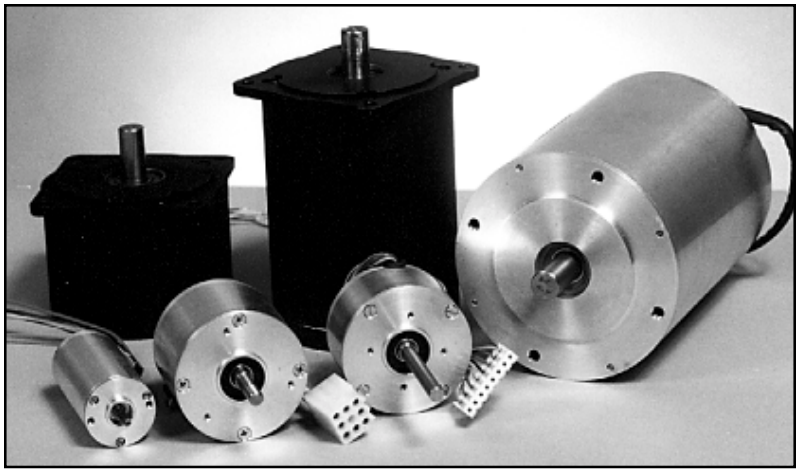
Silencer™ Series
Brushless DC Motors
Commercial and Industrial

BN12, 23, 34, and 42
1.2" – 4.15" Diameter



TYPICAL APPLICATIONS

- Medical equipment - pumps, blowers and electric scooters and wheelchairs
- Automatic door and window openers
- Computer-controlled embroidery machines
- Scanners
- Packaging equipment and printing products
- HVAC equipment (air handling)
- Robotic tape storage and retrieval
- Semiconductor handling and insertion machines
- Actuators

FEATURES

- Inside rotor construction for quick acceleration
- 8 pole motor standard, 4 pole motors optional for high speed applications
- Compact size – lengths from 1.3 to 5.5 inches
- Continuous torques from 2.4 to 519 oz-in
- High energy neodymium magnets
- Safe, arcless operation
- High speed capability – up to 20,000 rpm
- High torque per dollar ratio

BENEFITS

- Operation at any single speed - not limited to AC frequency
- Motor life is not limited to brush or commutator life
- An essentially linear speed/torque curve
- Efficient operation without losses associated with brushes and commutation or armature induction
- Precise, variable speed control
- Extremely quiet operation
- Long-life operation

ENCODERS

High resolution, high reliability, and state-of-the-art technology in a small package:

- Bidirectional incremental code
- Up to 1024 cycles standard
- Up to 3 channels: A, B, and index
- TTL/CMOS compatible
- Hewlett Packard HEDS-5500 encoder standard, other configurations and resolutions available

SILENCER BRUSHLESS MOTOR DRIVES

Optimized for use with Silencer Brushless DC motors, these drives provide:

- Multiple operating modes - commutation, velocity, torque, 2 and 4 quadrant
- Feedback using Hall effect sensor or encoder
- Efficient PWM speed control
- CE approved for European applications
- Low cost
- Operating temperatures from -10° to 45°C

Quiet, Brushless Motors

Silencer Brushless motors provide smooth, efficient operation and increased speed ranges. Utilizing bonded neo magnets, our BN series motors provide excellent value with their low cost and high torque. Each frame of the BN motors is available in four different lengths with a variety of electrical options to meet a wide range of commercial and industrial operating specifications.

Reliable, Low-cost Operation

The compact BN motors are well-suited for applications demanding low audible noise and long life. An aluminum housing protects the unit well in rugged applications and environments. Typical options include electronic drives, encoders and gearheads, as well as Hall effect, resolver and sensorless feedback.

Our engineering department is available for consultation to help you tailor a brushless motor for your specific application.

Litton
Poly-Scientific
Clifton Precision®
Motors, Drives and Resolvers

For literature: ***800-336-2112 ext. 279*** • *540-552-3011*
For sales assistance: ***800-577-8685 ext. 222*** • *828-837-5115*
or ***800-336-2112 ext. 197***
For technical applications assistance:
800-577-8685 ext. 256 • *828-837-5115*
❑*www.litton-ps.com* ❑*email: info@litton-ps.com*

ISO 9001 Certified facility

NOTES AND TERMS ON BRUSHLESS DC MOTORS

Application Assistance:

There are a few typical questions Litton Poly-Scientific engineers will ask when discussing your specific application:

- ❑ What torque range is required?
- ❑ What speed range is required?
- ❑ What space is available?
- ❑ What voltage is available?
- ❑ What current is available?
- ❑ Are there any special shaft and/or mounting requirements?

