SHADIN AVIONICS

INNOVATION THROUGH SIMPLICITY

SHADIN AVIONICS SOLUTIONS

BRUSHLESS DC MOTORS

FLIGHT CERTIFIED

SHADIN AVIONICS

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SHADIN AVIONICS SOLUTIONS

We like the word “simplicity”. Not because what we do is simple. In fact, it is quite the opposite. We like the word because of what we can do for our customers. We simplify the complex challenge of aircraft systems integration. And that, quite simply, makes them happy!

Shadin Avionics has been supplying reliable avionics and unmatched support for more than 40 years, one-third of the time since the Wright Brother’s first flying machine! Throughout that rich history, Shadin has developed a reputation for unmatched product quality and unwavering support.
Now, in our fifth decade and under new ownership, we are excited to apply over 100 years of executive team aerospace experience and a uniquely developed and customizable product technology to revolutionize aircraft system integration with unparalleled agility and expertise

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Shadin Avionics has a long history in fielding FAA certified avionics products. This catalog represents more complementary products within our portfolio. This catalog provides an overview of various frame sizes of Brushless DC Motors. All designs included in this catalog are fully customizable!

Available operating voltages range from 18VDC to 800VDC. The catalog also shows various commutation options available.

All motors are fully customizable for LRU applications. Space rated, high pressure or sealed applications. These motors are rated for continuous operation at for operation at -55 Deg. C to +220 Deg. C. and a peak rating of +300 Deg. C. upon request with optional high temperature insulations systems.

Construction of these motors are fully modular to accept various ancillary devices as each application requires. Available Planetary or Spur gearing are also modular to ease construction for any application.

All products are made from high strength stainless steel and thermally matched materials to provide smooth operation across wide temperature extremes.

Motor Commutation Options

Hall-Effect

The simplest form of motor commutation is Hall-Effects. These are DC excitation and DC digital outputs. When using Hall-Effects, the typical control methodology used is square wave or trapezoidal commutation. Shadin Avionics offers multiple packages of devices that can be used depending upon the application and environment. Hall-Effects in either a ceramic or plastic package are available within the envelope specified within. The MIL-STD-883 Class B Hall-Effect has a temperature rating of -55 Deg. C to +125 Deg. C. The plastic encapsulated Hall-Effect has a temperature rating of -40 Deg. C to +150 Deg. C. This part has also been used and qualified for many applications operating down to -55 Deg. C. Both of these types of parts are latching devices.

High Temperature Hall-Effect

Typical Hall-Effect function with a higher operating temperature range. A high temp rated Hall-Effect is offered for potential use. This device has an operating temperature range of -55 Deg. C to +200 Deg. C.

Solid Core Resolver:

A resolver is a rotary variable transformer designed to produce two outputs that have a sine-cosine relationship as a function of rotor position. The tangent of the two voltages represents the rotor position. Using a Resolver for commutation allows a sinusoidally driven, torque ripple free motor control methodology. The construction used is a solid core rotor. This allows use in more challenging environmental conditions. This type of resolver lends itself for use in high vibration, high shock and high-speed applications. These types of Resolvers are available in 2 or more cycles to match motor pole counts. The operating temperature limits for this type of device is -55 Deg. C. to +155 Deg. C.

Wound Core Resolver:

A resolver is a rotary variable transformer designed to produce two outputs that have a sine-cosine relationship as a function of rotor position. The tangent of the two voltages represents the rotor position. Using a Resolver for commutation allows a sinusoidally driven, nearly torque ripple free motor control methodology. The operating temperature limits for this type of device is -55 Deg. C. to +200 Deg. C. This type of Resolver is a single cycle unit. Resolver commutation allows sinusoidal current control for smooth, ripple free operation where no torque disturbances are tolerated.

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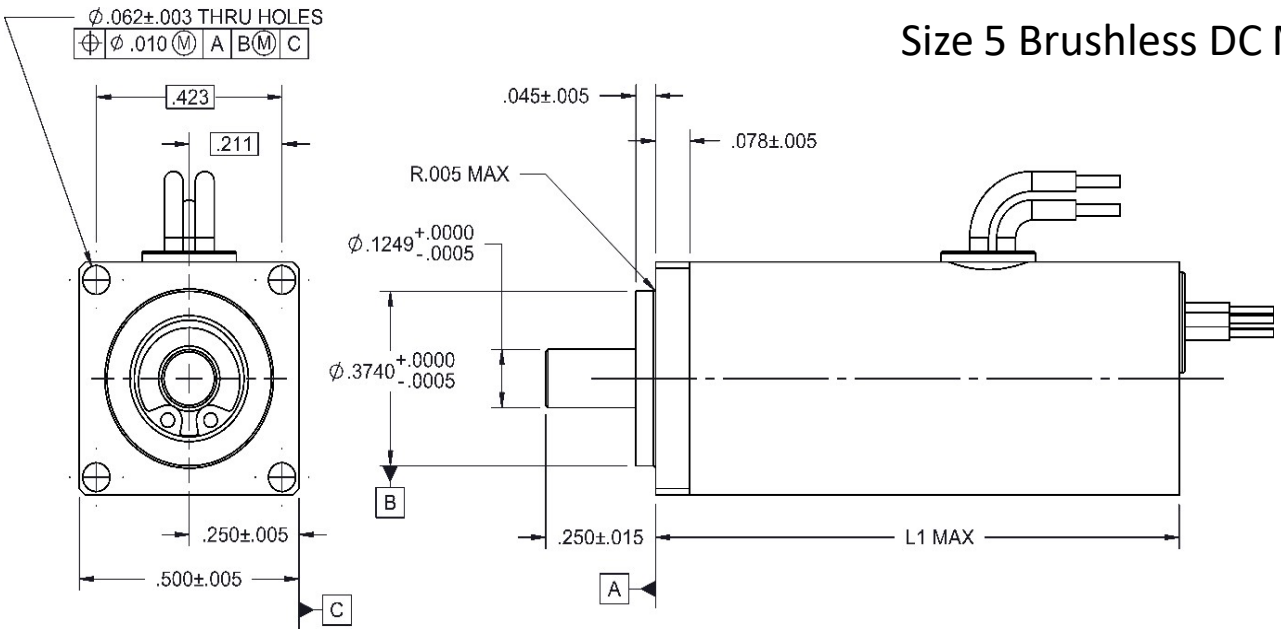
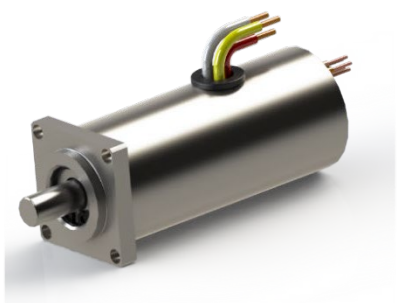
Size 5 Brushless DC Motor



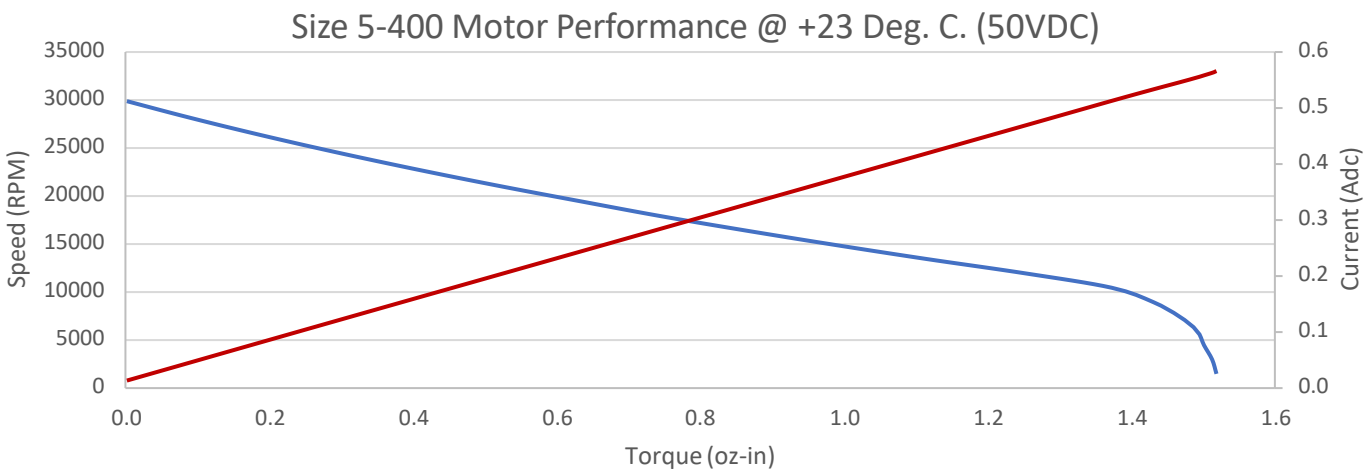


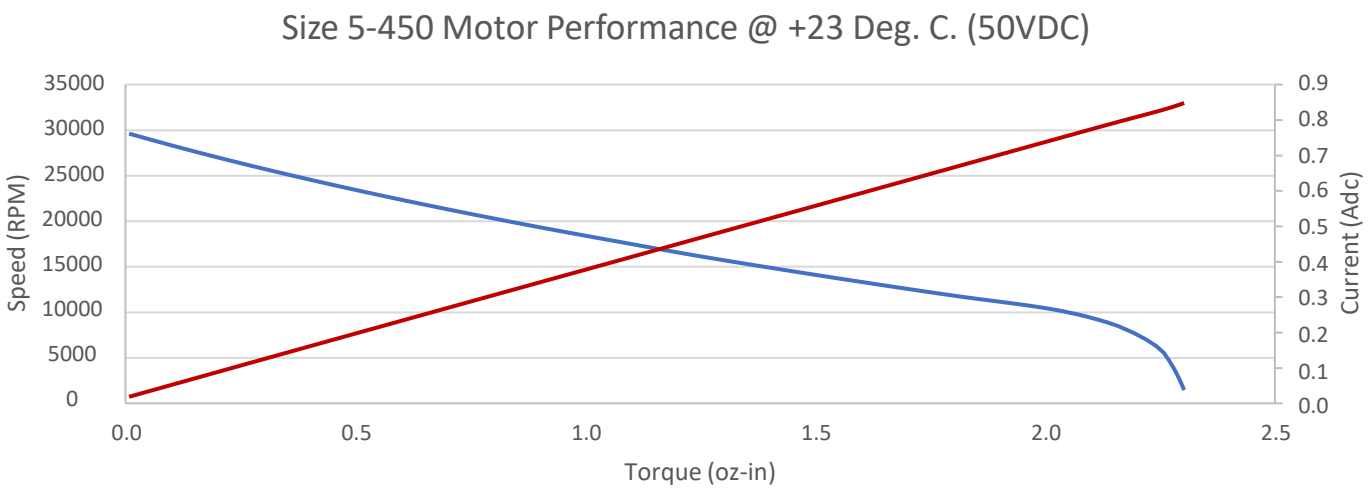
		5-400 Motor Motor With Hall-Effect Commutation	5-450 Motor Motor With Hall-Effect Commutation	5-800 Motor Motor With Hall-Effect Commutation
Motor Constant	(in-oz/Watt$^{.5}$)	0.30	0.50	0.61
Peak Torque	(oz-in)	1.5	2.25	3.5
Peak Power Output	(Watts)	11	17	28
Max. Rated Velocity	(RPM)	100,000	100,000	100,000
Rotor Inertia	(in-oz-sec^2)	2.383 x 10^{-6}	2.628 x 10^{-6}	4.132 x 10^{-6}
Electrical Time Constant (L/R)	(mSec)	0.04	0.06	0.07
Number of Poles		4	4	4
Number of Phases		3	3	3
Mass	(Oz)	0.76	0.85	1.9
"L1" Length	(In)	1.205	1.260	1.61

