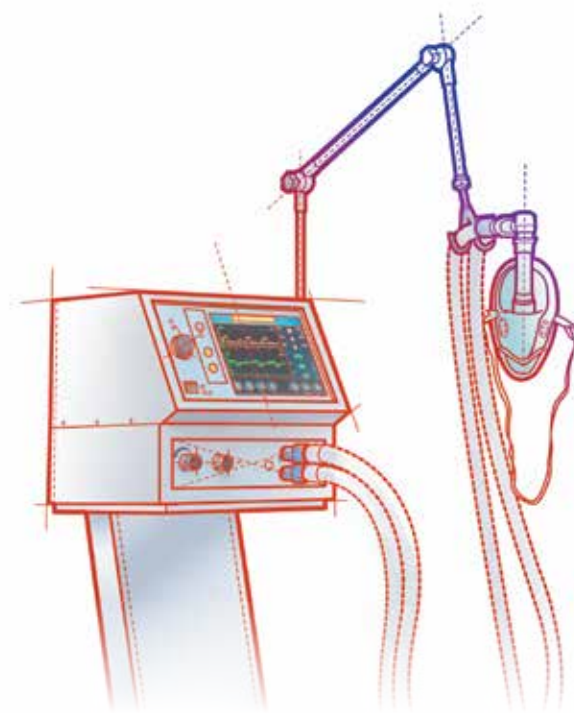
## Benefits

- Compact solution for visual access to the surgical site
- High-level integration capabilities for reduced size of final solution
- High torque for smooth operation even through tough tissues
- 3,000+ autoclave cycle reliability for increased instrument life and reduced per-procedure cost
- High efficiency for reduced battery size/weight and longer life per charge

## Typical Options

- Custom output shaft and housing interface feature
- High-level assembly integration
- Ceramic bearings for increased operational life
- Custom shafts and housing seals for added reliability
- Custom lead wire and connector
- Non-sterilizable products for disposable designs

# Ventilators



As hospitals release patients sooner than ever to convalesce in the comfort of their own homes, the need for portable ventilators has never been greater. Our highly efficient slotless brushless motors allow manufacturers to reduce blower size while achieving all the necessary pressure and flow.

Providing faster step function response, Portescap brushless slotless motors enable more comfortable bi-level operating modes that improve therapy acceptance for chronic patients, as well as a volume-controlled mode for invasive life-support applications. These quiet, reliable and highly efficient motors allow ventilators to operate on battery for hours and offer maximum patient mobility. With the ability to provide blower-level assembly solutions, Portescap can shorten your time to market.

## Product Selection

Motor	Diam. (in)	Leng. (in)	Technology	Max Cont. Torque at 10 krpm (oz-in)	Max Speed (rpm)	Inertia (kgm <sup>2</sup> 10 <sup>-7</sup> )	Mechanical Time cst (ms)
16ECP36 Ultra EC	0.24	1.42	Slotless BLDC	1.07	63,000	0.6	3.9
16ECP52 Ultra EC	0.24	2.05	Slotless BLDC	2.28	40,000	1	1.9
22ECP45 Ultra EC	0.87	1.77	Slotless BLDC	4.17	47,000	2.3	1.8
22ECP60 Ultra EC	0.87	2.36	Slotless BLDC	7.16	38,000	3.5	1
22ECS45 Ultra EC	0.87	1.77	Slotless BLDC	3.8	73,000	2.3	1.9
22ECS60 Ultra EC	0.87	2.36	Slotless BLDC	6.5	60,000	3.5	1.4

## Recommended Solutions

- 16-22mm Ultra EC™ brushless slotless motors

## Benefits

- High efficiency for extended operation per battery charge
- Increased reliability through reduced operating heat with low-loss material design
- Low inertia for rapid pressure and flow adjustment, improving patient acceptance and comfort
- Slotless design for smooth rotational motion and quiet operation

## Typical Options

- High-level impeller or blower assembly for cost-effective flow generation
- Motor sealing to reduce leaks and increase pneumatic efficiency
- Bearing change for operation in O<sub>2</sub> enriched mode
- Custom front flange to accommodate blower design
- Integrated electronics
- Integrated thermistor for thermal performance control

# Infusion Pumps

Clinicians and patients rely on pumps for safe and accurate administration of nutrients and medications. Along with the ability to continuously deliver fluids in flows ranging from a few milliliters per hour to a liter per hour, pumps can also deliver these solutions in a repetitive, precise and pressure-controlled manner.

