

# PITTMAN Customization Options

## Shaft Options:

Pittman offers many motor shaft and gearmotor output shaft options. Standard shaft material is 416 Stainless Steel, but other grades of steel are available. Standard shaft diameters and common optional diameters are listed in Table 1 A. The shaft on all of Pittman's motor products can be modified to suit your unique requirements. Some of our common shaft options are shown below. Any combination of the options shown below are also available.

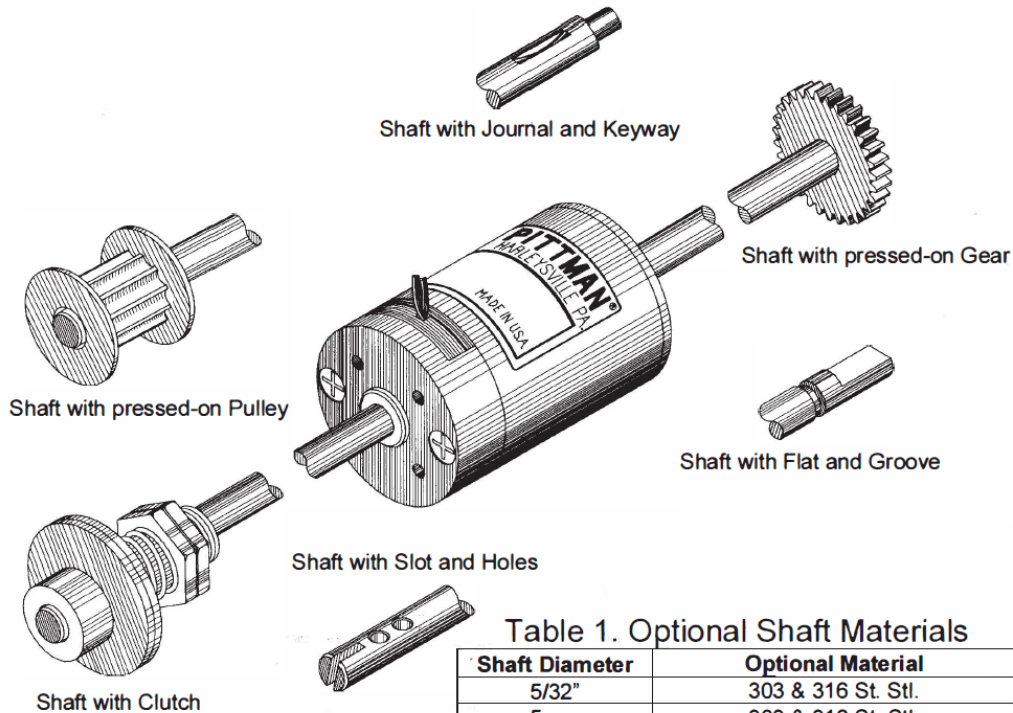


Table 1. Optional Shaft Materials

Shaft Diameter	Optional Material
5/32"	303 & 316 St. Stl.
5mm	303 & 316 St. Stl.
3/16"	303 St. Stl. & Hi-Carbon Stl.
1/4"	303 & 316 St. Stl., Hi-Carbon Stl.
8mm	303 & 316 St. Stl., Hi-Carbon Stl.