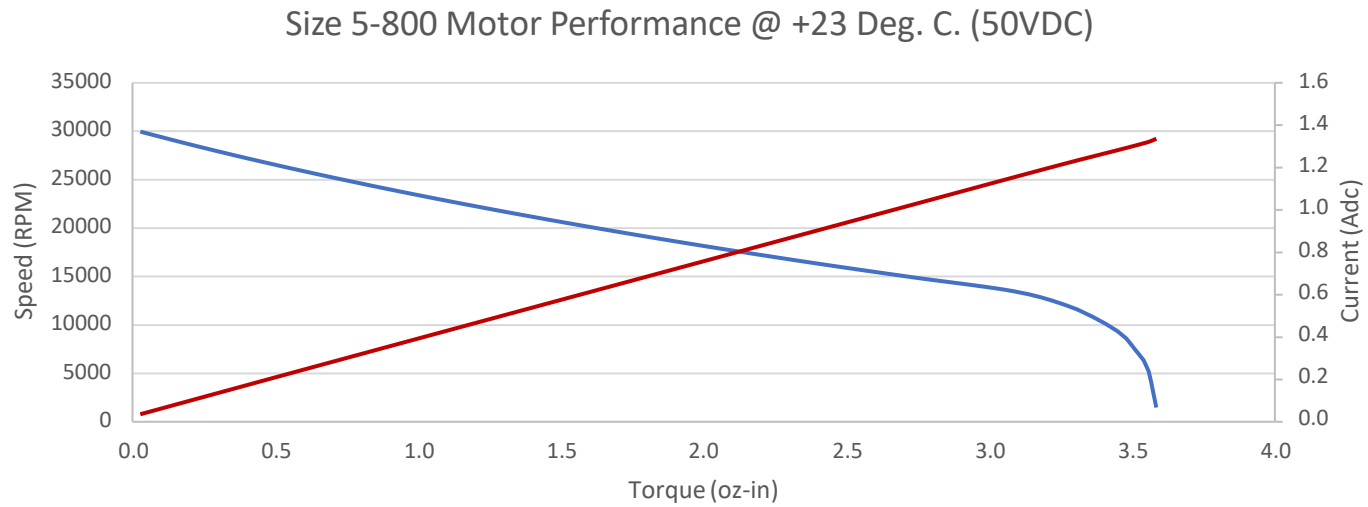
Notes:

1. Unit is of high strength Stainless Steel construction.
2. Optional mounting and shaft configurations available on request. Fully Sealed LRU packages also available.
3. Space rated or other special motors are available upon request.
4. For thermal operation limits (Continuous or peak), consult Shadin for specifics of your application. Environment, mounting and other factors will drive thermal capability.
5. Above motors indicate “standard” products and alternative configurations are also available. i.e., 2 phase motors, 2 or 4 pole designs etc.
6. Complementary Gearboxes or other ancillary devices are also available upon request.
7. Motors can be optimized for Sinusoidal or Trapezoidal Drive operation.
8. Operating voltages from 18VDC to 50VDC available. Performance curves on following pages are examples. Shadin can design a motor for your application’s optimized specific needs.

Size 5 BLDC Motor







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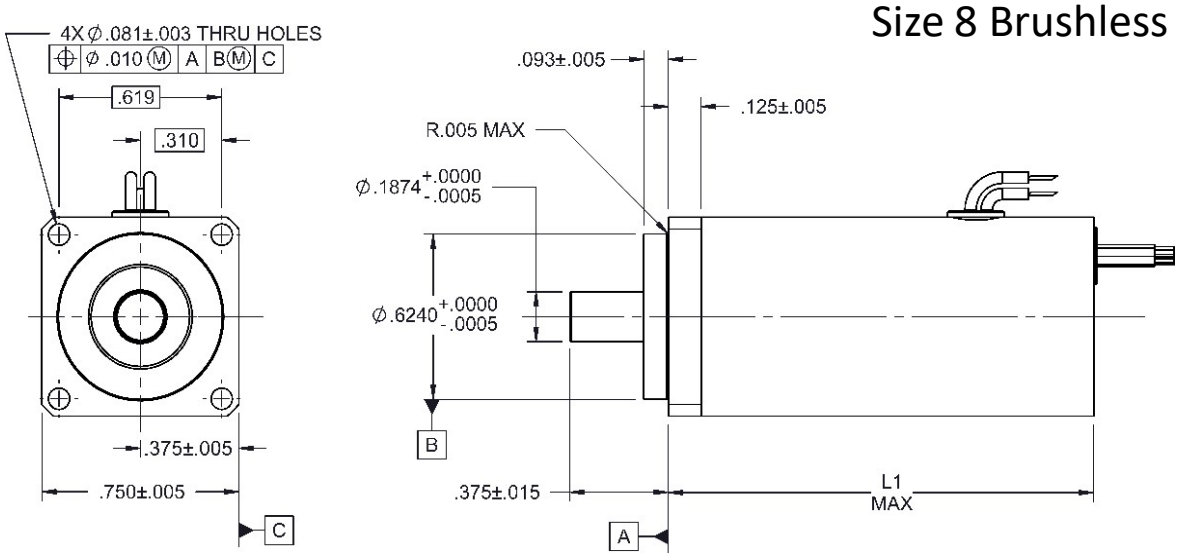
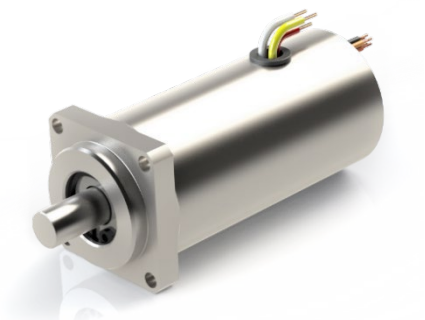
Size 8 Brushless DC Motor





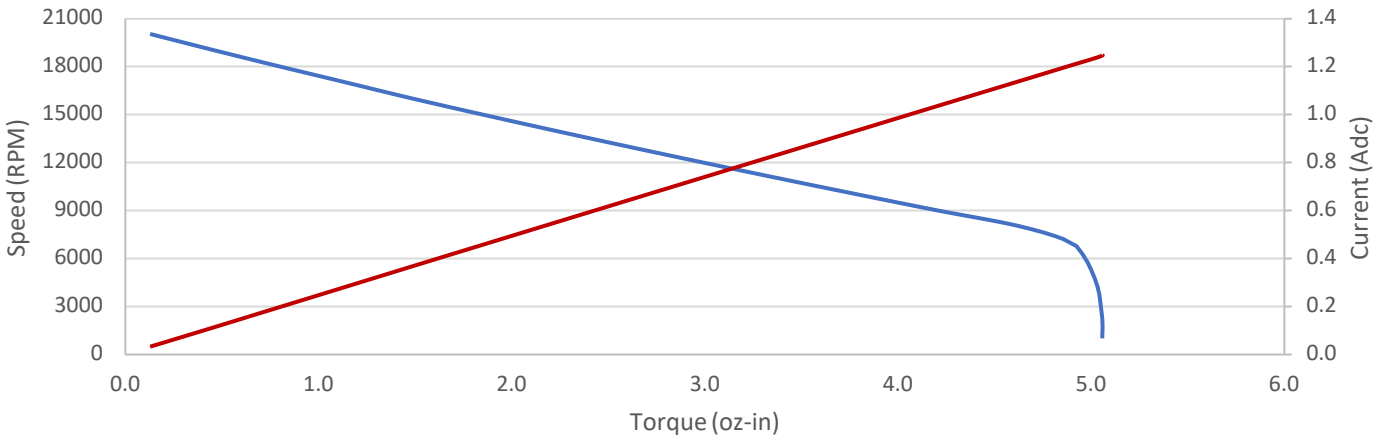
		8-400 Motor Motor With Hall-Effect Commutation	8-500 Motor Motor With Hall-Effect Commutation	8-800 Motor Motor With Hall-Effect Commutation
Motor Constant	(in-oz/Watt$^{.5}$)	1.1	1.6	2.0
Peak Torque	(oz-in)	5	9	14
Peak Power Output	(Watts)	60	90	130
Max. Rated Velocity	(RPM)	60,000	60,000	60,000
Rotor Inertia	(in-oz-sec^2)	1.885 x 10^{-5}	2.317 x 10^{-5}	2.765 x 10^{-5}
Electrical Time Constant (L/R)	(mSec)	0.06	0.09	0.11
Number of Poles		4	4	4
Number of Phases		3	3	3
Mass	(Oz)	2.8	3.0	3.5
Outer Diameter	(In)	0.755	0.755	0.755
"L1" Length	(In)	1.305	1.420	1.715

Notes:

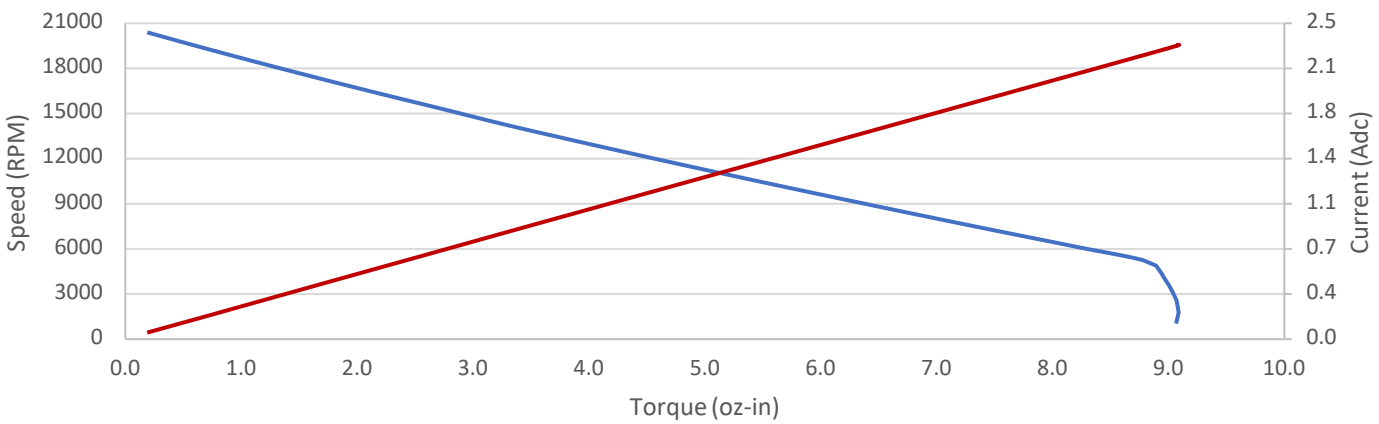
1. Unit is of high strength Stainless Steel construction.
2. Optional mounting and shaft configurations available on request. Fully Sealed LRU packages also available.
3. Space rated or other special motors are available upon request.
4. For thermal operation limits (Continuous or peak), consult Shadin for specifics of your application. Environment, mounting and other factors will drive thermal capability.
5. Above motors indicate “standard” products and alternative configurations are also available. i.e., 2 phase motors, 2 or 4 pole designs etc.
6. Complementary Gearboxes or other ancillary devices are also available upon request.
7. Motors can be optimized for Sinusoidal or Trapezoidal Drive operation.
8. Operating voltages from 18VDC to 50VDC available. Performance curves on following pages are examples. Shadin can design a motor for your application’s optimized specific needs.