Terms:

Back EMF Constant: (Ke) (V/Krpm)
Also referred to as Voltage Constant. This is the voltage generated while the motor is operating which is proportional to speed, but opposing to the applied voltage.

Bearing Life:
The bearing life of an individual ball bearing is the number of revolutions (or hours at a given speed) which the bearing runs before the first evidence of fatigue develops in the material of either ring or of any of the rolling elements.

Bearing Rating Life:
The rating life, L10, of a group of apparently identical ball bearings is the life in millions of revolutions that 90% of the group will complete or exceed. For a single bearing, L10 also refers to the life associated with 90% reliability, L5 refers to 95% reliability and L1 refers to 99% reliability.

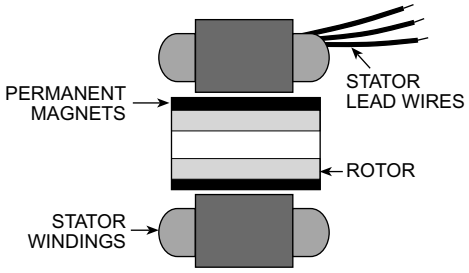
Brushless DC Motor:
A brushless DC motor is a motor which is electronically commutated and exhibits the linear speed-torque characteristics of the conventional DC motor. The motors typically use a permanent magnet to produce the rotor field.

Continuous Stall Torque: (Tcs) (oz-in)
The maximum torque at zero speed which a motor can continuously deliver without exceeding its thermal rating.

Encoder:
The encoder is a feedback device which converts mechanical motion into a digital signal. The resolution of the encoder is defined in counts per revolutions as the number of electrical pulses provided in one mechanical revolution. The number of pulses is determined by a metal or glass code wheel and optical sensors.

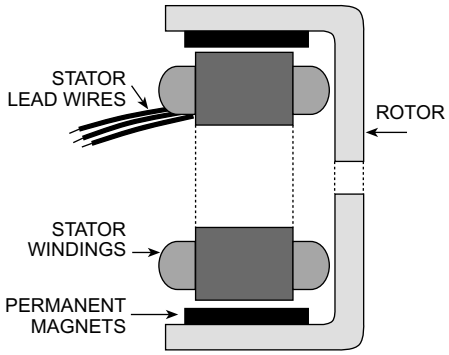
Hall Effect Sensors:
Hall devices are magnetic sensing devices which produce an electronic signal. This signal provides information to the amplifier to electronically commutate the brushless motor.

Inside Rotor Motor:
This is the most common motor construction. The permanent magnet rotor is on the inside and is surrounded by the wound stator assembly. This is the typical construction of Litton Poly-Scientific BN motors.



Motor Constant: (Km) (oz-in/ /Watt)
The motor constant is the ratio of motor torque to motor input power. It is a figure of merit typically used to compare motor capability.

Outside Rotor Motor:
The outside rotor motor is a special design used in applications where higher rotor inertia is desired. The wound stator field is stationary and located on the inside of the rotating magnetic field. The rotor is typically a magnet inside of a housing. Litton Poly-Scientific produces these motors in our BOH, BOF or BON series.



Peak Torque:
The peak torque of a motor is the maximum amount of torque the motor can produce for short periods of time. In a brushless PMDC motor, the current (and therefore the peak torque) is usually limited by the control electronics.

Permanent Magnet DC Motor:
A permanent magnet DC motor is a motor with a wound armature and a permanent magnetic field. Power is supplied to the armature through brushes and a commutator. This type of motor provides a linear speed/torque performance characteristic. Litton Poly-Scientific provides a line of PMDC motors in our C-series products.

Resolver:
The resolver is an electro-mechanical device which converts shaft position into analog signals. The resolver output is a sine and a cosine signal. There are several types of resolvers. The brushless motor typically uses the single speed transmitter type resolver. Position is determined by the ratio of the sine output amplitude to the cosine output amplitude. A single speed resolver produces one sine and cosine wave at the output for each mechanical revolution. Litton Poly-Scientific manufactures both single speed and multispeed resolvers.

