

# Miniature Brushless DC Motors

## PerformeX Series Slotless Miniature BLDC Motors

Size 5, High Speed, High Performance BLDC Motors

Patented technology in Allied Motion's PerformeX series enables these miniature slotless brushless motors to deliver up to double the performance of equivalently-sized motors.

The PerformeX series was designed specifically to power precision instruments such as surgical handpieces and similar medical and dental power tools; however, they are also an ideal choice for any application that requires a small yet powerful, high speed BLDC motor, such as small high speed spindles, machine automation, or robotics.

### Features & Benefits

- Size 5 (12.5 mm) diameter accommodates a wide range of handpiece designs

- Standard 24 and 48 VDC windings
- High speed capability up to 100,000 RPM
- High  $K_m$  values mean high torque density and high performance
- Slotless design for smooth cog-free torque output
- Precision ball bearings for long life and low audible noise
- Hall-effect feedback as standard

### Options

- Planetary gearhead (3:1, 5:1, 25:1)
- Autoclavable version (minimum of 500 autoclave cycles)
- Shaft seals
- Custom winding designs
- Custom shaft, cabling, materials designs



- Size 5 (0.5" dia.) high performance brushless DC motor for surgical handpieces
- Double the performance of same sized competitive units
- Available options include planetary gearhead and

## SPECIFICATIONS

Motor Constants	Symbol	Units	Winding A	Winding B	Winding C	Winding D
Continuous Torque <sup>1</sup>	$T_{CSM}$	oz-in (mNm)	0.95 (6.71)	0.95 (6.71)	0.95 (6.71)	0.95 (6.71)
Continuous Torque (heat sink) <sup>2</sup>	$T_{CSHS}$	oz-in (mNm)	1.05 (7.40)	1.04 (7.37)	1.04 (7.37)	1.06 (7.52)
Stall Torque (nom. supply voltage)	$T_{stall}$	oz-in (mNm)	5.23 (36.9)	2.60 (18.4)	3.36 (23.7)	2.65 (18.7)
Motor Constant <sup>3</sup>	$K_m$	oz-in/ $\sqrt{W}$	0.386	0.385	0.385	0.393
Electrical Time Constant	$t_e$	ms	0.063	0.063	0.063	0.065
Mechanical Time Constant	$t_m$	ms	3.180	3.204	3.205	3.081
Thermal Impedance Motor Only	$R_{thm}$	$^{\circ}F/watt$ ( $^{\circ}C/watt$ )	68.90 (20.50)	68.90 (20.50)	68.90 (20.50)	68.90 (20.50)
Thermal Impedance With heat sink	$R_{thHS}$	$^{\circ}F/watt$ ( $^{\circ}C/watt$ )	62.60 (17.00)	62.60 (17.00)	62.60 (17.00)	62.60 (17.00)
Damping Constant Zero Source Impedance	$K_d$	oz-in/kRPM (N-m/rad/s)	1.65E-01 (1.11E-05)	1.63E-01 (1.10E-05)	1.63E-01 (1.10E-05)	1.70E-01 (1.15E-05)
Friction Torque	$T_f$	oz-in (N-m)	0.05 (3.53E-04)	0.05 (3.53E-04)	0.05 (3.53E-04)	0.05 (3.53E-04)

1.) Specified at max. winding temperature at 25C ambient, motor only

2.) With 4" X 4" X 0.125" Aluminum heat sink

Mechanical Constants	Symbol	Units	Winding A	Winding B	Winding C	Winding D
Rotor Inertia	$J_m$	oz-in-s <sup>2</sup> (kg-m <sup>2</sup> )			5.00E-06 (3.53E-08)	
Motor Weight	$W_m$	oz (g)			1.42 (40.26)	
Motor Axial Length	$L_1$	in (mm)			2.00 (50.80)	

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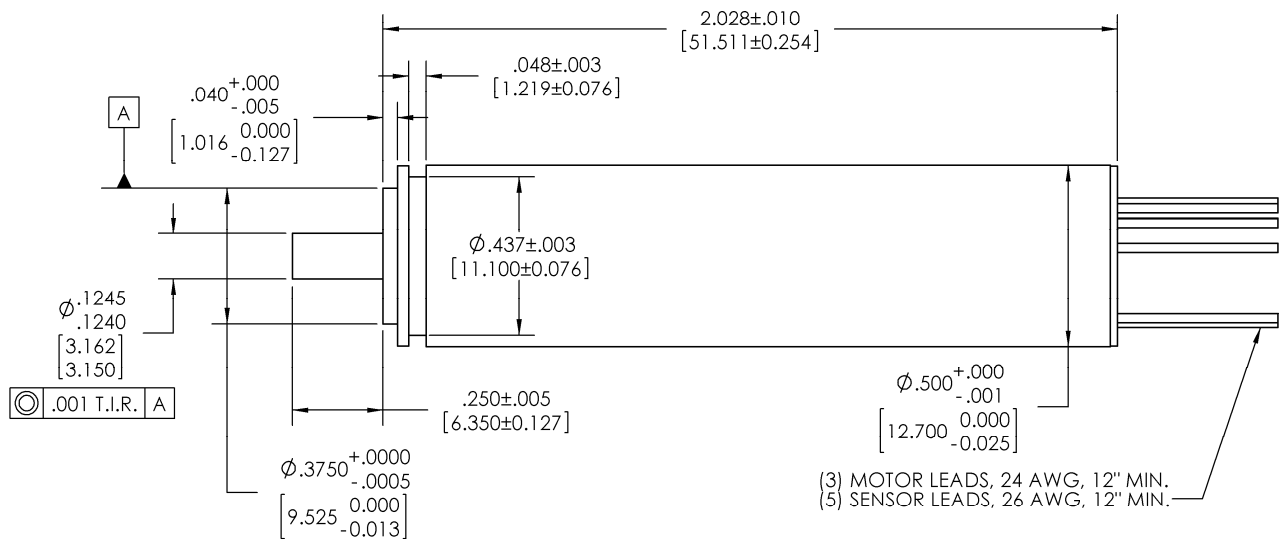
### SPECIFICATIONS