Size 8 BLDC Motor

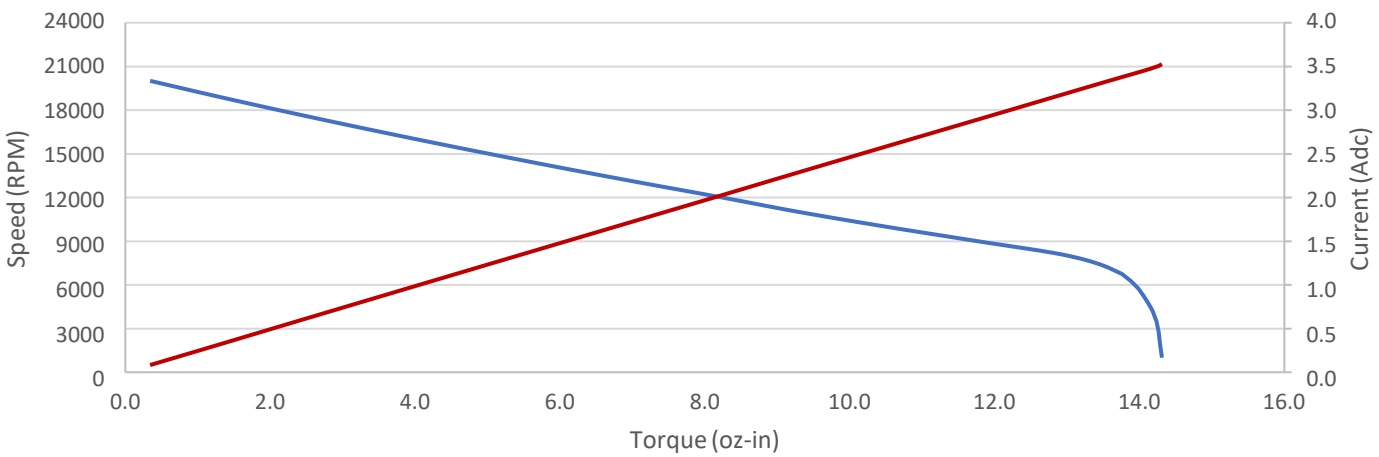
Size 8-400 Motor Performance @ +23 Deg. C. (50VDC)



Size 8-500 Motor Performance @ +23 Deg. C. (50VDC)



Size 8-800 Motor Performance @ +23 Deg. C. (50VDC)



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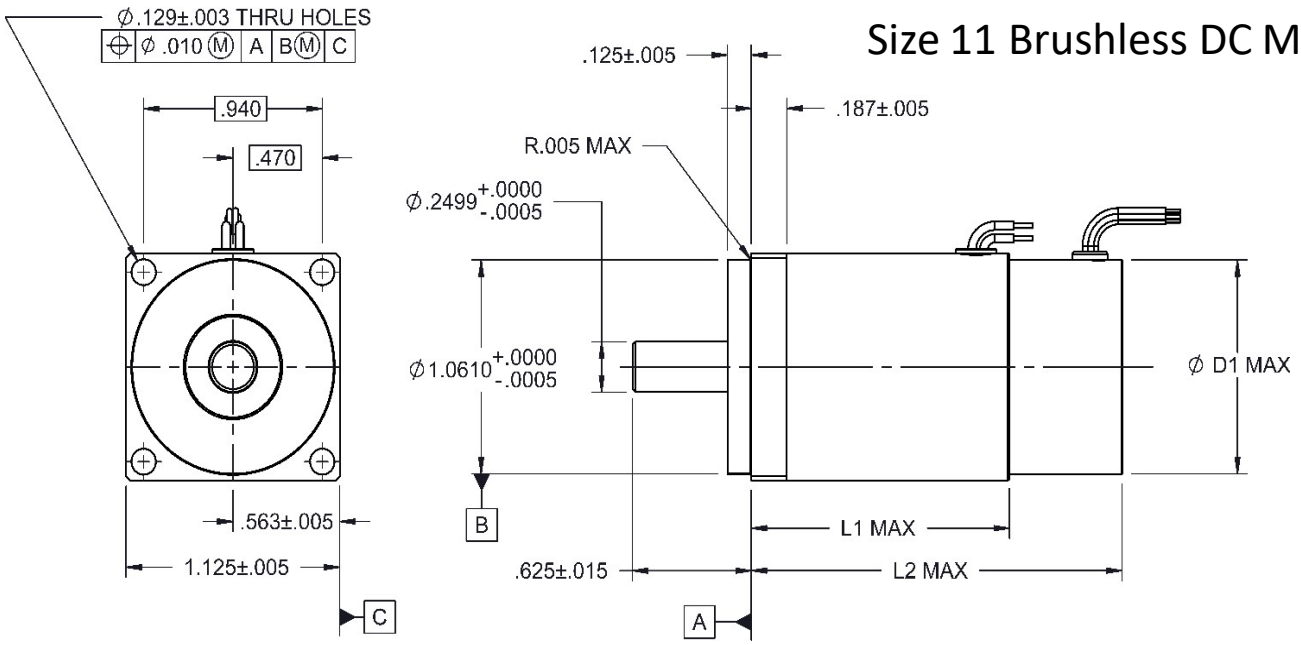
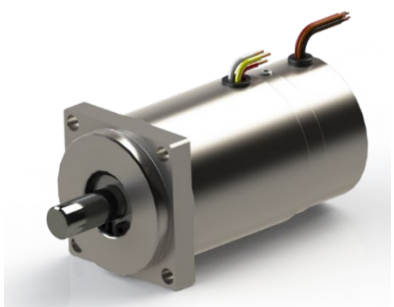
Size 11 Brushless DC Motor





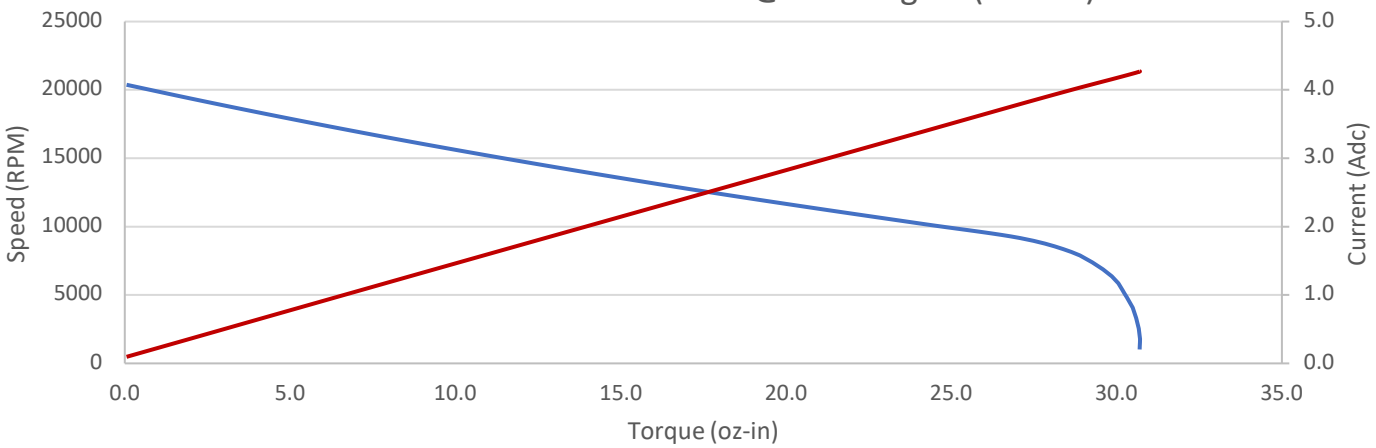
		11-450 Motor			11-700 Motor			11-1100 Motor		
		With Hall-Effect Commutation	With Solid Core Resolver Commutation	With Wound Core Resolver Commutation	With Hall-Effect Commutation	With Solid Core Resolver Commutation	With Wound Core Resolver Commutation	With Hall-Effect Commutation	With Solid Core Resolver Commutation	With Wound Core Resolver Commutation
Motor Constant	(in-oz/Watt$^{.5}$)	2.0	2.0	2.0	3.0	3.0	3.0	4.3	4.3	4.3
Peak Torque	(oz-in)	30	30	30	80	80	80	110	110	110
Peak Power Output	(Watts)	300	300	300	450	450	450	700	700	700
Max. Rated Velocity	(RPM)	40,000	40,000	20,000	40,000	40,000	20,000	40,000	40,000	20,000
Rotor Inertia	(in-oz-sec^2)	5.881×10^{-5}	7.895×10^{-5}	8.074×10^{-5}	7.900×10^{-5}	9.914×10^{-5}	1.009×10^{-4}	1.062×10^{-4}	1.264×10^{-4}	1.281×10^{-4}
Electrical Time Constant (L/R)	(mSec)	0.15	0.15	0.15	0.2	0.2	0.2	0.28	0.28	0.28
Number of Poles		4	4	4	4	4	4	4	4	4
Number of Phases		3	3	3	3	3	3	3	3	3
Mass	(Oz)	5.7	6.2	6.8	7.0	7.5	8.1	8.3	8.8	9.4
ØD1	(In)	1.075	1.075	1.075	1.075	1.075	1.075	1.075	1.075	1.075
L1 Length	(In)	1.100	1.100	1.090	1.380	1.380	1.370	1.760	1.760	1.750
L2 length	(In)	1.620	1.865	2.110	1.900	2.145	2.320	2.210	2.525	2.700

Notes:

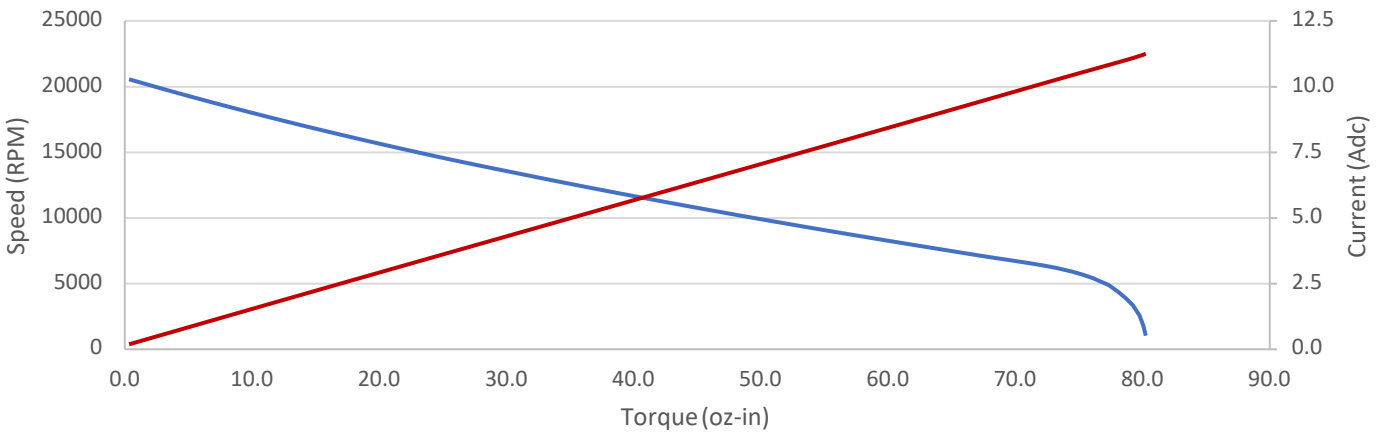
1. Unit is of high strength Stainless Steel construction.
2. Optional mounting and shaft configurations available on request. Fully Sealed LRU packages also available.
3. "Wet", space rated or other special motors are available upon request.
4. For thermal operation limits (Continuous or peak), consult Shadin for specifics of your application. Environment, mounting and other factors will drive thermal capability.
5. Above motors indicate "standard" products and alternative configurations are also available. i.e., 2 phase motors, 2 or 4 pole designs etc.
6. Complementary Gearboxes or other ancillary devices are also available upon request.
7. Motors can be optimized for Sinusoidal or Trapezoidal Drive operation.
8. Operating voltages from 18VDC to 270VDC available. Performance curves on following pages are examples. Shadin can design a motor for your application's specific needs.

