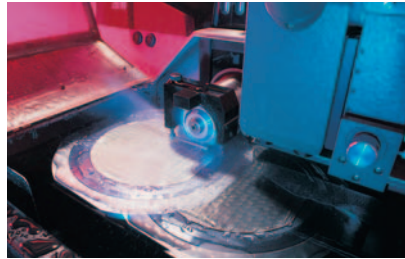




### Medical

From brushed DC coreless motors increasing performance in analyzers to brushless DC motors enhancing the human to machine interface in hand tools, Portescap miniature motors offer the power, performance, reliability, customization and engineering expertise that is demanded by today's top medical OEM's and end users. Recently a medical precision hand tool manufacturer chose to use a 12.7 mm (0.5 in.) Portescap brushless DC motor in their surgical ear, nose and throat hand tool, known as the microdebrider device, because of the motor's unique capability to enhance the surgeon's comfort by reducing temperature, vibration and weight. In addition to surgical hand tools and instruments, Portescap also delivers flexible system solutions in several other medical applications such as digital imaging, portable pumps, ventilators and respirators.



### Semiconductor and Electronic Assembly

Acceleration and accuracy are key motor attributes for rotating head and pick & place applications in electronic assemblies and semiconductor manufacturing. Portescap miniature motors serve these applications by offering unique disc magnet stepper technology that produces extremely low inertia allowing for high acceleration with precise positioning and brushed DC coreless motors that provide high acceleration and multiple size variations. In addition, Portescap's 44 mm (1.7 in.) can stack technology, with unparallel thickness from the front mounting flange to the rear of the motor, allows for one of the most compact feeder designs in the industry.



### Industrial and Commercial Automation

Long-life and reliability are key attributes for motors used in industrial and commercial automation applications. Portescap brushless DC motors are running critical scanning systems, plant instrumentation systems and increasing the life of capital equipment such as conveyor systems and industrial robots. Additionally, Portescap miniature motors are used in other automation applications ranging from security cameras and remote controlled vehicles to bar code readers.



### Ventilation Control/HVAC

With the need for performance, customization and quick lead times, building control and HVAC OEM's turn to Portescap miniature motors. One example points to a demanding refrigeration valve application that required Portescap to develop a customized motor. Starting with a standard step motor, Portescap integrated a gearhead to provide unsurpassed accuracy and repeatability over the entire speed range and a lead screw to provide fine resolution for precise valve control. The result is a complete package allowing the customer to assemble the product directly into the application.



### Civil Aviation and Aerospace

By partnering with Portescap miniature motors, major aviation OEM's are providing aircraft manufacturers with cabin and cockpit solutions that contribute to a higher performance aircraft. One example involves Portescap's brush coreless motors being integrated into a fully automated window shade system that allows passengers to control their own shade movement while also empowering the flight crew to control all window shades during the most critical times of flight. With 20% lighter motors than its Iron Core counterpart, the aircraft manufacturer chose the Portescap 13mm (0.5 in.) brush DC coreless motor due to its high power density to weight ratio, good acceleration, low power consumption and insensitivity to thermal and mechanical shocks.

## APPLICATIONS

### 1. Medical

- Dental instruments
- Inoculation guns
- Respirators
- Digital Imaging
- Surgical saws, drills and screwdrivers
- Infusion and volumetric pumps
- Exerciser and prosthesis
- Surgical instruments
- Analyzers
- Scanners
- Therapy equipment
- Microscopes
- Thermometers
- Viscosity measurement

### 2. Semiconductor and Electronic Assembly

- Wafer handling robots
- Inspection test systems
- Pick and place machines

### 3. Industrial and Commercial Automation

- Cameras
- Locks
- Paging systems
- Signaling
- Fire doors
- Bar code readers
- Ticket and cash handling machines
- Conveyors
- Remote controlled vehicles
- Industrial robots

### 4. Ventilation Control/HVAC

- Environment control
- Refrigeration units
- Air filtration systems
- Precision valve control
- Damper actuation

### 5. Civil Aviation and Aerospace

- Gyroscopes
- Electric actuation
- Autopilot systems
- Onboard instrumentation
- Satellites
- Optical scanners
- Transceivers
- Valves

### FOR IMMEDIATE ASSISTANCE:

Internet: [www.Portescap.com](http://www.Portescap.com)