Torque Sensitivity: (Kt) (oz-in/Amp)
The relationship of the output torque to the input current of the motor.

Terminal Resistance: (Rt) (ohms)
This is the line to line resistance at 25°C. The value of resistance in the motor is determined by the temperature of the windings in a particular application.

Part Numbering System Guide

BN □ □ – □ □ □ □ – □ □ T F O

BRUSHLESS MOTOR

MAGNET TYPE
N – Bonded Neo

FRAME
COMMERCIAL DC MOTOR
12 – size 12
23 – size 23
34 – size 34
42 – size 42

MOTOR LENGTH
Refer to motor data table for standard offerings.

MECHANICAL OPTIONS
Refer to motor data table for standard offerings. Many other custom mechanical options are available.

WINDING CODE
Corresponds to terminal voltage, refer to specifications tables throughout this brochure for standard offerings. Many other winding options are available.

TERMINATION OPTIONS

FEEDBACK OPTIONS

OTHER OPTIONS

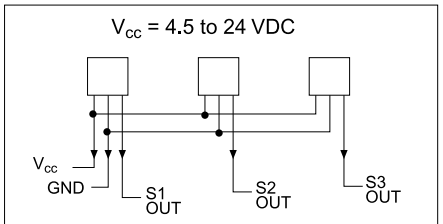
CONVERSION TABLE

FROM	TO	MULTIPLY BY
LENGTH		
inches	cm	2.540
feet	cm	30.48
cm	inches	.3937
cm	feet	3.281×10^{-2}
MASS		
oz	g	28.35
lb	g	453.6
g	oz	3.527×10^{-2}
lb	oz	16.0
g	lb	2.205×10^{-3}
oz	lb	6.250×10^{-2}
TORQUE		
oz-in	g-cm	72.01
lb-ft	g-cm	1.383×10^{4}
g-cm	oz-in	1.389×10^{-2}
lb-ft	oz-in	192.0
g-cm	lb-ft	7.233×10^{-5}
oz-in	lb-ft	5.208×10^{-3}
ROTATION		
rpm	degrees/sec	6.0
rad/sec	degrees/sec	57.30
degrees/sec	rpm	.1667
rad/sec	rpm	9.549
degrees/sec	rad/sec	1.745×10^{-2}
rpm	rad/sec	.1047
MOMENT OF INERTIA		
oz-in^2	g-cm^2	182.9
lb-ft^2	g-cm^2	4.214×10^{5}
g-cm^2	oz-in^2	5.467×10^{-3}
lb-ft^2	oz-in^2	2.304×10^{3}
g-cm^2	lb-ft^2	2.373×10^{-6}
oz-in^2	lb-ft^2	4.340×10^{-4}
oz-in-sec^2	g-cm^2	7.062×10^{4}

Timing Diagram for Hall Switches

DEGREES													
	ELEC	0	60	120	180	240	300	360	60	120	180	240	300	360
	MECH	0	15	30	45	60	75	90	105	120	135	150	165	180
S1 OUT														
S2 OUT														
S3 OUT														
A COIL		–	0	+	+	0	–	–	0	+	+	0	–	
B COIL		+	+	0	–	–	0	+	+	0	–	–	0	
C COIL		0	–	–	0	+	+	0	–	–	0	+	+	

Hall Effect Switches



Open collector outputs. Use pull-up resistors between V_{cc} and outputs to achieve 25 mA maximum of current.

IMPORTANT

The operational life and performance of any motor is dependent upon individual operating parameters, environment, temperature, and other factors. Your specific application results may vary. Please consult the factory to discuss your requirements.

Bearing Load Rating (lbs.)