Winding Constants	Symbol	Units	Winding A	Winding B	Winding C	Winding D
Nominal Supply Voltage	E	V	24		48	
Max. Cont. Current <sup>1</sup>	I <sub>CSM</sub>	A	2.864	1.426	0.913	0.705
Max. Cont. Current (heat sink) <sup>2</sup>	I <sub>CSHS</sub>	A	3.145	1.566	1.002	0.774
Stall Current (nom. supply volt)	I <sub>pk</sub>	A	15.7	3.9	3.23	1.93
No-Load Current	I <sub>NL</sub>	A	0.291	0.208	0.184	0.170
Torque Constant	K <sub>T</sub>	oz-in/A (N-m/A)	0.333 (2.36E-03)	0.666 (4.72E-03)	1.041 (7.38E-03)	1.375 (9.74E-03)
No-Load Speed	S <sub>NL</sub>	RPM (rad/s)	99,874 (10,459)	49,937 (5,229)	64,599 (6,765)	48,939 (5,125)
Back EMF Constant	K <sub>E</sub>	V/kRPM (V/rad/s)	0.246 (2.40E-03)	0.493 (4.70E-03)	0.770 (7.40E-03)	1.016 (9.70E-03)
Resistance (ph-ph)	R <sub>c</sub>	Ohms	0.499	2.010	4.908	8.221
Inductance	L	mH	0.032	0.126	0.309	0.538
Max. Winding Temp.	Θ <sub>M</sub>	°F (°C)	302 (150)	302 (150)	302 (150)	302 (150)

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### DIMENSIONS



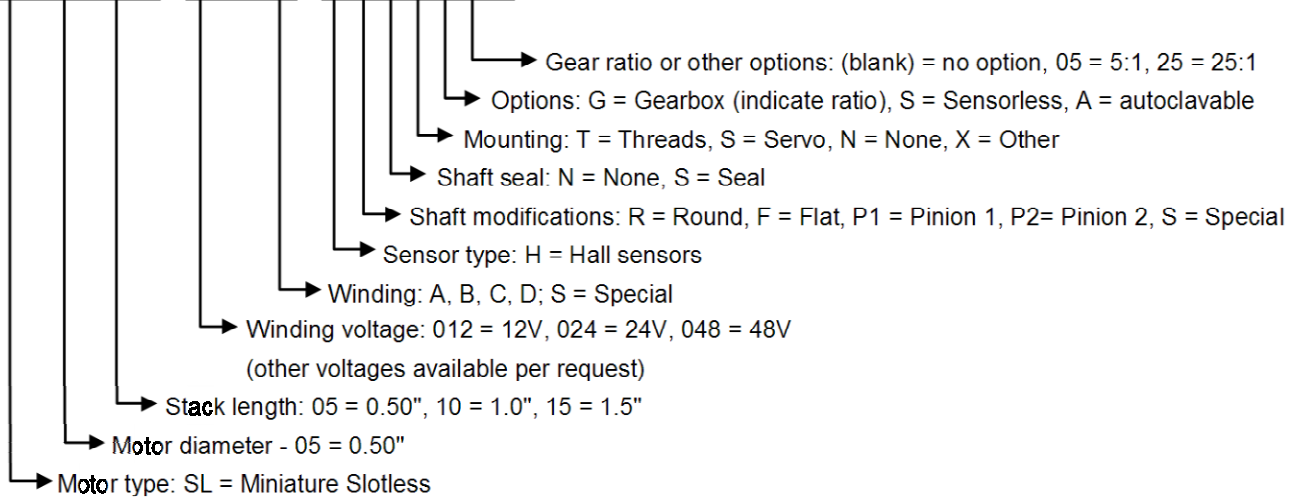
in. (mm)

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### MODEL NUMBERING

S L 0 5 1 0 - 0 4 8 A - H R N T G 0 5





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