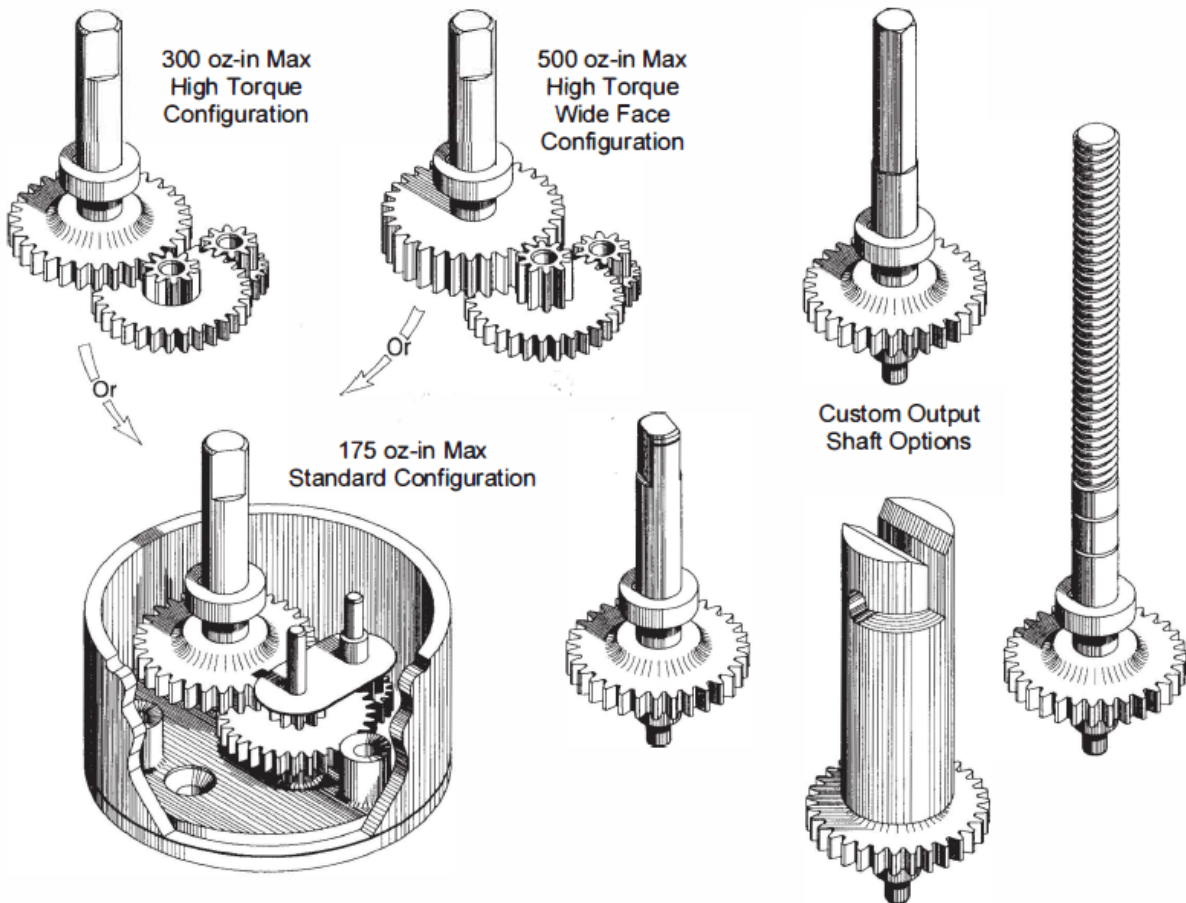
Table 1 A. Standard & Optional Shaft Diameters

Motor Series	Standard Shaft Diameter	Optional Shaft Diameter
3000 Brushless	5mm	
4000 Brushless	6mm	
5000 Brushless	8mm	
8000 Brush	5/32"	1/8" 14mm
9000 Brush	5/32"	1/8" 14mm 15mm
14000 Brush	1/4"	8mm
GM 8000 Brush	3/16"	5mm / 1/4"
GM 9000 Brush	1/4"	3/8" 16mm
GM 14000 Brush	1/4"	3/8" 16mm

**Gearheads:**

Spur gearheads are simple, inexpensive and flexible enough to suit many customers' needs. All spur gearheads can be custom tailored for an application's specific torque, noise and cost requirements. Sintered nickel steel gears are standard in all geartrains. The low torque, high speed gear can be replaced with a quieter Delrin\* gear. For higher torque applications, a cut steel or hybrid cluster is available to replace any of the sintered gears in a geartrain. In addition to several spur gearhead configurations, Pittman also offers a wide selection of planetary gearheads. The planetary gearhead uses low backlash, hardened AGMA 10 gears, which makes it a higher torque alternative to a spur gearhead. Several different shaft diameters and bearing configurations are available for each type of gearhead. All gearhead output shafts can be modified to suit your unique requirements. Refer to the shaft configuration section for a description of Pittman's motor shaft and gearmotor output shaft customization capabilities.