Motor size	Dynamic	Static
BN-12	295	110
BN-23	743	304
BN-34	1532	683
BN-42	1340	725

BN12 SPECIFICATIONS - *Continuous Stall Torque 2.4 - 8.6 oz-in (0.0170 - 0.0587 Nm)*
Peak Torque 13 - 72 oz-in (0.0918 - 0.509 Nm)

Part Number*		BN12-15AF- ☐☐ T F O			BN12-20AF- ☐☐ T F O			BN12-25AF- ☐☐ T F O			BN12-30AF- ☐☐ T F O		
Winding Code**		01	02	03	01	02	03	01	02	03	01	02	03
L = Length	inches	1.50"			2.00"			2.50"			3.00"		
	millimeters	38.1			50.8			63.5			76.2		
Terminal Voltage	volts DC	12.0	24.0	36.0	12.0	24.0	36.0	12.0	24.0	36.0	12.0	24.0	36.0
Peak Torque	oz-in	13.0	13.0	14.0	37.0	37.0	39.0	58.0	58.0	61.0	77.0	77.0	72.0
	Nm	0.0918	0.0918	0.0989	0.2613	0.2613	0.2754	0.4096	0.4096	0.4308	0.5437	0.5437	0.5084
Continuous Stall Torque	oz-in	2.4	2.4	2.4	4.9	5.0	5.0	6.9	6.9	6.9	8.3	8.6	8.6
	Nm	0.0169	0.0169	0.0169	0.0346	0.0353	0.0353	0.0487	0.0487	0.0487	0.0586	0.0607	0.0607
Rated Speed	RPM	13027.0	12736.0	13753.0	11928.0	11448.0	12320.0	10604.0	10601.0	11489.0	11036.0	10253.0	9529.0
	rad/sec	1364	1334	1440	1249	1199	1290	1110	1110	1203	1156	1074	998
Rated Torque	oz-in	1.8	1.8	1.8	3.5	3.6	3.5	5.0	5.0	4.7	5.4	5.9	6.2
	Nm	0.0127	0.0127	0.0127	0.0247	0.0254	0.0247	0.0353	0.0353	0.0332	0.0381	0.0417	0.0438
Rated Current	Amps	2.26	1.13	0.77	3.49	1.76	1.20	4.32	2.16	1.46	4.81	2.46	1.61
Rated Power	watts	17.3	17.0	18.3	30.9	30.5	31.9	39.2	39.2	39.9	44.1	44.7	43.7
Torque Sensitivity	oz-in/amp	1.02	2.06	2.95	1.24	2.56	3.64	1.42	2.84	4.01	1.41	2.99	4.75
	Nm/amp	0.0072	0.0145	0.0208	0.0088	0.0181	0.0257	0.0100	0.0201	0.0283	0.0100	0.0211	0.0335
Back EMF	volts/KRPM	0.75	1.53	2.18	0.92	1.89	2.69	1.05	2.10	2.96	1.04	2.21	3.51
	volts/rad/sec	0.0072	0.0145	0.0208	0.0088	0.0181	0.0257	0.0100	0.0201	0.0283	0.0100	0.0211	0.0335
Terminal Resistance	ohms	0.953	3.89	7.85	0.403	1.67	3.36	0.294	1.18	2.36	0.219	0.934	2.36
Terminal Inductance	mH	0.135	0.556	1.13	0.098	0.417	0.840	0.086	0.346	0.687	0.064	0.288	0.726
Motor Constant	oz-in/šwatt	1.04	1.04	1.05	1.95	1.98	1.99	2.62	2.61	2.61	3.01	3.09	3.09
	Nm/šwatt	0.00738	0.00738	0.00744	0.01379	0.01399	0.01402	0.01849	0.01846	0.01843	0.02128	0.02185	0.02183
Rotor Inertia	oz-in-sec^{2}x10^{-3}	0.040	0.040	0.040	0.080	0.080	0.080	0.120	0.120	0.120	0.16	0.16	0.16
	g-cm^2	2.82	2.82	2.82	5.65	5.65	5.65	8.47	8.47	8.47	11.3	11.3	11.3
Weight	oz	3.6	3.6	3.6	5.5	5.5	5.5	7.3	7.3	7.3	9.1	9.2	9.2
	g	102.2	102.2	102.2	156.2	156.2	156.2	207.3	207.3	207.3	258.4	261.3	261.3
# of Poles		8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Timing		120°	120°	120°	120°	120°	120°	120°	120°	120°	120°	120°	120°
Mech. Time Constant	ms	5.2	5.2	5.1	3.0	2.9	2.9	2.5	2.5	2.5	2.5	2.4	2.4
Electrical Time Constant	ms	0.14	0.14	0.14	0.24	0.25	0.25	0.29	0.29	0.29	0.29	0.31	0.31
Thermal Resistivity	deg. C/watt	10.7	10.3	11.2	9.5	8.9	9.3	8.3	8.3	8.3	7.7	7.3	7.4
Speed/Torque Gradient	rpm/oz-in.	1245.8	1234.2	1220.6	353.3	345.2	343.2	197.2	197.9	198.8	149.3	141.3	141.6

Notes:
1. Motor mounted to a 4" x 4" x 1/4" aluminum plate, still air.
2. Maximum winding temperature of 155°C.
3. Typical electrical specifications at 25°C.