Size 11 BLDC Motor

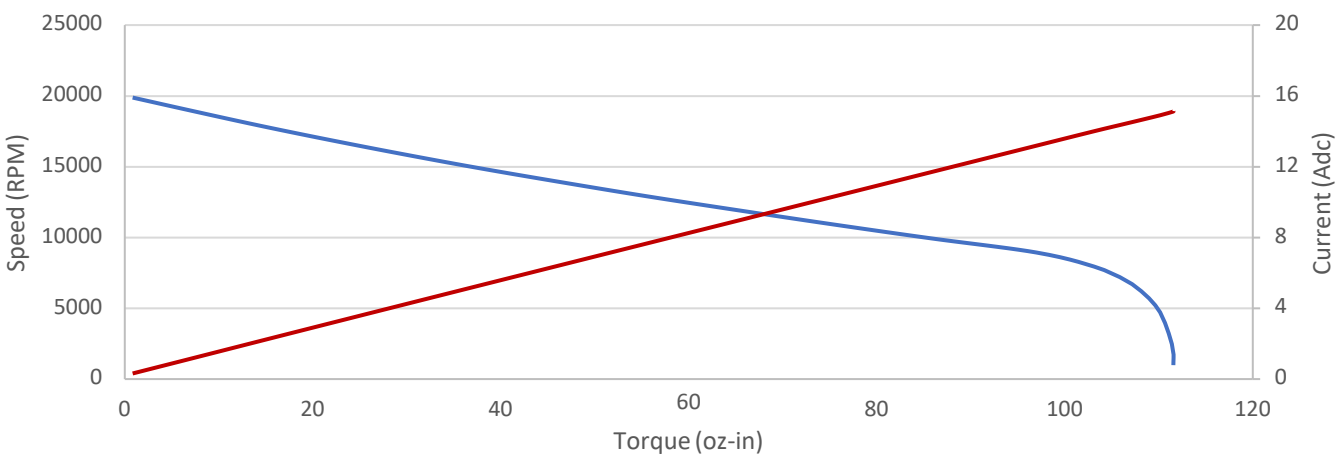
Size 11-450 Motor Performance @ +23 Deg. C. (90VDC)



Size 11-700 Motor Performance @ +23 Deg. C. (90VDC)



Size 11-1100 Motor Performance @ +23 Deg. C. (90VDC)



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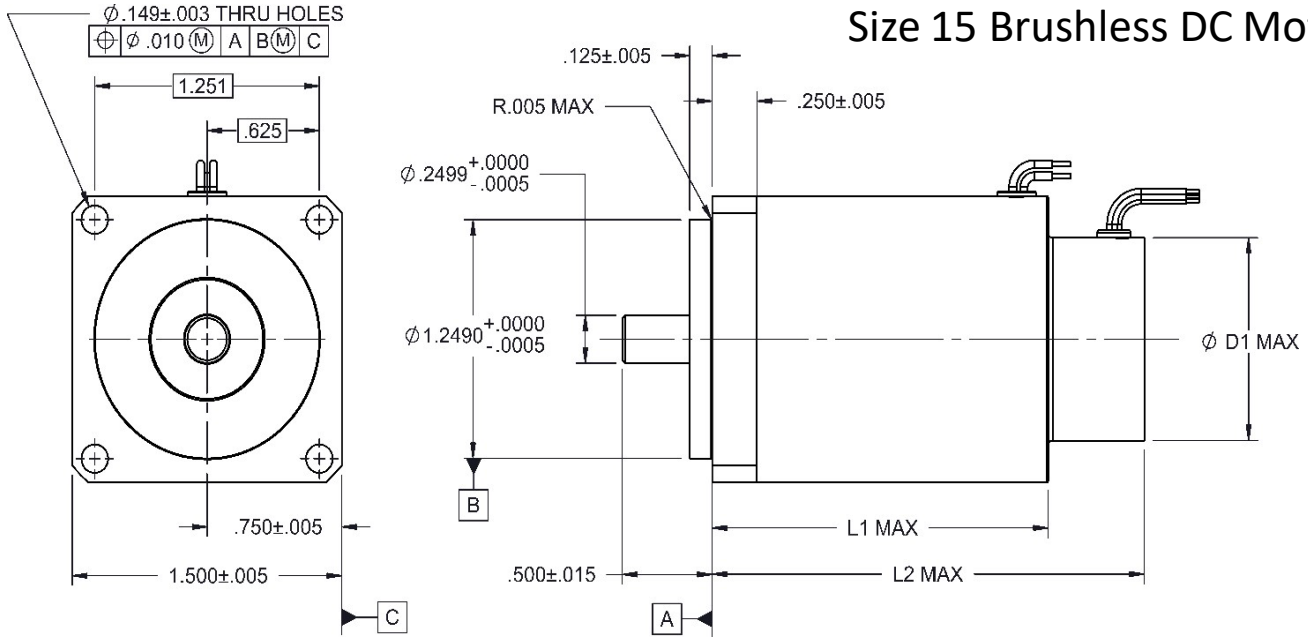
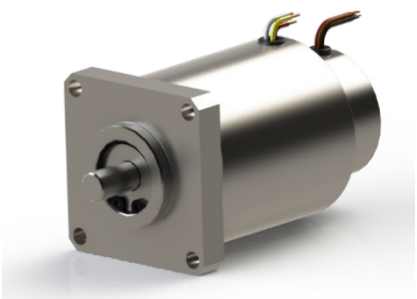
Size 15 Brushless DC Motor





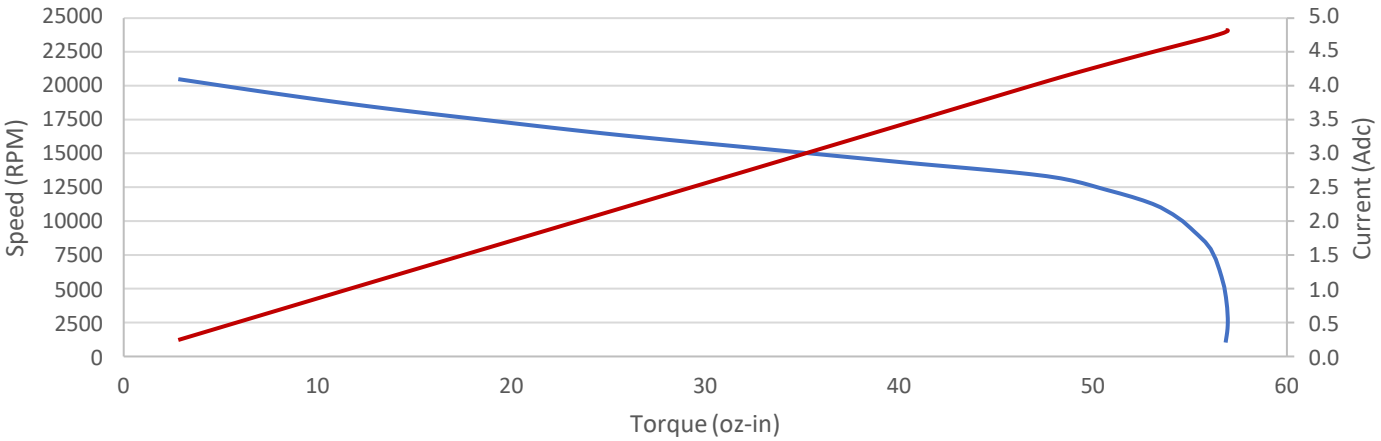
		15-700 Motor			15-1000 Motor			15-1500 Motor		
		With Hall-Effect Commutation	With Solid Core Resolver Commutation	With Wound Core Resolver Commutation	With Hall-Effect Commutation	With Solid Core Resolver Commutation	With Wound Core Resolver Commutation	With Hall-Effect Commutation	With Solid Core Resolver Commutation	With Wound Core Resolver Commutation
Motor Constant	(in-oz/Watt$^{.5}$)	3.9	3.9	3.9	6.8	6.8	6.8	10	10	10
Peak Torque	(oz-in)	55	55	55	110	110	110	200	200	200
Peak Power Output	(Watts)	550	550	550	1000	1000	1000	1800	1800	1800
Max. Rated Velocity	(RPM)	35,000	35,000	20,000	35,000	35,000	20,000	35,000	35,000	20,000
Rotor Inertia	(in-oz-sec^2)	1.872×10^{-4}	2.064×10^{-4}	6.730×10^{-4}	2.404×10^{-4}	2.596×10^{-4}	7.262×10^{-4}	3.317×10^{-4}	3.509×10^{-4}	8.174×10^{-4}
Electrical Time Constant (L/R)	(mSec)	0.2	0.2	0.2	0.32	0.32	0.32	0.5	0.5	0.5
Number of Poles		4	4	4	4	4	4	4	4	4
Number of Phases		3	3	3	3	3	3	3	3	3
Mass	(Oz)	12.0	12.5	13.1	14.5	15.0	15.6	18.0	18.5	19.1
D1 Dia.	(In)	1.078	1.078	1.078	1.078	1.078	1.078	1.078	1.078	1.078
L1 Length	(In)	1.610	1.580	1.580	1.900	1.900	1.900	2.405	2.405	2.405
L2 length	(In)	2.030	2.350	2.535	2.320	2.670	2.855	2.825	3.175	3.360

Notes:

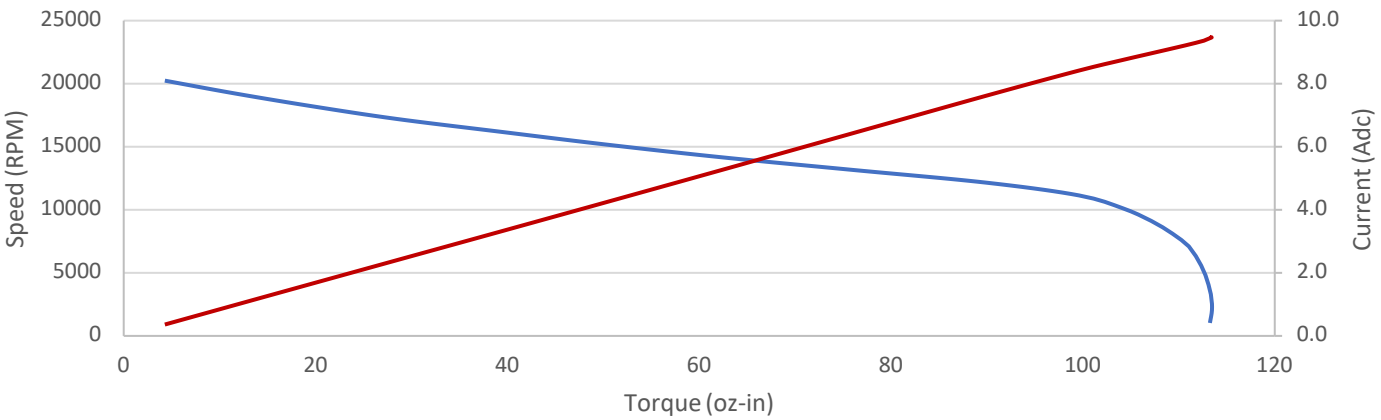
1. Unit is of high strength Stainless Steel construction.
2. Optional mounting and shaft configurations available on request. Fully Sealed LRU packages also available.
3. "Wet", Space rated or other special motors are available upon request.
4. For thermal operation limits (Continuous or peak), consult Shadin for specifics of your application. Environment, mounting and other factors will drive thermal capability.
5. Above motors indicate "standard" products and alternative configurations are also available. i.e., 2 phase motors, 2 or 4 pole designs etc.
6. Complementary Gearboxes or other ancillary devices are also available upon request.
7. Motors can be optimized for Sinusoidal or Trapezoidal Drive operation.
8. Operating voltages from 18VDC to 270VDC available. Performance curves on following pages are examples. Shadin can design a motor for your application's specific needs.