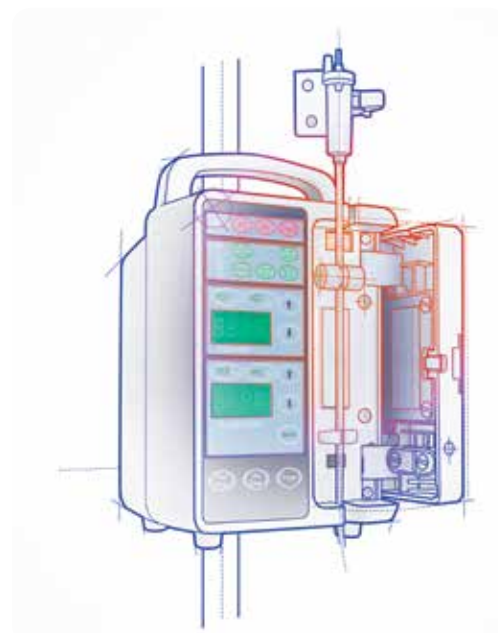
Portescap solutions allow the design of smaller ambulatory systems, ever more precise and capable of operating on battery powered for longer periods of time. Miniature encoders allow for accurate and repetitive dispensing of pain medication, while high-strength plastic gearheads minimize noise for discretion, night operation, and reduced patient stress.

## Product Selection

Motor	Diam. (in)	Leng. (in)	Technology	Max Cont. Torque (oz-in)	Max Speed (rpm)	Positioning Control
08G61	0.31	0.77	Brush DC	0.14	10,000	Magnetic / Optical encoder - up to 1024 lines
10NS61 Athlonix	0.39	0.71	Brush DC	0.13	10,000	Magnetic / Optical encoder - up to 1024 lines
12G88 Athlonix	0.47	1.1	Brush DC	0.49	10,000	Magnetic / Optical encoder - up to 1024 lines
16DCP Athlonix	0.63	1	Brush DC	0.45	10,000	Magnetic / Optical encoder - up to 1024 lines
P110 104	0.63	0.75	Disc Magnet	0.9	10,000	40 step/rev.
17DCT Athlonix	0.67	1	Brush DC	0.86	10,000	Magnetic / Optical encoder - up to 1024 lines
22DCP Athlonix	0.87	1.26	Brush DC	0.86	10,000	Magnetic / Optical encoder - up to 1024 lines
26M048B	1.02	0.54	Can Stack	1.5	1,750	48 step/rev.

Gear-heads	Diam. (in)	Ratio	Max Cont. Torque (oz-in)	Max Static Torque (oz-in)	Option
R10	0.39	4 to 4096:1*	14.2	21.2	Ball bearing
B16	0.63	5 to 2187:1	17	56	Ball bearing
R16	0.63	5.5 to 915:1	42.4	141	Ball bearing
R22	0.86	5.75 to 1090:1	85	283	Ball bearing

\* Contact us for ratio availability



## Recommended Solutions

- 8-22mm Athlonix™ brush DC motors
- 10, 16 and 22mm gearheads
- D12, F16 and MSense encoders
- 26-42mm can stack stepper motors
- 20-35mm linear actuators for automatic tube/cassette clamping
- 15-26mm can stack or disc magnet motors for cassette loading and bubble elimination

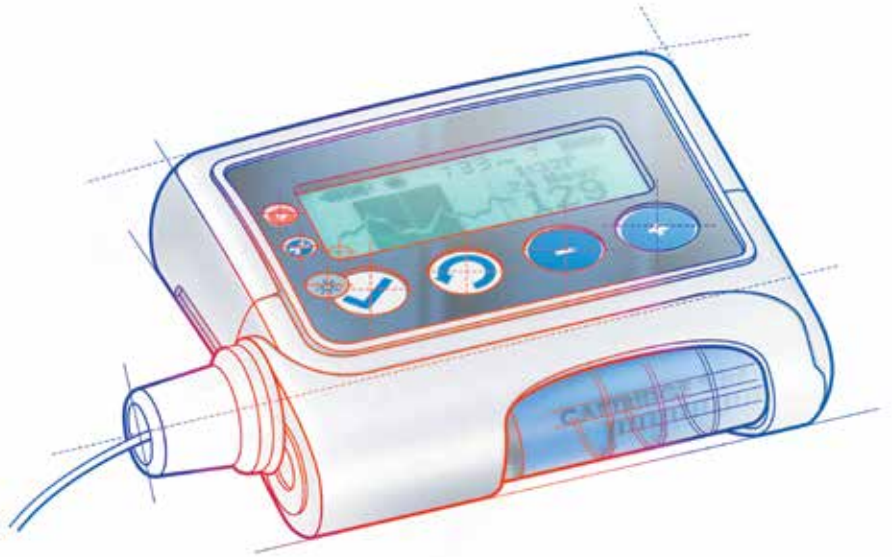
## Benefits

- High efficiency for longer operation time on battery power
- High count encoders for high accuracy dispensing as well as custom low cost solutions
- Increased reliability and reduced noise level thanks to precious metal commutation
- Compactness for ambulatory devices
- Quiet for patient comfort and discretion

## Typical Options

- High level cam/roller assembly for a cost-effective integrated solution
- Integrated encoder/gearhead solution for compactness
- Ball bearing options for longer life under side loads
- Low noise gearboxes

# Insulin Pumps



Each year, more patients switch from manual injection to continuous monitoring and delivery of fast-acting insulin, thanks to battery-operated pumping systems that are more comfortable and convenient than ever. Portescap's compact and efficient motors, gearheads and custom solutions allow pumping systems to be smaller and safer, while operating longer on standard commercial batteries. High resolution feedback controls accurate delivery of insulin down to micro units for continuous delivery, as well as monitor highly responsive DC Brushed and Brushless motors during a rapid bolus to compensate for food intake.