**Spur Gearhead Configurations**



\* Delrin is a registered trademark of E.I. DuPont de Nemours & Co. (Inc.), Wilmington, DE.

**Gear Options:**

**Sintered Nickel-Steel**

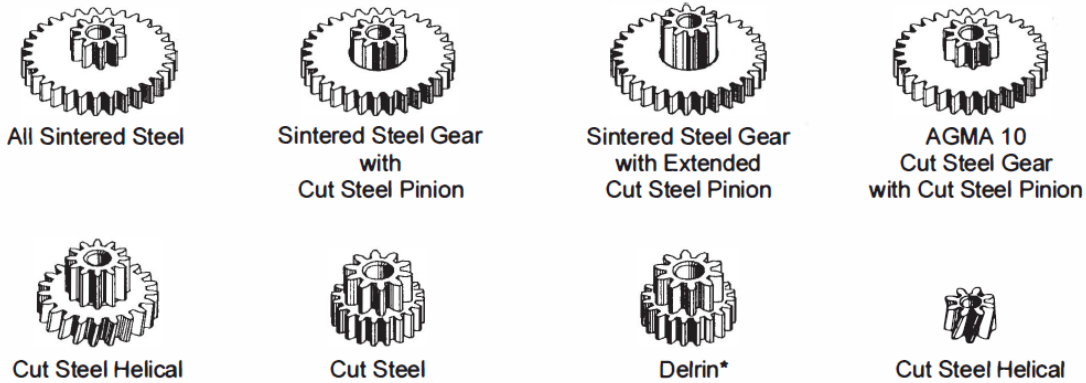
Low cost, moderate torque handling, and reasonable audible noise levels makes sintered Nickel-Steel our standard gear material. The sintering process allows for close tolerances (AGMA Q7 to QB) and low cost. The porosity of these gears help the gear hold lubricant while reducing audible noise. In applications where more strength is needed, a hybrid cluster may be used. A hybrid cluster gear is an assembly consisting of a cut steel pinion (AGMA QB to O10) and a sintered bottom gear.

**Cut Steel**

Precision (AGMA O10) cut steel gears are optional in all spur gearheads. These gears offer the highest torque capability.

**Delrin\* Plastic:**

Delrin gears are used primarily to reduce audible noise, but they may also reduce the gearhead's maximum torque capability. 20% glass fill makes these gears low cost and dimensionally stable (AGMA Q6).



**Lubricant Options:**

**EP-1/EP-2**

Standard grease for Pittman gearheads is EP-1. EP-2 is a higher viscosity version that is sometimes recommended for applications requiring low speed and/or low audible noise. Both are lithium based, all purpose greases that are recommended for applications with moderate ambient temperatures. Rated for operation at -34 to +135 degrees C.

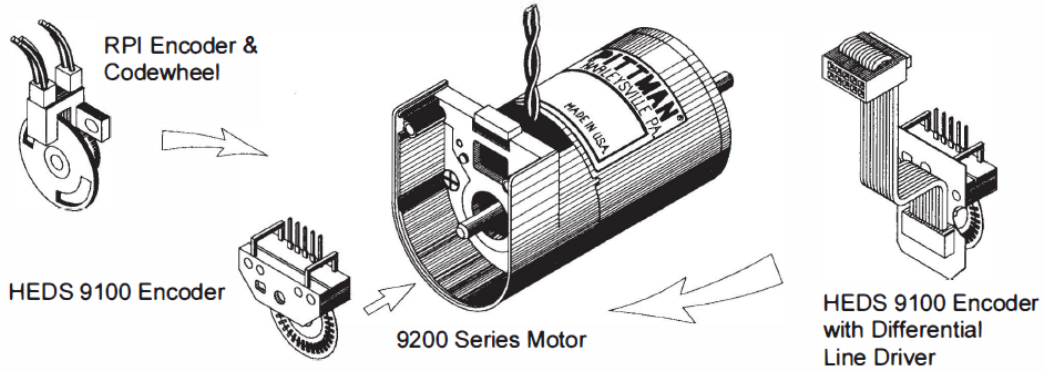
**MOBIL-28**

Used primarily for moderate load applications, extreme temperature conditions and high speed. Rated for operation at -48 to +177 degrees C.