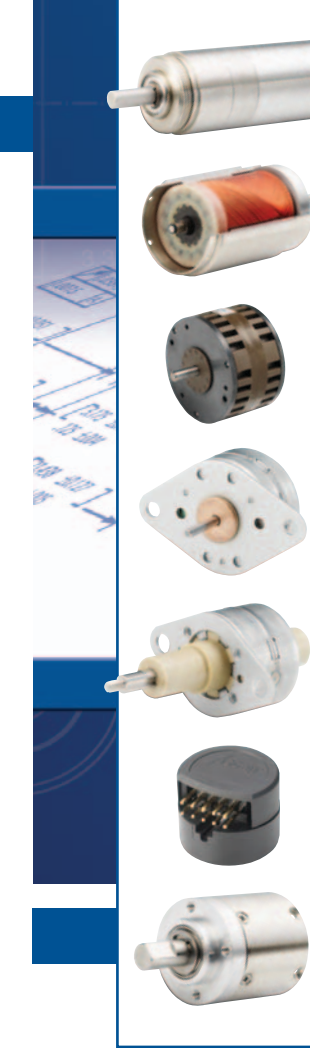
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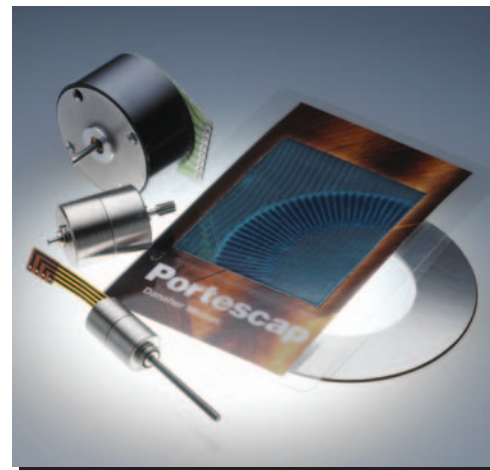
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# PORTESCAP MINIATURE MOTORS

## Exceeding your miniature motor requirements with unparalleled breadth



## KEY ATTRIBUTES

### BRUSHLESS DC

- Frame sizes range from 12.7 mm (0.5 in.) to 58 mm (2.3 in.)
- Speeds up to 100,000 rpm
- Torque range of 2.3 mNm (0.32 oz. in.) to 316 mNm (44.7 oz. in.)
- Speed, direction, current control options, and a 2-wire option are available
- Autoclavable features available

### BRUSHED DC CORELESS

- Frame sizes from 8 mm (0.31 in.) to 35mm (1.38 in.)
- Speeds up to 12,000 rpm
- Torque range of 0.64 mNm (0.09 oz. in.) to 115 mNm (16.3 oz. in.)
- Low power consumption ratings

### STEPPER

- Frame sizes as small as 10 mm (0.394 in.)
- Speeds up to 10,000 rpm
- Torque range of 1.2 mNm (0.17 oz. in.) to 1321 mNm (187 oz. in.)
- Broad product offering and customization capabilities

### DIGITAL LINEAR ACTUATOR

- Frame sizes range from 20 mm (0.787 in.) to 57 mm (2.281 in.)
- Linear travel per step: 0.0127 mm (0.0005 in.) to 0.1016 mm (0.0040 in.)
- Output force up to 111.2 N (25 lbf)
- Eliminates coupling necessary to translate rotary to linear motion

### GEARHEAD

- Torque range of 10.4 mNm (1.47 oz. in.) to 9534 mNm (1350 oz. in.)
- Reduction ratio of 5:1 to 49:1 and Ratios go up to 3280:1
- Compact design
- Compatible with an array of miniature motor offerings

### ENCODER

- Provide controlled precision movements when paired with specialty motors
- Provide tachogenerators and a combination of motor-tacho units
- Compact design
- Magnetic encoders integrated into or adapted onto specialty motors are available

## Technology vs. Features

	Brushless DC	Brushed DC	Stepper	DLA	DMM	Hybrid	Encoder	Gearhead
Cost	●	●	●	●	●	●	●	●
Reliability	●	●	●	●	●	●	●	●
Audible Noise	●	●	●	●	●	●	●	●
Efficiency	●	●	●	●	●	●	●	●
Smoothness	●	●	●	●	●	●	●	●
Resolution	●	●	●	●	●	●	●	●
Accuracy	●	●	●	●	●	●	●	●
Acceleration	●	●	●	●	●	●	●	●
Power Density	●	●	●	●	●	●	●	●

● Excellent ● Above Average ● Average ○ Fair

## BRUSHLESS DC

Details	Characteristics	Advantages
DC	Essentially linear torque/speed curve, with torque proportional to current and speed proportional to voltage	Ease of speed and position control
Brushless design	No mechanical commutation via brushes	Very long life, high reliability, insensitive to environment (no arcing), motor is dust free with reduced audible and electrical noise levels
Static winding attached to motor housing	Improved heat dissipation	Overload capability
Slotless configuration	No detent torque	Excellent velocity smoothness
Versions without hall sensor	Typically used in spindle applications	Cost effective. Less sensitive to environment. Only three connecting wires.
Versions with hall effect sensors	Typically used in applications with variations of speed or load	Very simple commutation circuitry
Versions with encoder or resolver	Typically used in incremental motion	Very precise speed and position control