## Product Selection

Motor	Diam. (in)	Leng. (in)	Technology	Max Cont. Torque (oz-in)	Max Speed (oz-in)	Positioning Control
8mm BLDC**	0.31	TBD	Slotless BLDC	TBD	TBD	Hall Sensors
08GS61	0.31	0.65	Brush DC	0.08	10,000	Magnetic / Optical encoder - up to 1024 lines
08G61	0.31	0.77	Brush DC	0.14	10,000	Magnetic / Optical encoder - up to 1024 lines
P010 064	0.39	0.65	Disc Magnet	0.26	10,000	24 step/rev.
10NS61 Athlonix	0.47	0.71	Brush DC	0.13	10,000	Magnetic / Optical encoder - up to 1024 lines

\*\* Contact us for motor availability

Gear-heads	Diam. (in)	Type	Ratio	Max Cont. Torque (oz-in)	Max Static Torque (oz-in)	Option
R08	0.31	Planetary	4 to 4096:1*	7.1	21.4	Ball bearing
R10	0.39	Planetary	4 to 4096:1*	14.2	21.2	Ball bearing
R13	0.51	Planetary	5.5 to 915:1	35.4	70.8	Ball bearing

\* Contact us for ratio availability

### Recommended Solutions

- 8mm BLDC motors
- 8-10mm Athlonix brush DC motors
- 10mm disc magnet stepper motors
- 8-13mm gearheads and encoders

### Benefits

- Longer battery operation thanks to higher efficiency solutions
- Safe and accurate delivery of insulin through integrated high-count encoders or hall sensors
- Compact size for patient comfort and privacy
- Quiet for overnight comfort and discrete day-time use

### Typical Options

- High-level assembly capabilities
- Custom integrated design
- Low noise gearhead options

# Hand Held Pipettes

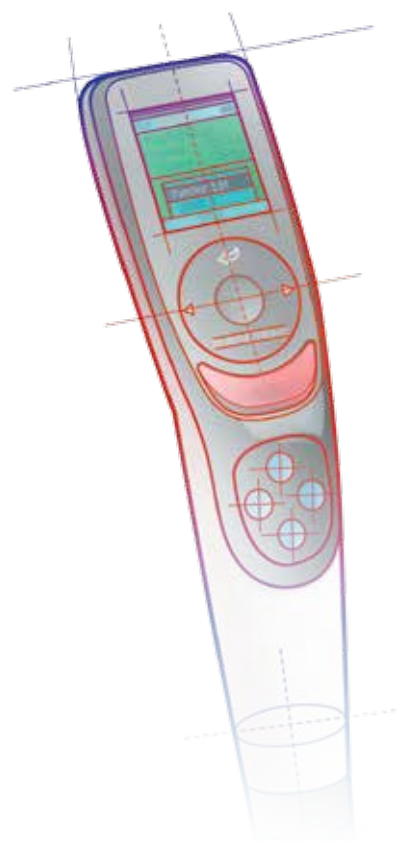
Used in molecular biology, analytical chemistry and many medical tests, electronic pipettes allow for accurate and repeatable delivery of samples and reagents while reducing the risk of repetitive strain injury.

Portescap's compact, efficient solutions allow electronic pipettes to be more ergonomic and to dispense faster and for a longer period of time before recharging. Integral linear actuation systems simplify and accelerate the design of new-generation handheld devices, while their superior actuation force allows for a wider range and larger volume of substances to be dispensed in multi-channel solutions.

## Product Selection

Motor	Diam. (in)	Leng. (in)	Technology	Max Cont. Torque (oz-in)	Max Speed (rpm)	Positioning Control
08G61	0.31	0.77	Brush DC	0.13	12,000	Magnetic / Optical encoder - up to 1024 lines
P010 064	0.39	0.65	Disc Magnet	0.26	10,000	24 step/rev.
10NS61 Athlonix	0.47	0.71	Brush DC	0.13	10,000	Magnetic / Optical encoder - up to 1024 lines
12G88 Athlonix	0.47	1.1	Brush DC	0.49	12,000	Magnetic / Optical encoder - up to 1024 lines
16DCP Athlonix	0.63	1	Brush DC	0.37	10,000	Magnetic / Optical encoder - up to 1024 lines
P110 104	0.63	0.75	Disc Magnet	0.9	10,000	40 step/rev.