**Z-9560**

A high temperature lubricating paste that contains a molybdenum disulfide base. It is recommended for applications where high ambient temperatures, over +100 degrees C, might tend to cause our other greases to break down. Z-9560 has no dropping or bleeding point. Rated for operation up to +150 degrees C.

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**Optical Encoders:**

Closed loop servo applications require velocity and/or position feedback. Pittman offers tachometers and a number of incremental optical encoders to provide these signals. Metal housed Hewlett Packard HEDS 9000 and 9100 series encoders are available for any motor or gearmotor with side exiting power terminations. Refer to Table 2 for information on specific encoder models.

Hewlett Packard HEDS encoders are available with either two or three channel, TTL compatible, quadrature outputs. Three channel units provide an index signal that is active once for each full rotation of the codewheel. The maximum signal frequency, which limits the maximum operational speed, is 100kHz. A differential line driver is available on most models. The differential line driver offers improved signal integrity when the encoder is used in electrically noisy environments or when it is necessary to drive long distances. All encoders are available with connectors and/or lead wires. Custom cable assemblies, connectors and wire harnesses will be quoted upon request. Pittman can factory mount Hewlett Packard HEDS 5500 or HEDS 5540 encoders or prepare the motor for mounting of the encoder by the customer. These same guidelines apply to encoders produced by other manufacturers. Please contact a factory application engineer for additional information regarding specific encoder manufacturers and models.

The RPI (Rotary Pulse Indicator) is a single channel encoder available with open collector or TTL compatible outputs. The maximum frequency is 100kHz. This is a low cost solution for applications that need 120 counts per revolution or less, yet do not require direction sensing capabilities.

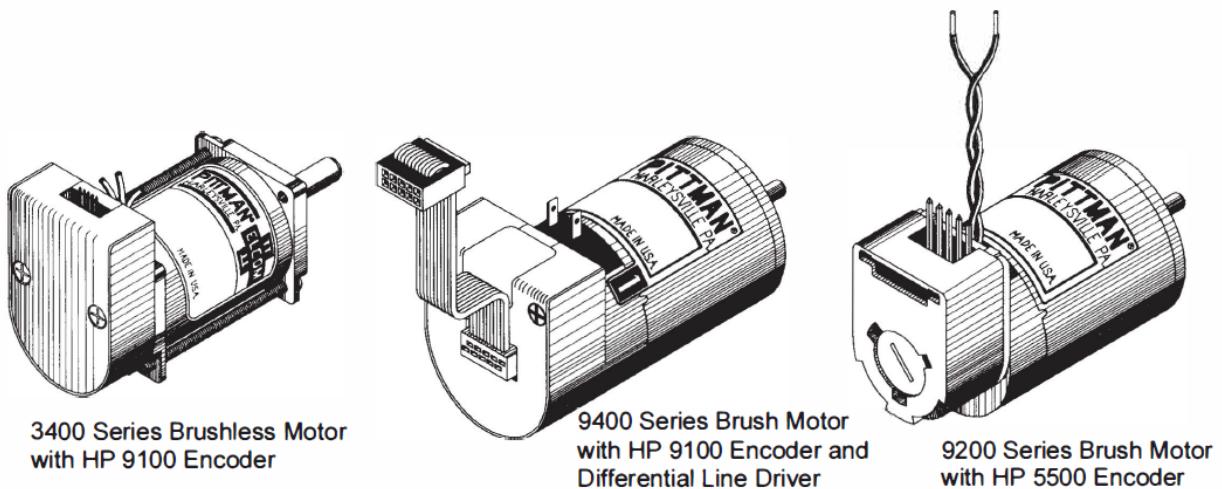
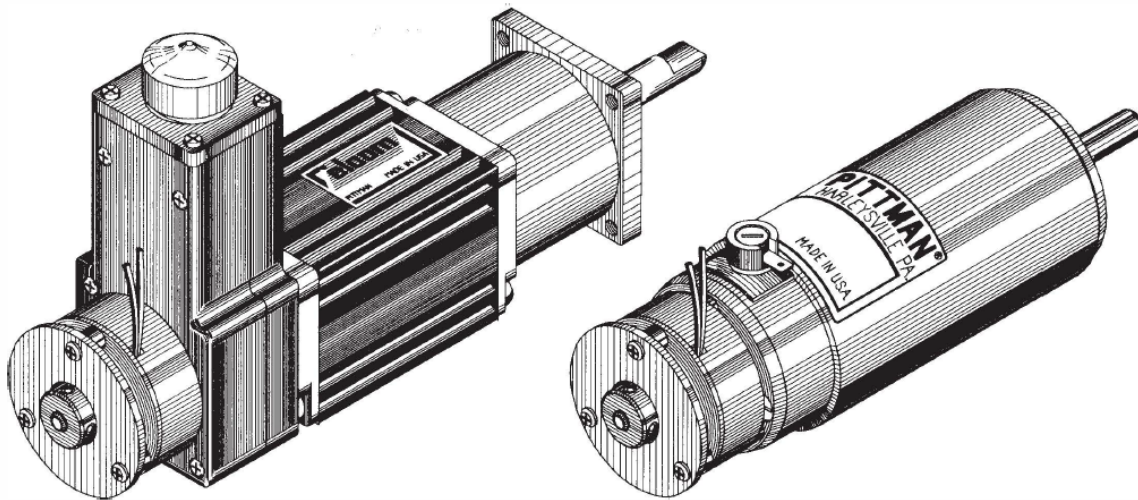