Size 15 BLDC Motor

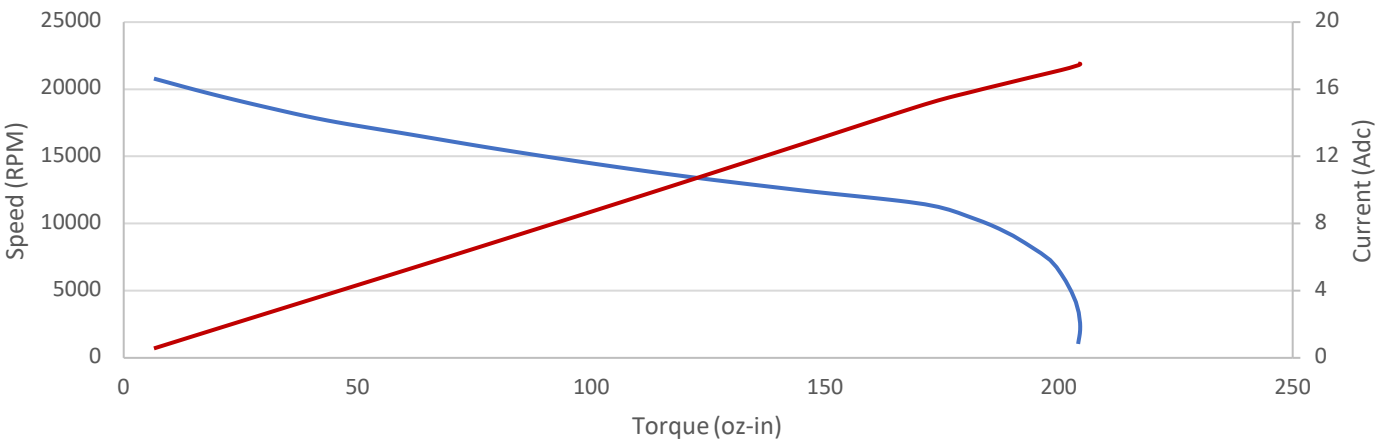
Size 15-700 Motor Performance @ +23 Deg. C. (150VDC)



Size 15-1000 Motor Performance @ +23 Deg. C. (150VDC)



Size 15-1500 Motor Performance @ +23 Deg. C. (150VDC)



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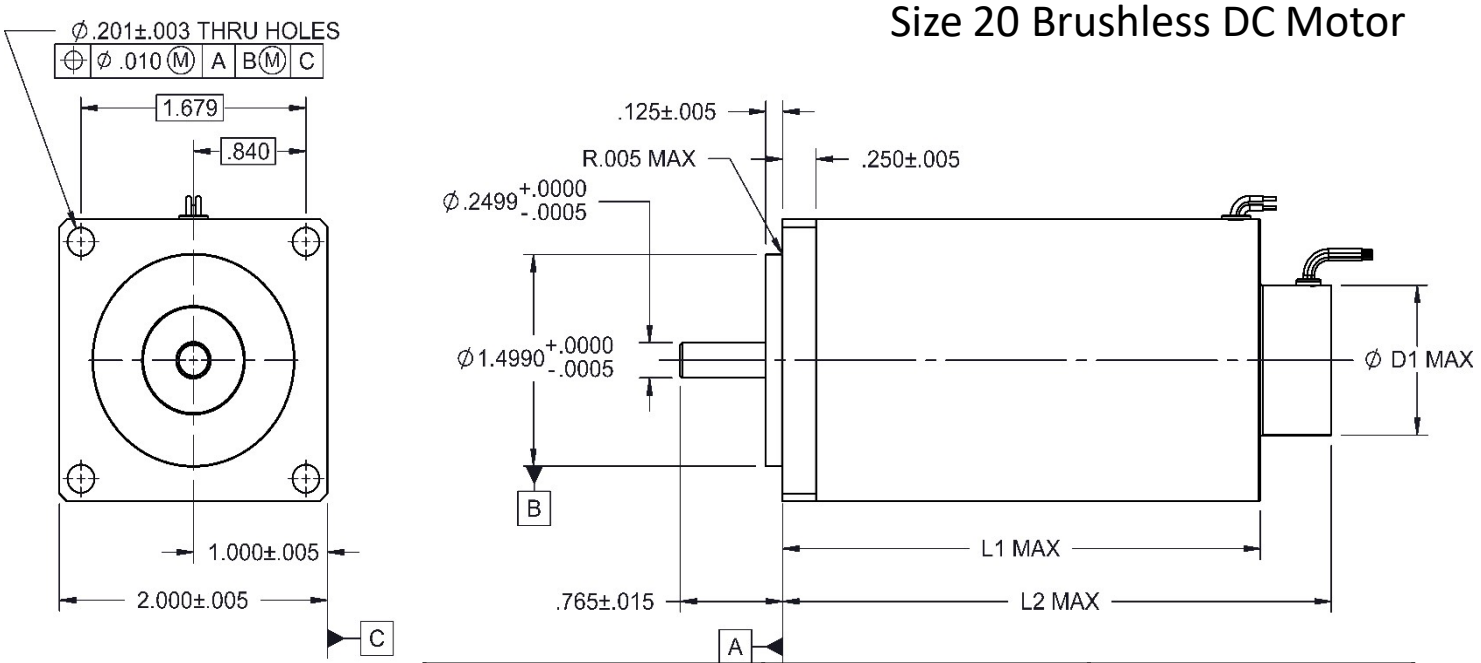
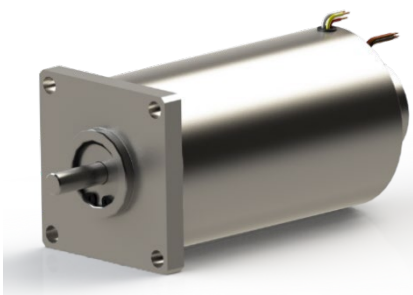
Size 20 Brushless DC Motor





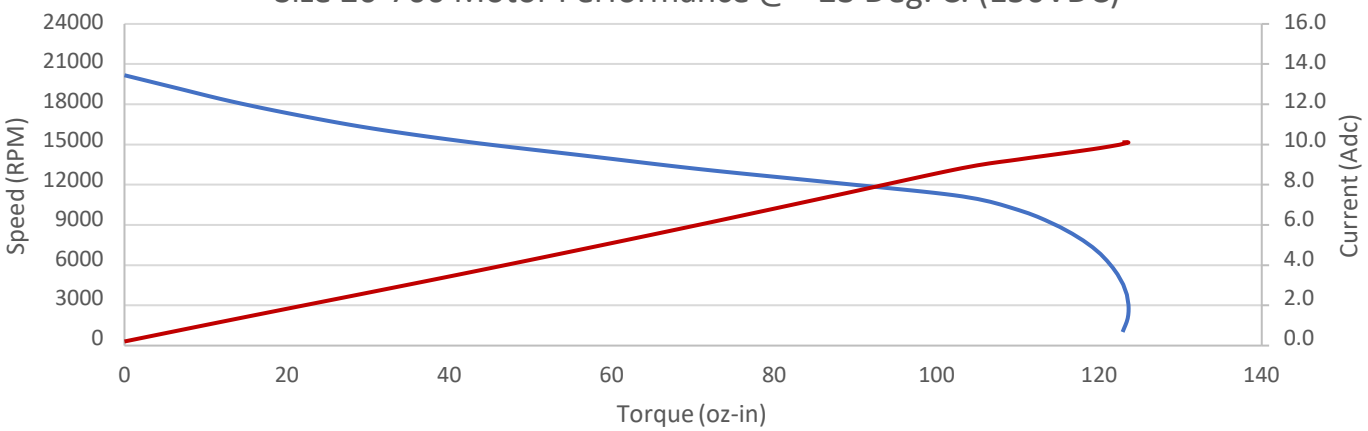
		20-700 Motor			20-1400 Motor			20-2500 Motor		
		With Hall-Effect Commutation	With Solid Core Resolver Commutation	With Wound Core Resolver Commutation	With Hall-Effect Commutation	With Solid Core Resolver Commutation	With Wound Core Resolver Commutation	With Hall-Effect Commutation	With Solid Core Resolver Commutation	With Wound Core Resolver Commutation
Motor Constant	(in-oz/Watt$^{.5}$)	6.6	6.6	6.6	10.5	10.5	10.5	20.5	20.5	20.5
Peak Torque	(oz-in)	120	120	120	200	200	200	450	450	450
Peak Power Output	(Watts)	850	850	850	1750	1750	1750	3950	3950	3950
Max. Rated Velocity	(RPM)	35,000	35,000	20,000	35,000	35,000	20,000	35,000	35,000	20,000
Rotor Inertia	(in-oz-sec^2)	3.512×10^{-4}	3.694×10^{-4}	8.430×10^{-4}	6.222×10^{-4}	6.400×10^{-4}	1.114×10^{-3}	1.024×10^{-3}	1.041×10^{-3}	1.515×10^{-3}
Electrical Time Constant (L/R)	(mSec)	0.55	0.55	0.55	0.9	0.9	0.9	1.22	1.22	1.22
Number of Poles		4	4	4	4	4	4	4	4	4
Number of Phases		3	3	3	3	3	3	3	3	3
Mass	(Oz)	25.0	25.5	26.1	35.7	36.2	36.8	48.7	49.2	50.0
D1 Dia.	(in)	1.078	1.078	1.078	1.078	1.078	1.078	1.078	1.078	1.078
L1 Length	(In)	1.745	1.745	1.745	2.475	2.475	2.475	3.550	3.550	3.550
L2 length	(In)	2.160	2.510	2.695	2.890	3.510	3.425	3.965	4.315	4.500

Notes:

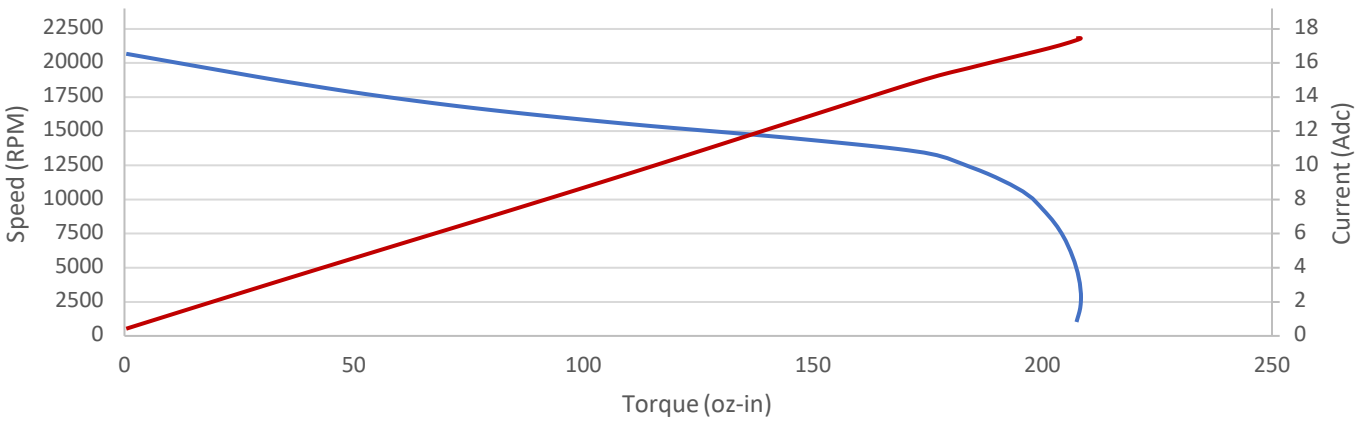
1. Unit is of high strength Stainless Steel construction.
2. Optional mounting and shaft configurations available on request. Fully Sealed LRU packages also available.
3. "Wet", Space rated or other special motors are available upon request.
4. For thermal operation limits (Continuous or peak), consult Shadin for specifics of your application. Environment, mounting and other factors will drive thermal capability.
5. Above motors indicate "standard" products and alternative configurations are also available. i.e., 2 phase motors, 2 or 4 pole designs etc.
6. Complementary Gearboxes or other ancillary devices are also available upon request.
7. Motors can be optimized for Sinusoidal or Trapezoidal Drive operation.
8. Operating voltages from 18VDC to 600VDC available. Performance curves on following pages are examples. Shadin can design a motor for your application's specific needs.