Linear Actuator	Diam. (in)	Leng. (in)	Technology	Max Force (oz)	Max Speed (in/sec)	Positioning Control	Travel (mm)
20DAM-K	0.8	0.59	Linear Actuator	110	1.6	24 step/rev.	15 (captive)
20DAM-L	0.8	0.59	Linear Actuator	110	1.6	24 step/rev.	50 (non- captive)
20DBM-K	0.8	0.67	Linear Actuator	180	1	48 step/rev.	20 (captive)
20DBM-L	0.8	0.67	Linear Actuator	180	1	48 step/rev.	50 (non- captive)
26DBM-K	1.02	0.84	Linear Actuator	128	0.6	48 step/rev.	13.2 (captive)
26DBM-L	1.02	0.84	Linear Actuator	128	0.6	48 step/rev.	48 (non- captive)



## Recommended Solutions

- 8-16mm DC and Athlonix brush DC motors
- 10 and 16mm disc magnet motors and lead screws
- 20 and 26mm digital linear actuators

## Benefits

- Improved ergonomics thanks to compact integrated solutions
- High efficiency for longer operating time on battery power
- Accuracy of sample delivery with high-count encoder and low inertia solutions
- Rapid time to market through integrated linear solutions
- Reliability of precious metal brush or stepper technologies

## Typical Options

- Lead screw integration
- Winding voltage adjustment
- Custom leadscrew pitch

# Laboratory Automation

With increasing demands on the medical system, the need to optimize analysis of patient fluids is critical. Analyzers and assay preparation equipment must be designed for the highest throughput, while maintaining exceptional reliability.

Portescap's continually advancing and innovative technologies enhance the consistency and standards of your workflows, resulting in better quality and more reliable data. Our extensive range of flexible and scalable automation products include solutions for every laboratory, whatever the size or application need.

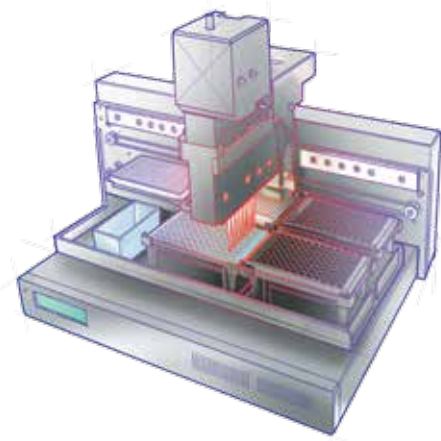
## Product Selection

Motor	Diam. (in)	Leng. (in)	Technology	Max Cont. Torque at (oz-in)	Max Speed (rpm)	Inertia (kgm <sup>2</sup> 10 <sup>-7</sup> )	Mech. Time Cst (ms) or Ang. Acc. (rad/s <sup>2</sup> )
12G88 Athlonix	0.47	1.1	Brush DC	0.49	10,000	0.28	3.8 ms
16ECP36 Ultra EC	0.63	1.42	Slotless BLDC	1.07	63,000	0.6	3.9
16ECP52 Ultra EC	0.63	2.05	Slotless BLDC	2.28	40,000	1	1.9
16DCP Athlonix	0.63	1	Brush DC	0.37	10,000	1.06	28.15 ms
P110 064	0.63	0.75	Disc Magnet	0.99	10,000	0.40	175,000 rad/s <sup>2</sup>
35NT2R82	1.37	2.25	Brush DC	16.2	10,000	71.40	6 ms
P532	2.04	1.28	Disc Magnet	29	6,000	12.00	195,000 rad/s <sup>2</sup>

Gear- heads	Diam. (in)	Type	Ratio	Max Cont. Torque (oz-in)	Max Static Torque (oz-in)	Option
R08	0.31	Planetary	4 to 4096:1*	7.1	21.4	Ball bearing
R10	0.39	Planetary	4 to 4096:1*	14.2	21.2	Ball bearing
R13	0.51	Planetary	5.5 to 915:1	35.4	70.8	Ball bearing

Feed- back	Diam. in	Type	Line Numbers	Number of Channels	Option
M-sense	0.62	Magnetic	1 to 1024	2 or 3, Quadrature/Index	Line driver type, index mode
F16	0.62	Magnetic	16	2, Quadrature	
HEDS	-	Optical	96 to 1024	2 or 3, Quadrature/Index	

\* Contact us for ratio availability



## Recommended Solutions

- 8-10mm solutions for multi pipette axes
- 10-12mm brush DC and 10-16mm disc magnet step geared motors for grippers and vial capping applications
- 12-16mm brush dc motors or 16mm integrated electronic BLDC motors for stirring axes
- 30-35mm brush DC and P500 series disc magnet motors for high dynamic X-Y travel