Table 2. Encoder Specifications and Availability

Encoder Type	Channels	Max CPR	Housing Material	Line Driver Options	Cost	Availability (Motor Series)					
						Brushless			Brush		
						3000	4000	5000	8000	9000	14000
HEDS-5500	2	1024	Plastic	Yes	Moderate	•	•	•	•	•	•
HEDS-5540	3	512	Plastic	Yes	Moderate	•	•	•	•	•	•
HEDS-9000	2	2048	Zinc	Yes	Moderate		•	•	•	•	•
HEDS-9040	3	1024	Zinc	Yes	Moderate		•		•	•	•
HEDS-9100	2	1024	Zinc	Yes	Moderate	•	•	•	•	•	•
HEDS-9140	3	512	Zinc	Yes	Moderate	•	•	•	•	•	•
RPI	1	120	Zinc	No	Low	•	•	•	•	•	•

**Electro-Magnetic Brakes:**

Rear mounted power-on and power-off brakes are available as an option for many Pittman motors and gearmotors. Brakes currently offered are designed for 16 and 40 oz-in static torques and 12, 24, 28, 48 and 90 VDC operation. Other operating voltages are available including 120 VAC. Please contact a factory application engineer for specific information on electromechanical brakes.

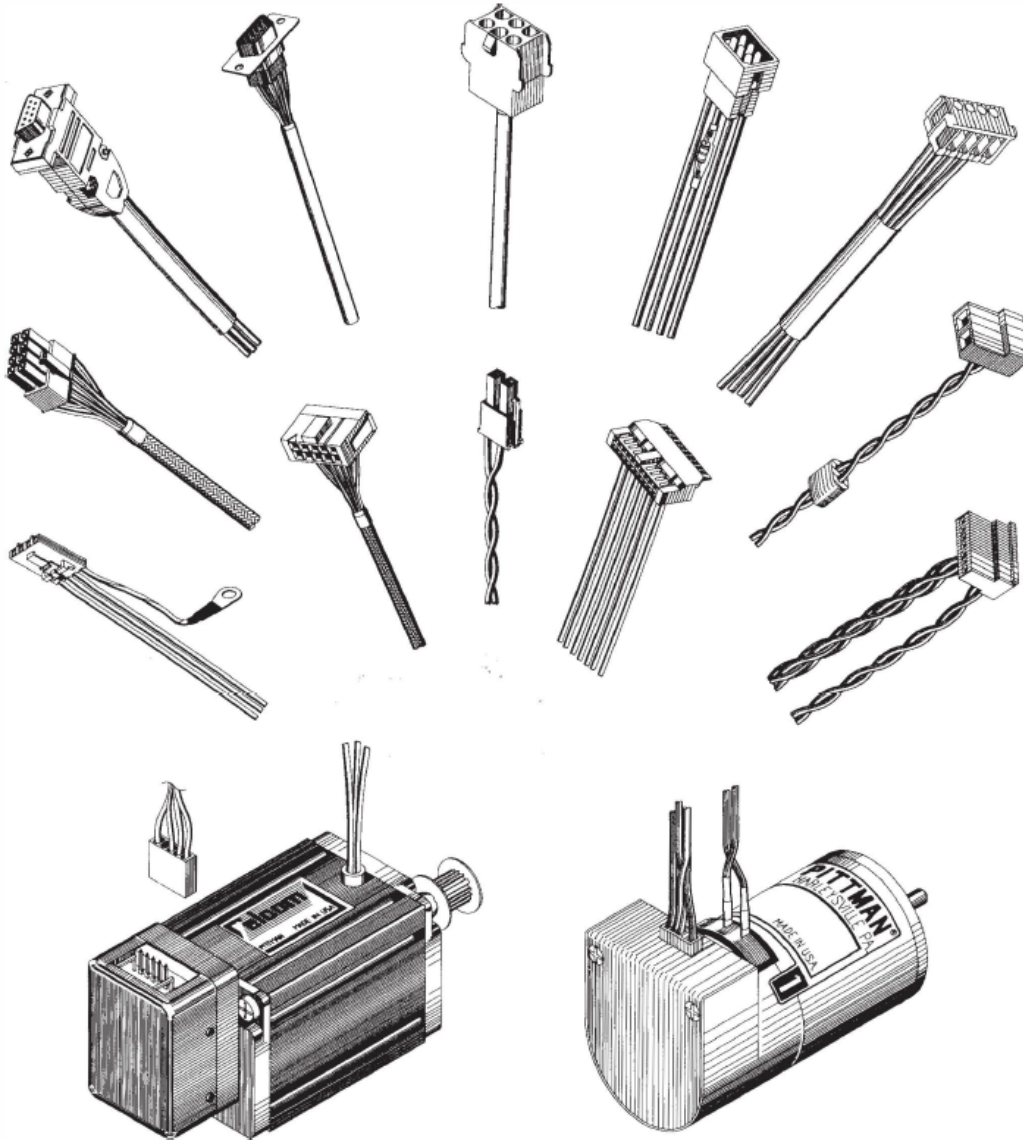


GM5170 Series  
Brushless Motor with Brake  
and Planetary Gearhead

14200 Series  
Brush Motor with Brake

**Leads and Cable Assemblies:**

Pittman can supply all motors, gearmotors, and most encoders with lead wires, with or without a termination connector. Lead wires are readily available with PVC insulation but other insulating materials such as Teflon are also available. Any reasonable lead or cable assembly requirement will be quoted upon request.