Size 20 BLDC Motor

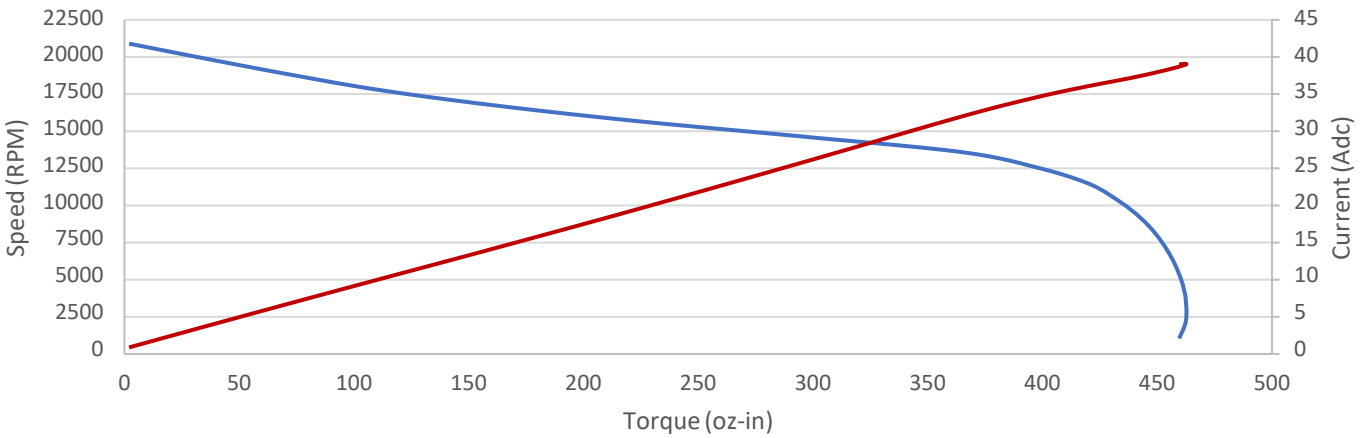
Size 20-700 Motor Performance @ +23 Deg. C. (150VDC)



Size 20-1400 Motor Performance @ +23 Deg. C.



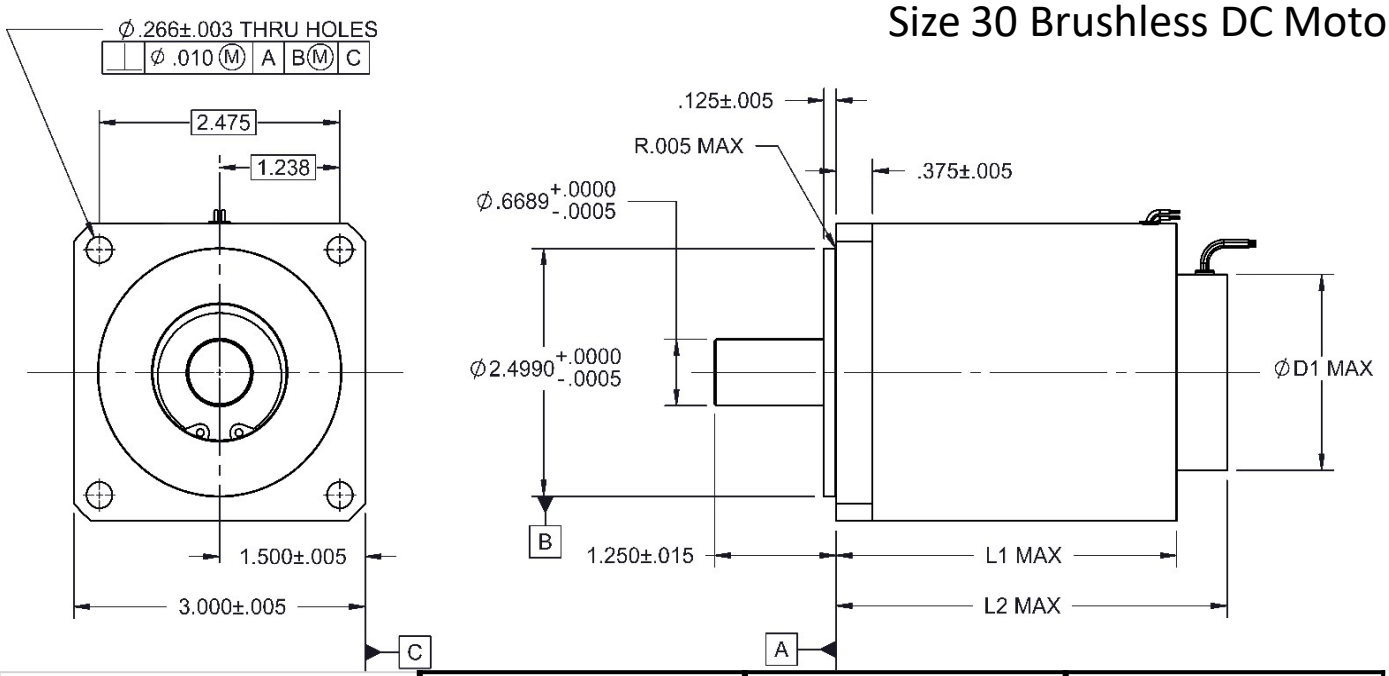
Size 20-2500 Motor Performance @ +23 Deg. C.



SHADIN AVIONICS
INNOVATION THROUGH SIMPLICITY

SHADIN AVIONICS SOLUTIONS

Size 30 Brushless DC Motor



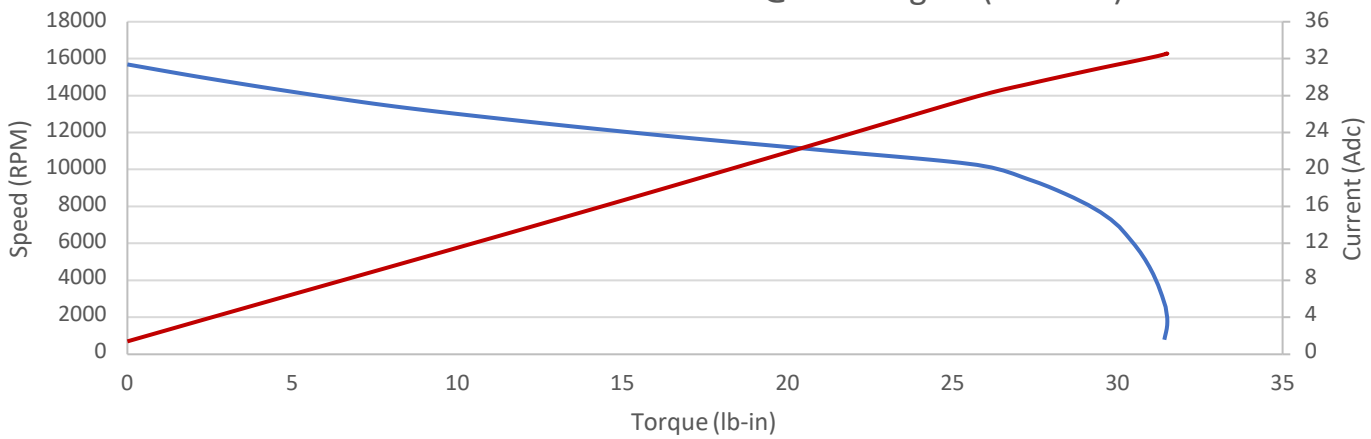
		30-1200 Motor			30-2500 Motor			30-3500 Motor		
		With Hall-Effect Commutation	With Solid Core Resolver Commutation	With Wound Core Resolver Commutation	With Hall-Effect Commutation	With Solid Core Resolver Commutation	With Wound Core Resolver Commutation	With Hall-Effect Commutation	With Solid Core Resolver Commutation	With Wound Core Resolver Commutation
Motor Constant	(in-oz/Watt$^{.5}$)	29	29	29	38	38	38	46	46	46
Peak Torque	(lb-in)	30	30	30	50	50	50	85	85	85
Peak Power Output	(Watts)	4200	4200	4200	6400	6400	6400	8500	8500	8500
Max. Rated Velocity	(RPM)	30,000	30,000	20,000	30,000	30,000	20,000	30,000	30,000	20,000
Rotor Inertia	(in-oz-sec^2)	6.286×10^{-3}	5.875×10^{-3}	2.581×10^{-2}	1.023×10^{-2}	9.818×10^{-3}	2.795×10^{-2}	1.428×10^{-2}	1.387×10^{-2}	3.381×10^{-2}
Electrical Time Constant (L/R)	(mSec)	1.35	1.35	1.35	2.43	2.43	2.43	3.22	3.22	3.22
Number of Poles		4	4	4	4	4	4	4	4	4
Number of Phases		3	3	3	3	3	3	3	3	3
Mass	(Lb)	5.6	5.7	5.9	7.9	8.0	8.2	9.7	9.8	10.0
D1 Dia.	(In)	2.005	2.005	2.150	2.005	2.005	2.150	2.005	2.005	2.150
L1 Length	(In)	2.815	2.815	2.815	3.795	3.795	3.795	4.805	4.805	4.805
L2 length	(In)	3.650	3.650	3.855	4.630	4.630	4.835	5.640	5.640	5.845

Notes:

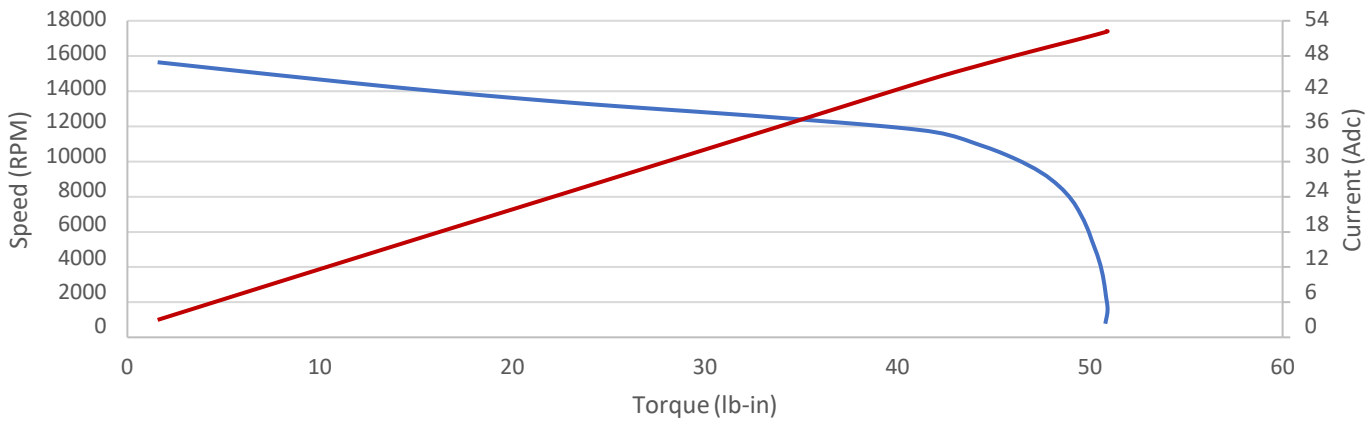
1. Unit is of high strength Stainless Steel construction.
2. Optional mounting and shaft configurations available on request. Fully Sealed LRU packages also available.
3. "Wet", Space rated or other special motors are available upon request.
4. For thermal operation limits (Continuous or peak), consult Shadin for specifics of your application. Environment, mounting and other factors will drive thermal capability.
5. Above motors indicate "standard" products and alternative configurations are also available. i.e., 2 phase motors, 2 or 4 pole designs etc.
6. Complementary Gearboxes or other ancillary devices are also available upon request.
7. Motors can be optimized for Sinusoidal or Trapezoidal Drive operation.
8. Operating voltages from 18VDC to 600VDC available. Performance curves on following pages are examples. Shadin can design a motor for your application's specific needs.