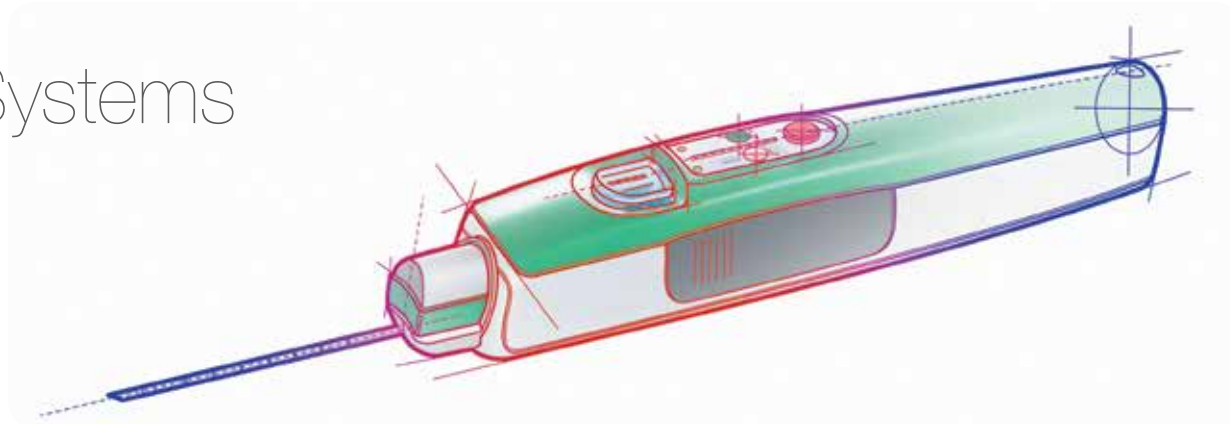
## Benefits

- Higher throughput due to low-inertia, high-dynamic solutions
- Reduced equipment footprint thanks to high power density brush and brushless DC solutions
- Reduced operating noise level
- A single vendor for virtually all your motion needs

## Typical Options

- Line driver encoder
- Winding adjustment
- Pulley mount

# Biopsy Systems



Whether to confirm the presence of cancerous cells or to identify lupus, powered biopsy tools are used to collect suspected tissue for analysis.

Portescap miniature motor solutions allow for the compact, lightweight biopsy systems doctors desire.

Portescap multi-technology platforms also provide solutions for the various motions within handheld devices. Brush or brushless motors typically allow for the retracting and cutting action of large-gage spring-loaded probes, while small step motors can be used to route multiple tissue samples into separate containers.

## Product Selection

Motor	Diam. (in)	Leng. (in)	Technology	Max Cont. Torque (oz-in)	Max Speed (rpm)	Positioning Control
P010 064	0.39	0.65	Disc Magnet	0.26	10,000	24 step/rev.
10NS61 Athlonix	0.47	0.71	Brush DC	0.13	10,000	Magnetic / Optical encoder - up to 1024 lines
12G88 Athlonix	0.47	1.1	Brush DC	0.49	12,000	Magnetic / Optical encoder - up to 1024 lines
Biopsy Handtool B0512N4103	0.5	2.45	Sterilizable BLDC	35.9	1,670	Hall sensors
15M20D	0.59	0.595	Can Stack	0.55	1,200	20 step/rev.
16DCP Athlonix	0.63	1	Brush DC	0.37	10,000	Magnetic / Optical encoder - up to 1024 lines
16BHS 2-wires	0.63	1.27	Slotless BLDC	0.57	10,900	Hall sensors

Gear- heads	Diam. (in)	Ratio	Max Cont. Torque (oz-in)	Max Static Torque (oz-in)	Option
R10	0.39	4 to 4096:1*	14.2	21.2	Ball bearing
R13	0.51	5.5 to 915:1	35.4	70.8	Ball bearing
R16	0.63	5.5 to 915:1	42.5	141	Ball bearing

\* Contact us for ratio availability

## Recommended Solutions

- 08-16mm brush DC motors and gearheads
- 16mm BLDC motors and gearheads
- 10 and 16mm disc magnet motors and gearheads
- 15 and 20mm can stack step motor

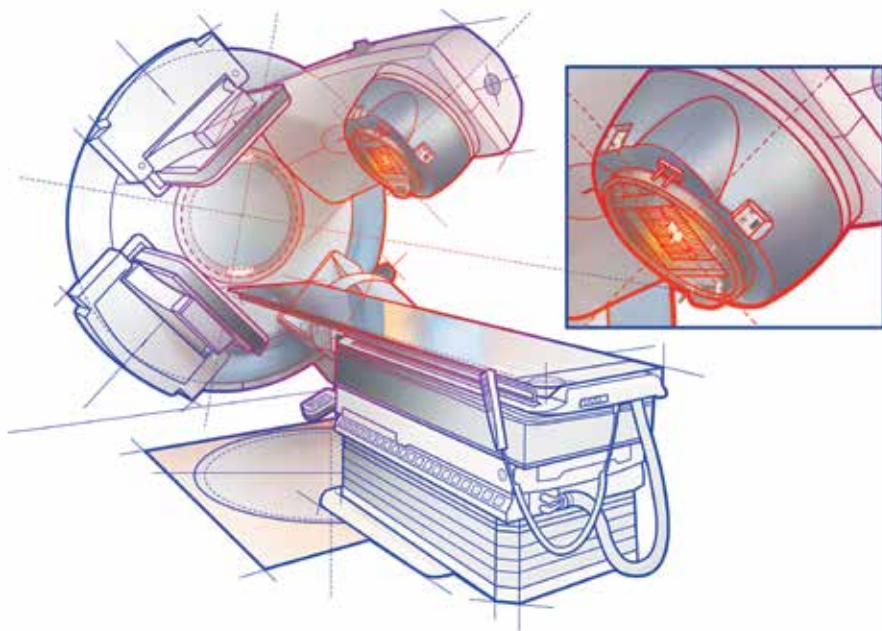
## Benefits

- Multi-technology miniature solutions from a single source
- Improved ergonomics thanks to high power density and efficiency for battery powered devices
- Reliability and long life through repeated autoclave cycles
- Inherent safety driven by low inertia rotors for rapid stop
- Low noise for reduced patient stress

## Typical Options

- Custom voltage winding for battery -powered applications
- Encoder

# Radiation Treatment Therapy



Following three-dimensional conformal radiation therapy (3D-CRT), image-guided radiation therapy (IGRT) is becoming the preferred method to treat malignant cells thanks to more precise placement of the radiation field.