* Many other custom mechanical options are available – consult factory.
** Many other winding options are available – consult factory.

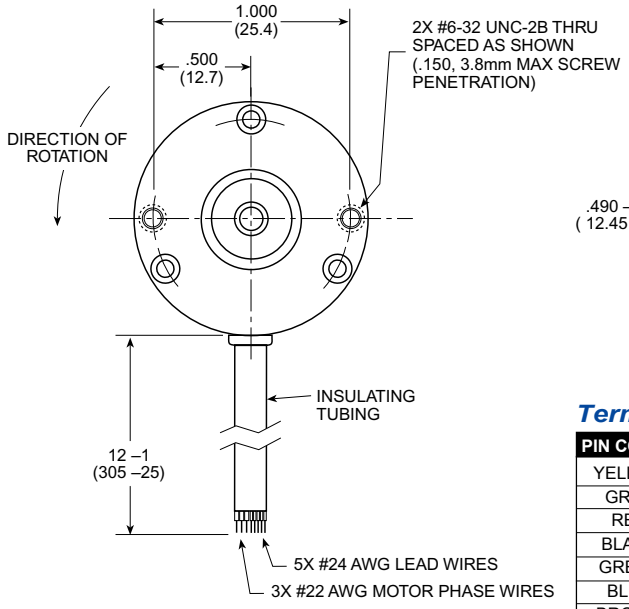
Select your options below and place their code in its corresponding block as shown on page 3.

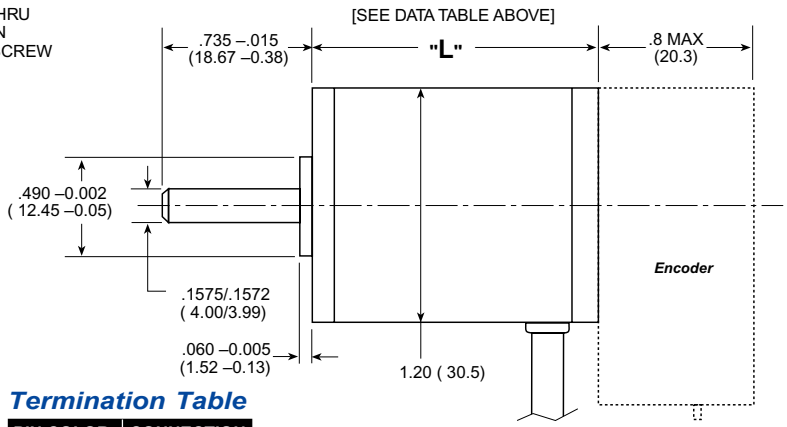
T TERMINATION
L – Leads (std)
C – Connector
M – MS connector

F FEEDBACK OPTIONS
H – Hall Effect (std)
R – Resolver
S – Sensorless

O OTHER OPTIONS
D – Drive
E – Encoder
G – Gearhead

BN12 Typical Outline





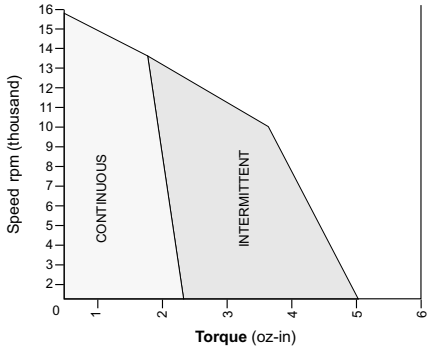
Termination Table

PIN COLOR	CONNECTION
YELLOW	V_{CC}
GRAY	GROUND
RED	A COIL
BLACK	B COIL
GREEN	C COIL
BLUE	S2 OUT
BROWN	S1 OUT
ORANGE	S3 OUT