Size 30 BLDC Motor

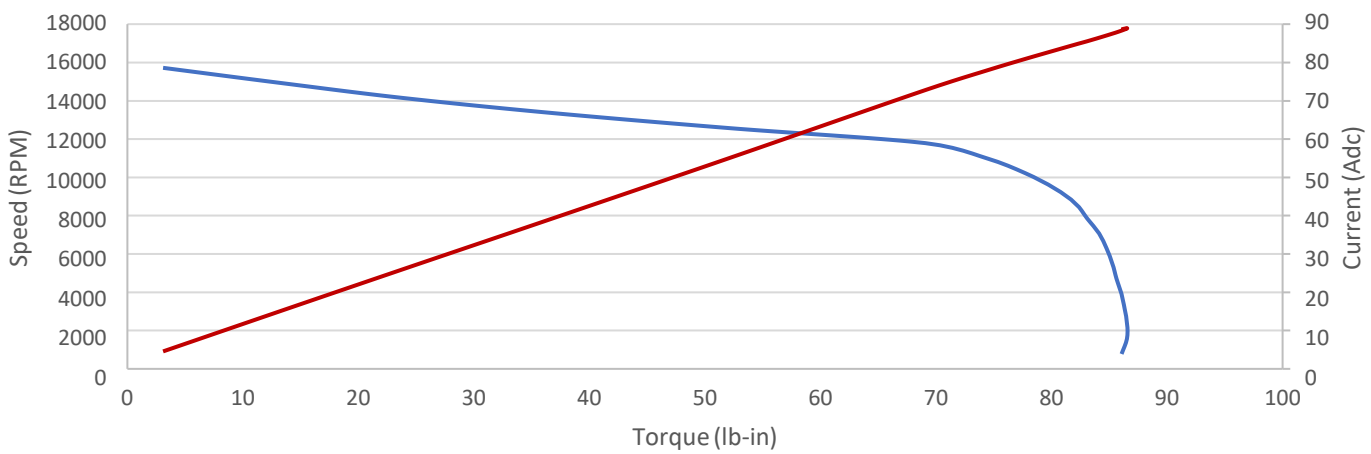
Size 30-1200 Motor Performance @ +23 Deg. C. (150VDC)



Size 30-2500 Motor Performance @ +23 Deg. C. (150VDC)

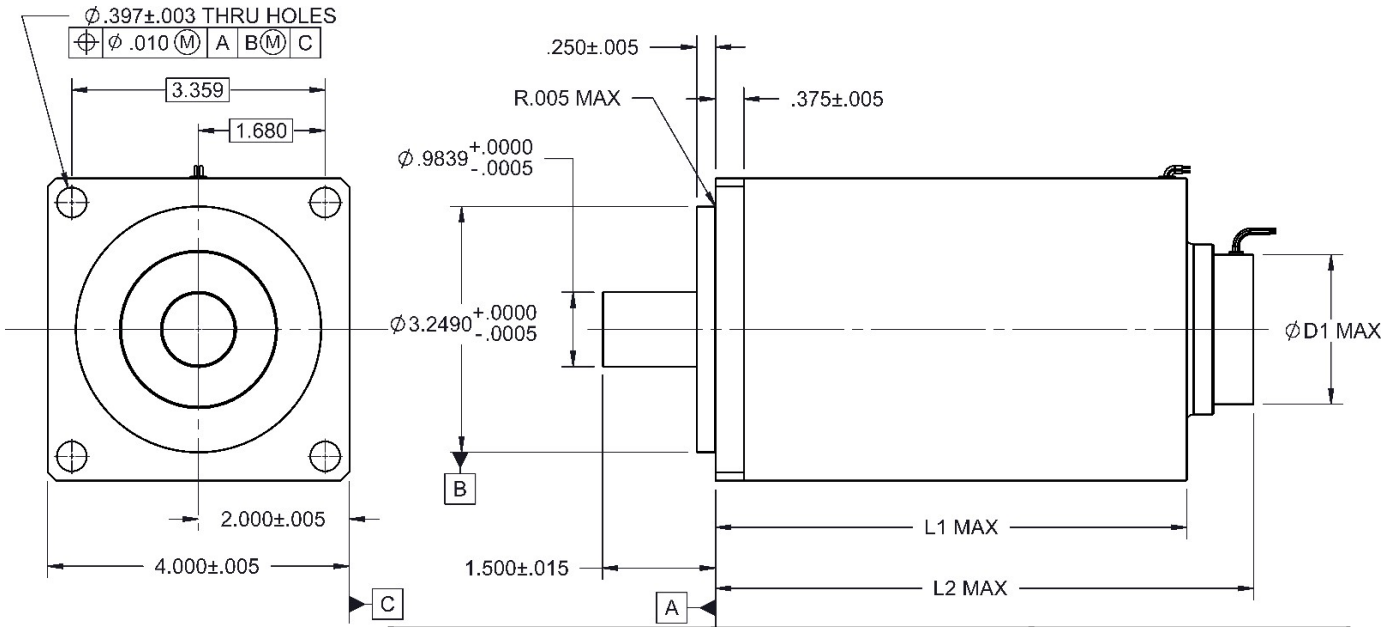


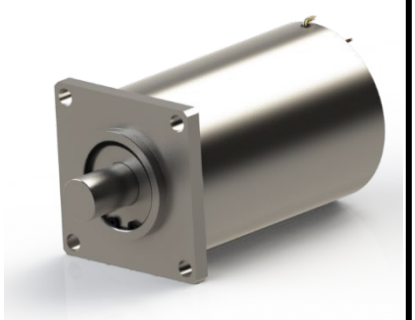
Size 30-3500 Motor Performance @ +23 Deg. C. (150VDC)



SHADIN AVIONICS SOLUTIONS

Size 40 Brushless DC Motor





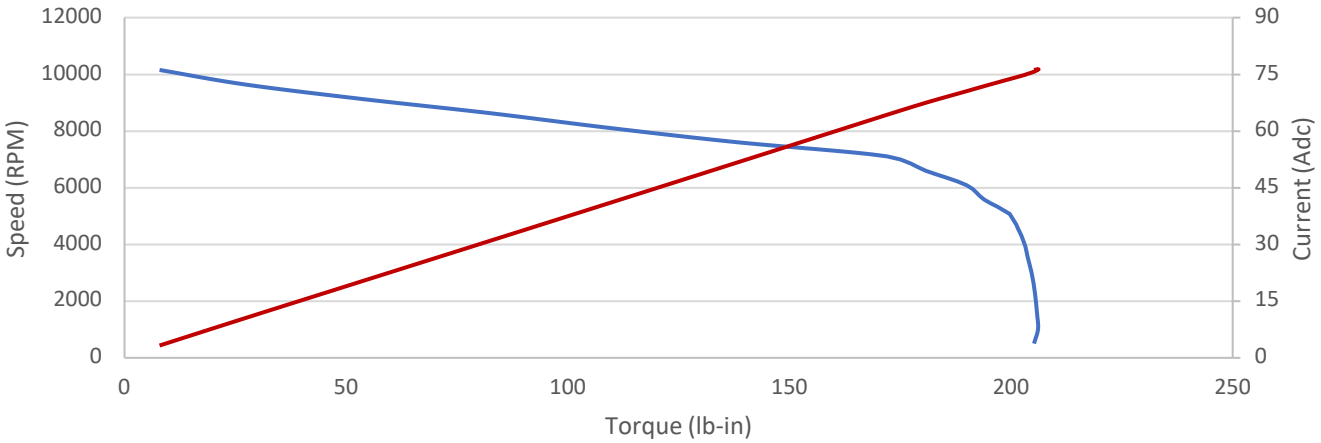
		40-2000 Motor			40-4000 Motor			40-5500 Motor		
		With Hall-Effect Commutation	With Solid Core Resolver Commutation	With Wound Core Resolver Commutation	With Hall-Effect Commutation	With Solid Core Resolver Commutation	With Wound Core Resolver Commutation	With Hall-Effect Commutation	With Solid Core Resolver Commutation	With Wound Core Resolver Commutation
Motor Constant	(in-oz/Watt$^{.5}$)	64	64	64	110	110	110	131	131	131
Peak Torque	(lb-in)	200	200	200	400	400	400	600	600	600
Peak Power Output	(kW)	23	23	23	40	40	40	60	60	60
Max. Rated Velocity	(RPM)	25,000	15,000	25,000	20,000	15,000	20,000	20,000	15,000	20,000
Rotor Inertia	(in-oz-sec^2)	5.436×10^{-2}	5.452×10^{-2}	5.459×10^{-2}	9.542×10^{-2}	9.558×10^{-2}	9.565×10^{-2}	1.263×10^{-1}	1.264×10^{-1}	1.265×10^{-1}
Electrical Time Constant (L/R)	(mSec)	1.38	1.38	1.38	2.02	2.02	2.02	2.27	2.27	2.27
Number of Poles		4	4	4	4	4	4	4	4	4
Number of Phases		3	3	3	3	3	3	3	3	3
Mass	(Lb)	13.8	14.0	14.2	19.8	20.0	20.2	24.2	24.3	24.5
D1 Dia.	(In)	2.005	2.005	2.150	2.005	2.005	2.150	2.005	2.005	2.150
L1 Length	(In)	4.520	4.520	4.520	6.505	6.505	6.505	8.020	8.020	8.020
L2 length	(In)	5.360	5.360	5.565	7.345	7.345	7.550	8.860	8.860	9.065

Notes:

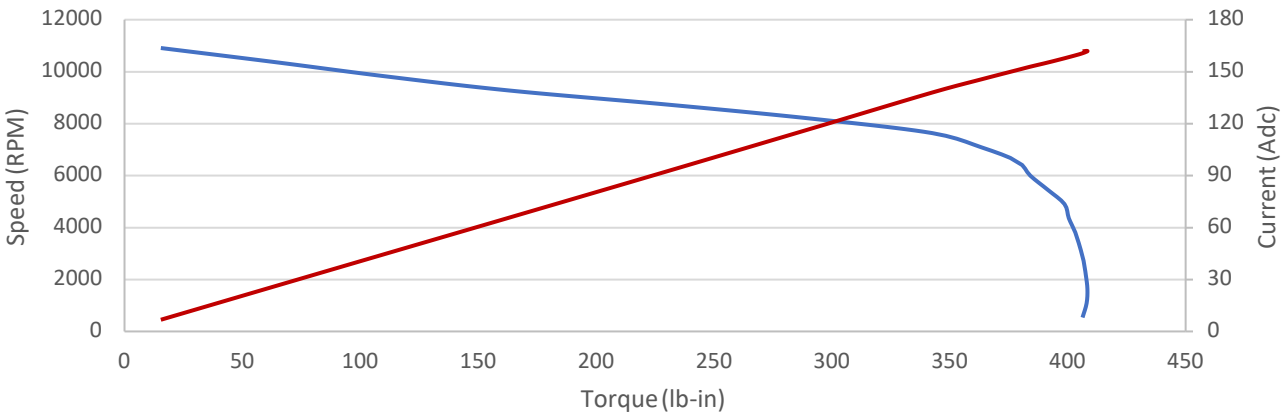
1. Unit is of high strength Stainless Steel construction.
2. Optional mounting and shaft configurations available on request. Fully Sealed LRU packages also available.
3. "Wet", Space rated or other special motors are available upon request.
4. For thermal operation limits (Continuous or peak), consult Shadin for specifics of your application. Environment, mounting and other factors will drive thermal capability.
5. Above motors indicate "standard" products and alternative configurations are also available. i.e., 2 phase motors, 2 or 4 pole designs etc.
6. Complementary Gearboxes or other ancillary devices are also available upon request.
7. Motors can be optimized for Sinusoidal or Trapezoidal Drive operation.
8. Operating voltages from 18VDC to 600VDC available. Performance curves on following pages are examples. Shadin can design a motor for your application's specific needs.