In either treatment method, Portescap miniature integral solutions allow MLCs to precisely operate thinner tungsten leaves. This enhances the precision with which a tumor's shape is replicated by the leaves and the malignant cells are targeted by the radiation beam to reduce damage to normal tissues.

The high power density of Portescap motors reduces leaf travel time, which in turn reduces the overall patient treatment time while carbon-brush commutation and REE coil technologies prolong equipment life.

## Product Selection

Motor	Diam. (in)	Leng. (in)	Technology	Max Speed (rpm)	Positioning Control
08G61	0.31	0.77	Brush DC	12,000	Magnetic / Optical encoder - up to 1024 lines
10NS61 Athlonix	0.47	0.71	Brush DC	10,000	Magnetic / Optical encoder - up to 1024 lines
12G88 Athlonix	0.47	1.1	Brush DC	12,000	Magnetic / Optical encoder - up to 1024 lines
13N88	0.51	1.1	Brush DC	9,000	MR/optical encoder 512 lines

Gear- heads	Diam. (in)	Ratio	Max Cont. Torque (oz-in)	Max Static Torque (oz-in)	Option
R08	0.31	4 to 4096:1*	7.1	21.4	Ball bearing
R10	0.39	4 to 4096:1*	14.2	21.2	Ball bearing
R13	0.51	5.5 to 915:1	35.4	70.8	Ball bearing

\* Contact us for ratio availability

## Recommended Solutions

- 8-13mm brush DC motors
- D12, F16 encoders
- R08, R10, R13 planetary gearheads

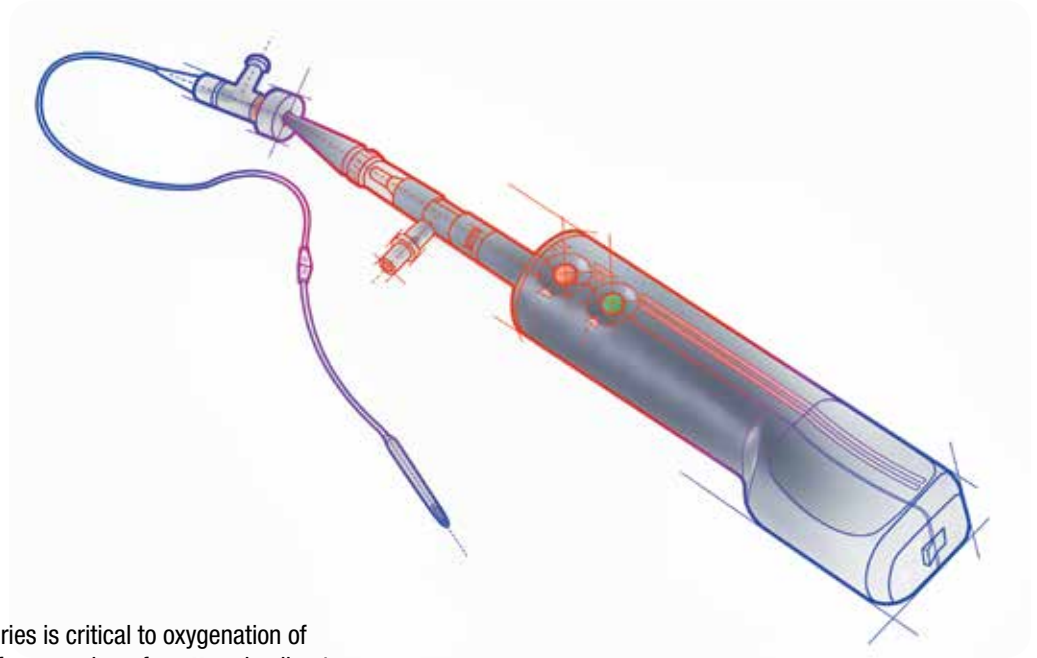
## Benefits

- Faster radiation beam shaping thanks to high power density
- Extended life thanks to carbon-brush commutation and REE multi-layer coil technologies
- Increased leaf positioning accuracy with high-count integrated encoder solutions
- Higher leaf density for increased beam-shaping precision

## Typical Options

- Custom integral solution
- Winding voltage adjustment
- Ball bearings
- Integral leadscrew

# Peripheral Artery Disease Treatment



Maintaining proper blood flow in veins and arteries is critical to oxygenation of tissues. Blood vessels can become obstructed for a number of reasons, leading to consequences ranging from discomfort to loss of limbs, and in some cases death. Orbital and rotational atherectomies are modern surgical procedures used to solve plaque buildup in vessels. A catheter-based rotary burr is inserted into the vessel to cut or grind the calcified deposit away.