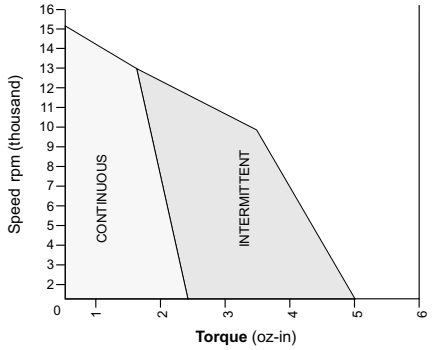
Dimensions are in inches (millimeters)

BN12 PERFORMANCE CURVES

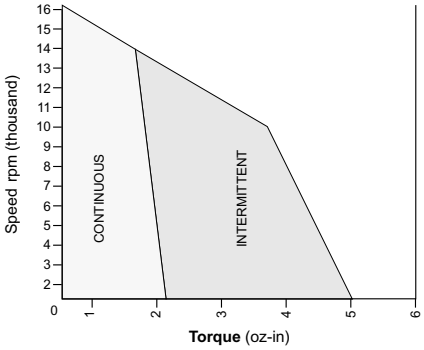
BN12-15AF-01: Continuous & Intermittent Operation at 12 Volt DC



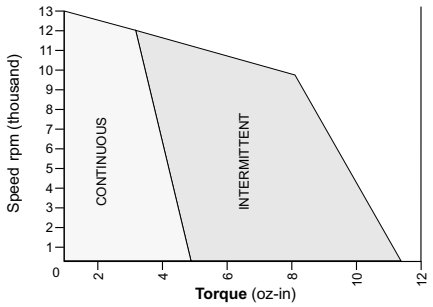
BN12-15AF-02: Continuous & Intermittent Operation at 24 Volt DC



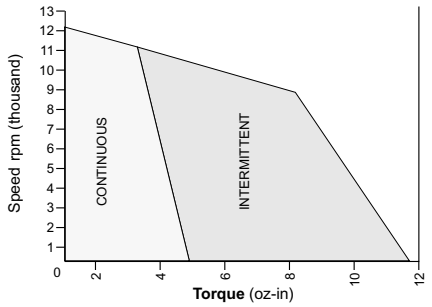
BN12-15AF-03: Continuous & Intermittent Operation at 36 Volt DC



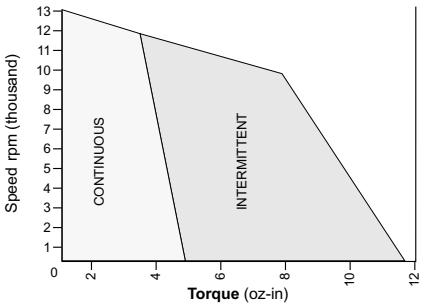
BN12-20AF-01: Continuous & Intermittent Operation at 12 Volt DC



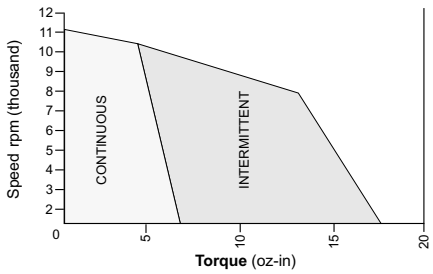
BN12-20AF-02: Continuous & Intermittent Operation at 24 Volt DC



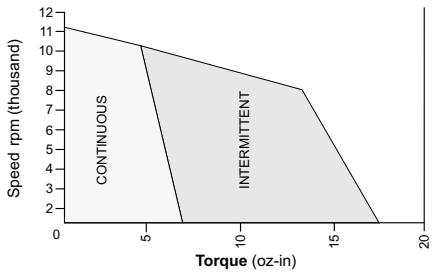
BN12-20AF-03: Continuous & Intermittent Operation at 36 Volt DC



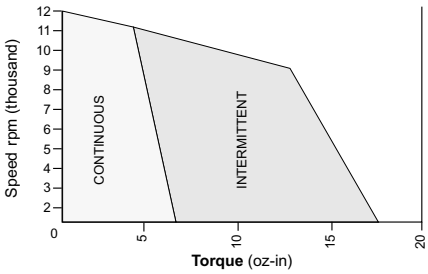
BN12-25AF-01: Continuous & Intermittent Operation at 12 Volt DC