Size 40 BLDC Motor

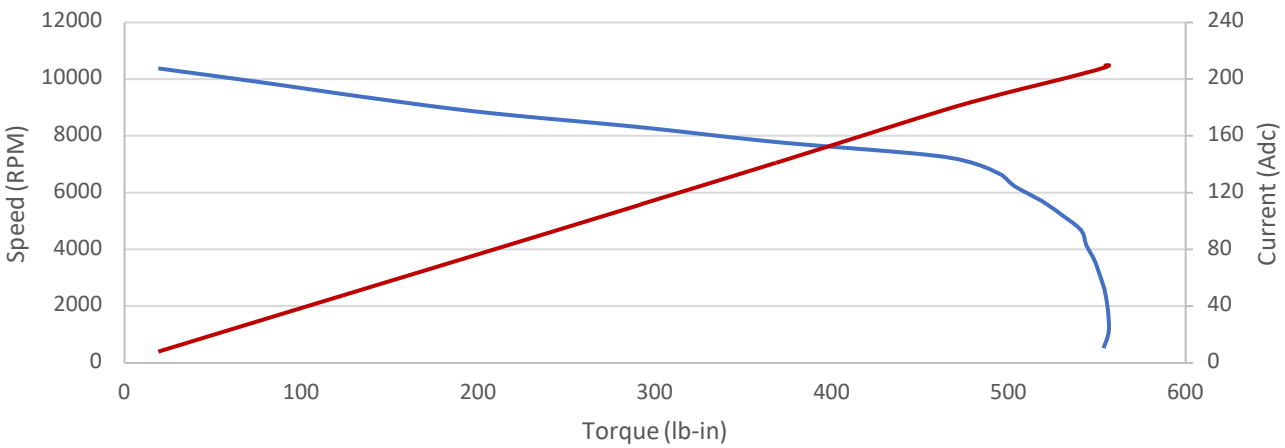
Size 40-2000 Motor Performance @ +23 Deg. C. (270VDC)



Size 40-4000 Motor Performance @ +23 Deg. C. (270VDC)



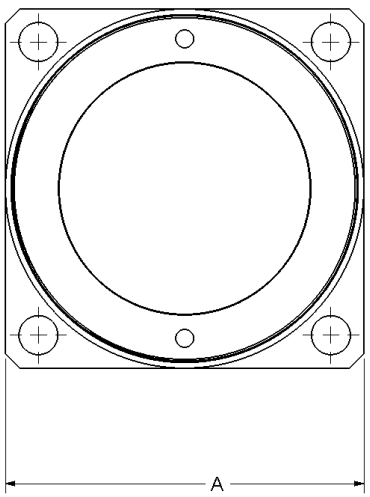
Size 40-5500 Motor Performance @ +23 Deg. C. (270VDC)

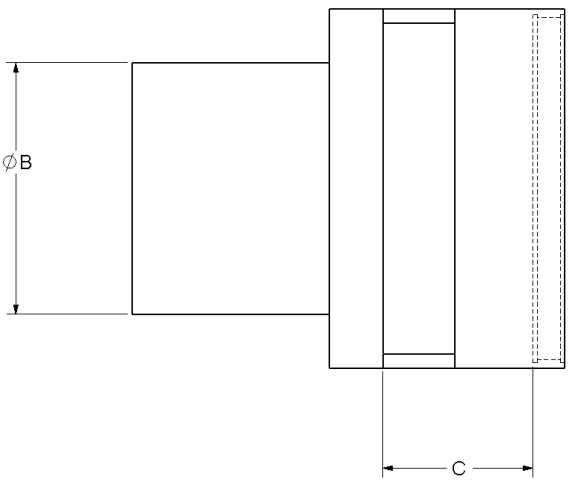


SHADIN AVIONICS
INNOVATION THROUGH SIMPLICITY

SHADIN AVIONICS SOLUTIONS

Planetary Gearheads





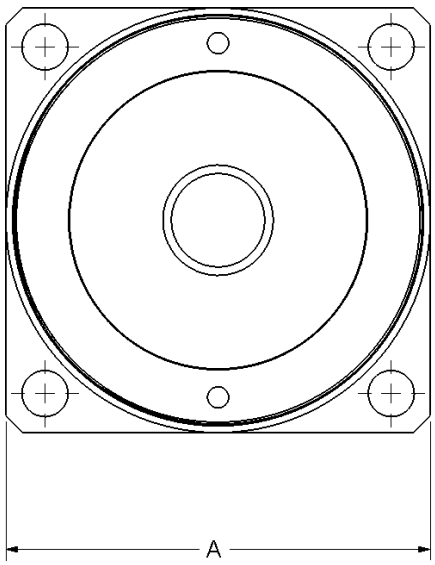
Shadin Avionics Planetary Gearing

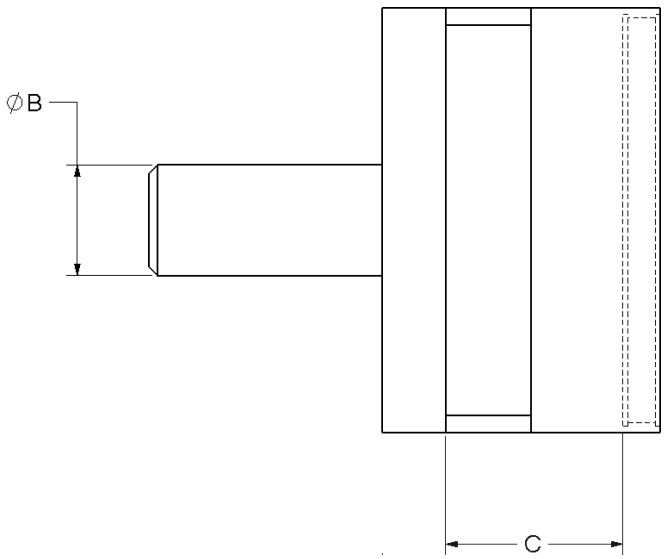
Gearhead Size	O.D. (A)	Length (C)	Weight	Max. Shaft Dia. (B)	Ratio	Torque Capability
5-SP	0.5	0.43	1.0 oz.	.275"	4:1	4 in-lb
9-SP	.875"	.550"	1.5 oz.	.500"	8:1	12 in-lb
12-SP	1.250"	.525"	4 oz.	.875"	8:1	90 in-lb
20-SP	2.000"	.830"	15 oz.	1.312"	9:1	240 in-lb
30-SP	3.000"	.850"	44 oz.	2.292"	9:1	1000 in-lb
40-SP	4.000"	1.300"	100 oz.	3.062"	10:1	10,000 in-lb

Notes:

1. **All D.O.R.'s are Direct**
2. **Alternate mounting and output shaft configurations available upon request.**
3. **Stainless Steel construction.**
4. **High stiffness, low backlash Planetary gearing.**
5. **Double Planetary, Hybrid (Integrated Planetary/Spur) or Tandem (Integrated Planetary & Spur modules) gearheads available. Ant-Backlash Output shafts are also available.**

Spur Gearheads





Shadin Avionics Spur Gearing

Gearhead Size	O.D. (A)	Length (C)	Weight	Max. Shaft Dia. (B)	Ratio	Torque Capability
9S	.875"	.650"	1.5 oz.	.187"	2:1 Thru 3000:1	4 in-lb
12S	1.250"	.650"	2.5 oz.	.250"	1.8:1 Thru 20,000:1	13 in-lb
20S	2.000"	1.200"	11 oz.	.375"	2:1 Thru 11,000:1	30 in-lb
30S	3.000"	1.500"	29 oz.	.375"	3.5:1 Thru 16,000:1	140 in-lb
40S	4.000"	2.200"	100 oz.	.500"	5.3:1 Thru 30,000:1	450 in-lb

Notes:

1. **All D.O.R.'s are dependent on ratio**
2. **Alternate mounting and output shaft configurations available upon request.**
3. **Stainless Steel construction.**
4. **ABL or safety clutch versions available.**

SHADIN AVIONICS SOLUTIONS

SHADIN AVIONICS
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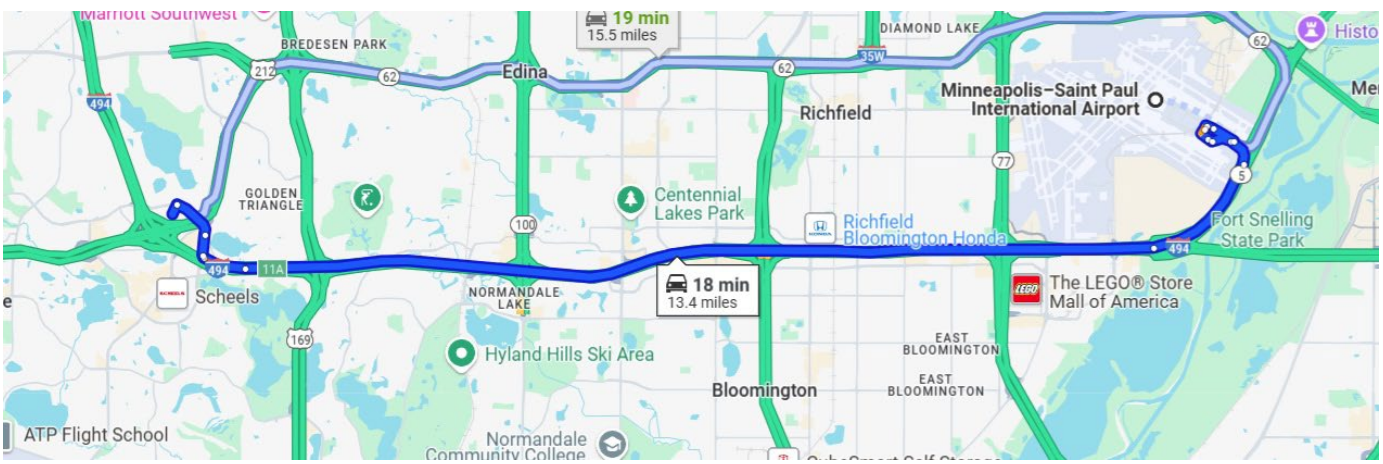

Shadin is located just 20 minutes west of MSP airport for convenient visits to our facility