## BRUSHED DC

Details	Characteristics	Advantages
Ironless rotor	Low moment of inertia	High acceleration. Ideal for incremental motion; Linear speed-torque function. Insensitive to shocks.
	No hysteresis and eddy current losses	High efficiency, low losses from friction only. Ideal for battery operation.
Central stator magnet	No magnetic saturation	High peak torques without the risk of demagnetization
	High power per size and per weight	Ideal for portable or small equipment or requiring small dimensions
Compact bearings	Low viscous damping	High peak speeds, very low speed dependent losses, low starting voltage
Precious metal commutation system	Low friction, little electrical noise	Low losses and wear, low electromagnetic interference
Copper-graphite commutation	High current densities may be commutated	High continuous and peak torques without risk of demagnetizing to motor. Very long life. Ideal for chopper drivers.
	Rated rotor temperature up to 155°C	Continuous torque is exceptionally high for the motor size, reducing the weight, dimensions, and the cooling system
	Very compact commutation system	Excellent resistance to shocks and vibration
	High torque to inertia ratio	High acceleration, short mechanical time constant

## STEPPER - DMM

Details	Characteristics	Advantages
Thin multipolar rare earth disc magnet	Very low rotor inertia	Very high acceleration
Very short iron circuit made of SiFe laminations Coils placed near to the airgap.	Low iron losses More torque at high step rates	High start/stop frequencies High speeds
Independent magnetic circuit	No coupling between phases	High power/volume ratio
Simple magnetic circuit	Sinusoidal torque function, low detent torque	Superior angular resolution in microstep mode
Optimally designed magnetic circuit	Torque constant is linear up to 2 to 3 times nominal current	High peak torques
High energy magnet	High power to weight ratio	For motors in mobile applications

## STEPPER - CAN STACK

Details	Characteristics	Advantages
Radially magnetized permanent magnet rotor	Windings can be designed for optimum performance	Low cost construction
Bobbin wound coil design	Long life lubrication	Ease of use in application
Sintered bronze bearing design - Ball bearings optional	Simple mechanical construction with proven design characteristics	Simple open loop positioning
Step angle variation - 3.6 degree to 20 degree	Unipolar or Bipolar windings	Customization to meet application demands
Simple motor construction	High torque to size ratio	

## DLA

Details	Characteristics	Advantages
Can stack design with threaded rotor and bobbin wound coil	Windings can be designed for optimum performance	Low cost construction
Stub acme thread design	Long life lubrication	Ease of use in application
Radially magnetized permanent magnet rotor	Simple mechanical construction with proven design characteristics	Fast, powerful and precise positioning
Bobbin wound coil design	Various Linear step resolutions - .0005 to .0040 inch	External components reduced in application
Precision radial ball bearing design	High force to size ratio	Customization to meet application demands
Simple motor construction	Captive and non-captive designs Unipolar or Bipolar windings	

## GEARHEAD

Details	Characteristics	Advantages
Spur gear concept: Only 1 transmission point per train	Low friction per train. Arrangement of several trains as intended by the designer. Input and output shaft not necessarily in line. Two output shafts possible.	Good efficiency, about 90% per train. Long gearbox of smaller diameter or short gearbox of large diameter. Free choice for placing the motor relative to the output shaft. Mounting of a sensor, a potentiometer etc.
Input wheel made of special grade plastics	Reaction of mechanical noise generated at high motor speeds	Silent functioning
Planetary concept: 3 or 4 transmission points per train	Reduction ratio per train is higher but so is friction. Can transmit higher torques. Input and output of a train have the same direction of rotation. Less backlash.	Less trains for a given reduction ratio efficiency about 0.85 per train. Very compact gearbox for its performance. For any number of trains, the load always rotates in the same direction as the motor. Smaller shock in case of a rapid reversal of motor rotation.

## ENCODER

Details	Characteristics	Advantages
DC tachometer: V* Ironless rotor Commutation system made of precious metals	Delivers a continuous signal Adds neglectable inertia Constant signal quality	Easy control even at very low speeds Little additional load for the motor Low sensitivity to hostile environments
Magnetic encoder: P* Encoder integrated in the motor Position monitored by Hall sensors	Simple construction Compact design Two output channels	Insensitive to hostile environments Negligible increase in length of the unit Very low current consumption High reliability and long life
Optical encoder: P+V* Phototransistors in push-pull Stand-by mode Mask integrated on receivers	High resolution Two channels plus Home position Signal level very stable Cuts LED supply at stall No thermal drift	Very precise positioning Facilitates counting the number of revolutions No phenomenon of aging Lower consumption, lower temperature rise Insensitive to temperatures, small dimensions

\*P = Position Sensor \*V = Velocity Sensor