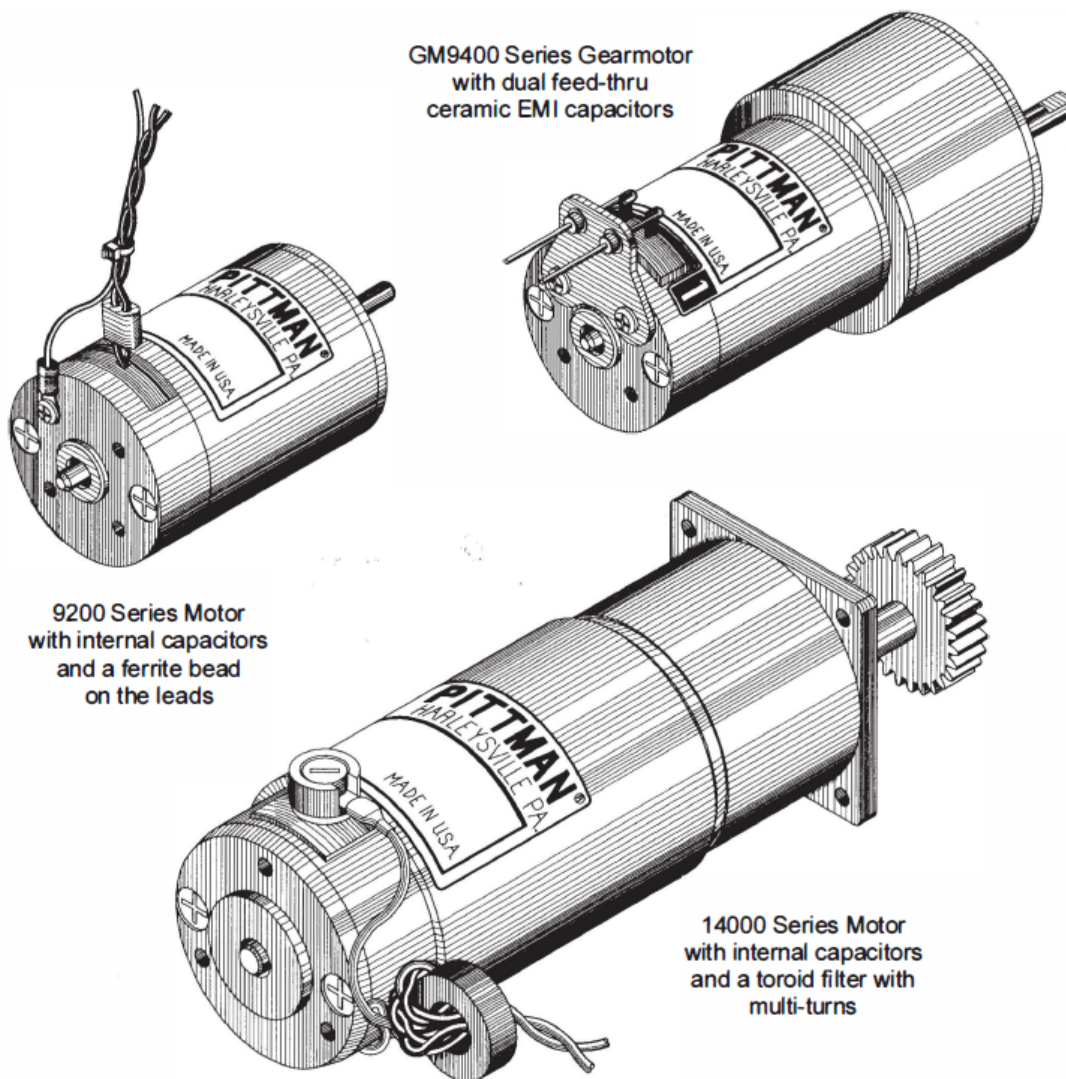
4190 Series Motor

9400 Series Motor

**CE/EMI/RFI Suppression Components:**

Pittman offers a number of solutions for CE applications or for applications that are sensitive to EMI/RFI emissions. Ferrite beads, chokes, and capacitors are commonly used for such applications. Ferrite beads and chokes must be assembled on lead wires, near the motor terminals, for maximum effectiveness. Ferrite beads simply slip over the wires' insulation, whereas chokes must be soldered in series with the wires' conductors.

Capacitors may be installed from the terminal to the ground and/or terminal to terminal. They can be mounted internally or externally on series 8000, 9000 and 14000 brush motors. Capacitance values range from 0.001 microfarad to 0.47 microfarad up to 100 working volts. Other values are available if the capacitor mounting characteristics are compatible. Please contact a factory Application Engineer to review your specific requirements.



**Endbell Options:**

Pittman can supply custom endbells for all brushless and brush motors. Customer requirements can be cast zinc, cast aluminum or any fully machined material. Special features or configurations can also be accomplished by adding stamped or molded components to the standard motor endbells. Please contact a factory Applications Engineer for information.