Portescap's wide motor-technology portfolio and miniature solutions are well adapted to the various designs of plaque excision devices. Slotless brushless motors allow for smooth high-speed operation for increased tactile feel for the surgeon, while coreless brush DC motors allow for the highest efficiency in battery-operated disposable devices. Portescap motors offer precise speed regulation for maximum control over the thickness of abrasion. Low-inertia rotor technology provides built-in safety in case of a required sudden burr slowdown.

## Product Selection

Motor	Diam. (in)	Leng. (in)	Technology	Max Cont. Torque (oz-in)	Max Speed (rpm)	Positioning Control
12G88 Athlonix	0.47	1.1	Brush DC	0.49	12,000	Magnetic / Optical encoder - up to 1024 lines
16ECP52 Ultra EC	0.63	2.05	Slotless BLDC	2.28	40,000	Hall sensors
16ECP36 Ultra EC	0.63	1.42	Slotless BLDC	1.07	63,000	Hall sensors
16BHS 2-wires	0.63	1.27	Slotless BLDC	0.57	10,900	Hall sensors
16DCP Athlonix	0.63	1	Brush DC	0.37	10,000	Magnetic / Optical encoder - up to 1024 lines
PAD B0612P1019	0.65	2.36	Sterilizable BLDC	1.67	83,000	Hall sensors

### Recommended Solutions

- 8-16mm brush DC motors
- 16mm Ultra EC™ motors

### Benefits

- Improved ergonomics due to compact integrated solutions
- High efficiency for longer operating time on battery power
- Smooth motion and improved tactile feel thanks to coreless coil technology
- Inherent safety driven by low inertia rotors for rapid stops

### Typical Options

- Custom voltage winding for battery-powered applications
- Custom shaft tip to interface with catheter coupler
- Ball bearings
- Integral leadscrew

## Other Medical Applications

Portescap motors can be integrated into numerous medical solutions, with customization capabilities to suit your most stringent needs.



### Applications

- Surgical robots
- High speed surgical drills (cranial/spine)
- Inoculation guns
- Dental filler injectors
- Dental milling machines
- Ophthalmic surgical tools
- Peristaltic and syringe pumps
- Prosthetic limbs
- Rehabilitation systems
- Blood analyzers
- DVT treatment devices
- Pharmacy dispensing machines
- Hospital beds
- X-ray machinery
- Dialysis machines
- Oxygen concentrators

# Compact, Powerful Motors for Your Application

Choose the standard motor technology that meets your needs for speed, torque, size, efficiency and acceleration. Or rely on our advanced custom engineering to get the exact windings, magnet types, commutation technologies, shafts, leads and other features you need for an optimized solution.



## Brushless Slotted DC

**Frame Size:** 12.7 - 50.8 mm (0.5 - 2")  
**Speed:** up to 100,000 rpm  
**Torque:** up to 6,526.6 mNm (924.17 oz-in)



## Stepper Disc Magnet

**Frame Size:** 10 - 85 mm (0.4 - 3.3")  
**Speed:** up to 10,000 rpm  
**Torque:** up to 325 mNm (46 oz-in)



## Gearheads

**Frame Size:** 8\* - 40 mm (0.31 - 1.57")  
**Speed:** up to 10,000 rpm  
**Torque:** up to 10 Nm (1,416 oz-in)  
\*upon request



## Brushless Slotless DC

**Frame Size:** 16 - 26 mm (0.63 - 1.02")  
**Speed:** up to 70,000 rpm  
**Torque:** up to 98 mNm (13.8 oz-in)



## Stepper Can Stack

**Frame Size:** 15 - 60 mm (0.6 - 2.36")  
**Speed:** up to 1,000 rpm  
**Torque:** up to 300 mNm (42.5 oz-in)



## Encoders

**Frame Size:** 8\* - 30 mm (0.31 - 1.18")  
**Technology:** Magnetic, Optical  
**Line Count:** 1 to 1024  
\*upon request



## Brush DC Coreless

**Frame Size:** 8 - 35 mm (0.31 - 1.38")  
**Speed:** up to 16,000 rpm  
**Torque:** up to 160 mNm (22.6 oz-in)



## Digital Linear Actuator

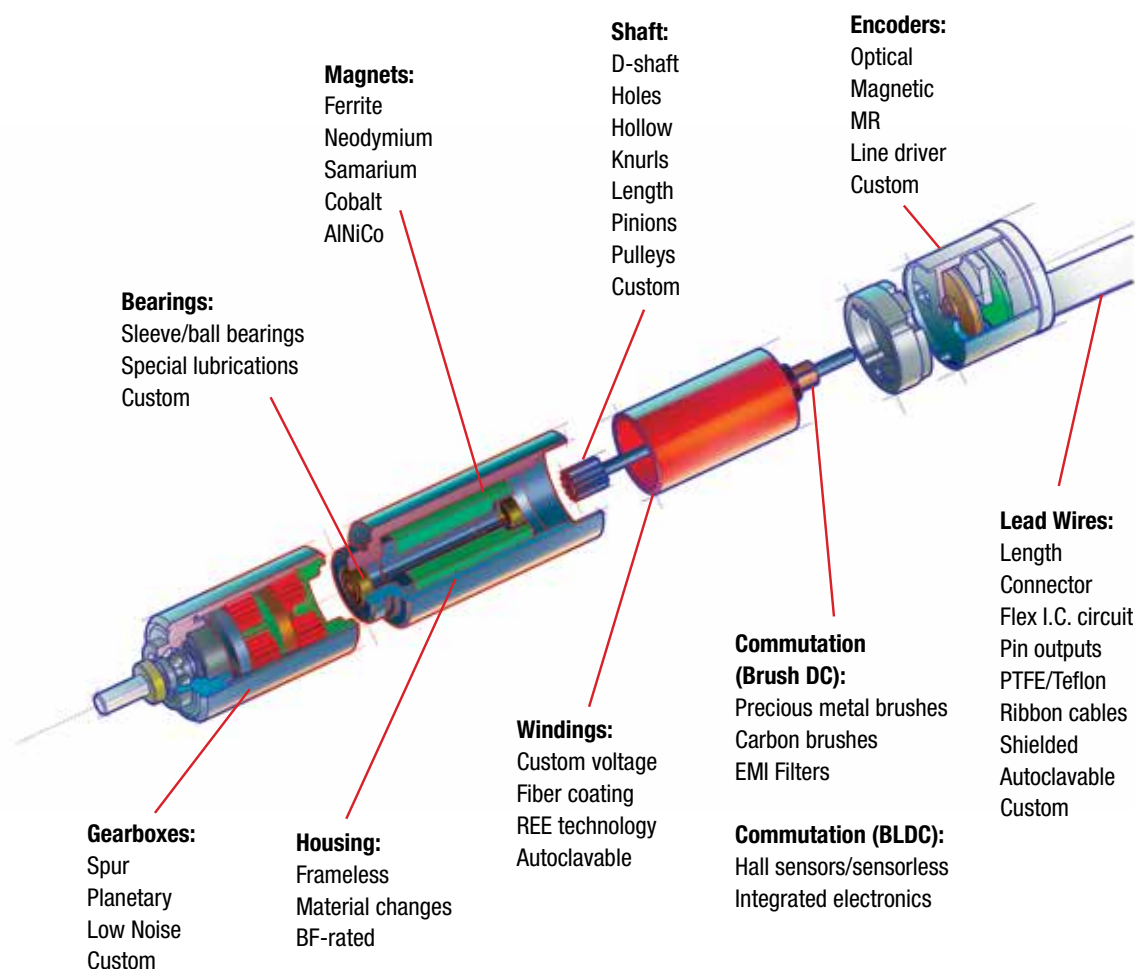
**Frame Size:** 20 - 57 mm (0.8 - 2.2")  
**Speed:** up to 500 full step/s  
**Torque:** up to 125 N (28.1 lbf)

## Choose the Right Technology for Your Application

	Brushless DC Slotted	Brushless DC Slotless	Brush DC	Disc Magnet	Can Stack	Can Stack Linear Actuator
Efficiency/battery life	++	+++	++++	+	+	+
Motor lifetime	++++	++++	++	++++	+++	++
Autoclavability	++++		+			
Ability to withstand harsh environments	++++	+++	++	++	+	+
High power/weight ratio	++++	++++	+++	+++	+	+
High motor acceleration	++	++	+++	++++		
Open loop positioning	+	+		++++	++	+++
Simple control	+	+	++++	++	++	++
Low noise	+++	++++	+++	++	++	+
Ease of achieving linear motion						++++
Max rated continuous torque	++++	++++	+++	++++	+	
Max speed	++++	++++	+++	++	+	+

# Customization Solutions to Optimize Each Application

We can customize standard motor features to meet specific application requirements, including performance specifications, mounting configuration, thermal and ambient condition requirements, and other operational needs.



## Customization Solutions To Optimize Each Opportunity

There's nothing we like better than putting new ideas in motion. Portescap's long track record of creating unique solutions spans a wide range of industries and applications. Portescap can enhance its standard products to meet specific needs including mounting configuration, performance specifications and thermal requirements, as well as ambient operating conditions or other installation and operational requirements. Whether your design has specific performance characteristics, size constraints, or operates in a special environment, Portescap can provide the exact solution.

### Customization Options Include:

- Special enclosures or sealants for clean room, high humidity, or dusty and dirty environments
- Frameless designs to reduce product weight, size and cost
- Customized speed, torque and duty cycle performance
- Special coils, magnets and windings to meet specific speed, torque and efficiency requirements
- Special markings such as CE or listings such as UL or CSA
- Custom connector and pin options
- Special shafts
- Value-added assembly

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## More than just motors ...

Originated in Switzerland, driven by a passion for precision, customer-centric innovation, technical excellence and best-quality service since 1931, Portescap has become a recognized leading expert in miniature motors and precision motion control solutions for the medical market.

... motion solutions  
for better medical  
outcomes.

# Portescap