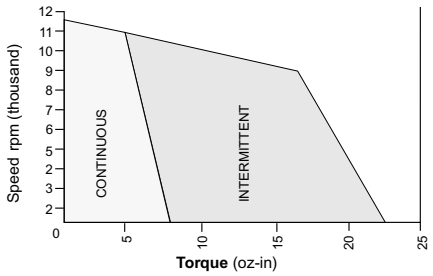
BN12-25AF-02: Continuous & Intermittent Operation at 24 Volt DC



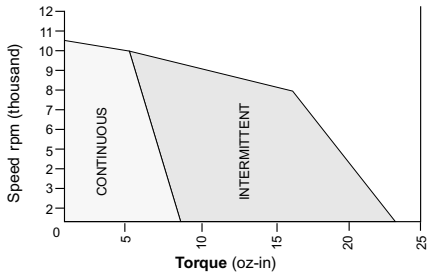
BN12-25AF-03: Continuous & Intermittent Operation at 36 Volt DC



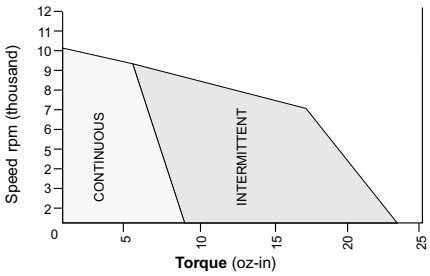
BN12-30AF-01: Continuous & Intermittent Operation at 12 Volt DC



BN12-30AF-02: Continuous & Intermittent Operation at 24 Volt DC



BN12-30AF-03: Continuous & Intermittent Operation at 36 Volt DC



Note:
Intermittent operation is based on a 20% duty cycle of one minute on, four minutes off.
Please contact the factory regarding the duty cycle of your application.

BN23 SPECIFICATIONS

Continuous Stall Torque 12.6 - 41 oz-in (0.0890 - 0.290 Nm)
Peak Torque 35 - 186 oz-in (0.248 - 1.32 Nm)

Part Number*		BN23-13PM- ☐☐ T F O			BN23-18PM- ☐☐ T F O			BN23-23PM- ☐☐ T F O			BN23-28PM- ☐☐ T F O		
Winding Code**		01	02	03	01	02	03	01	02	03	01	02	03
L = Length	inches	1.30"			1.80"			2.30"			2.80"		
	millimeters	33.0			45.7			58.4			71.1		
Terminal Voltage	volts DC	24.0	36.0	48.0	24.0	36.0	48.0	24.0	36.0	48.0	24.0	36.0	48.0
Peak Torque	oz-in	35.0	35.0	35.0	88.0	88.0	88.0	143.0	143.0	143.0	186.0	186.0	186.0
	Nm	0.2472	0.2472	0.2472	0.6214	0.6214	0.6214	1.0098	1.0098	1.0098	1.3134	1.3134	1.3134
Continuous Stall Torque	oz-in	12.6	12.6	12.6	24.2	24.2	24.2	34.5	34.5	34.5	41.0	41.0	41.0
	Nm	0.0890	0.0890	0.0890	0.1709	0.1709	0.1709	0.2436	0.2436	0.2436	0.2895	0.2895	0.2895
Rated Speed	RPM	12235.0	13040.0	12060.0	9810.0	10185.0	10985.0	8585.0	9490.0	8587.0	7640.0	8090.0	8720.0
	rad/sec	1281	1366	1263	1027	1067	1150	899	994	899	800	847	913
Rated Torque	oz-in	8.7	8.2	8.8	16.6	16.3	14.9	23.9	21.2	23.9	28.5	27.2	24.9
	Nm	0.0614	0.0579	0.0621	0.1172	0.1151	0.1052	0.1688	0.1497	0.1688	0.2013	0.1921	0.1758
Rated Current	Amps	4.10	2.75	2.10	6.00	4.10	3.00	7.40	4.90	3.70	8.00	5.40	4.00
Rated Power	watts	78.3	79.1	79.1	120.8	123.1	120.8	152.2	148.5	151.4	161.1	163.4	160.4
Torque Sensitivity	oz-in/amp	2.58	3.67	5.22	3.31	4.81	6.02	3.82	5.25	7.63	4.26	6.08	7.61
	Nm/amp	0.0182	0.0259	0.0369	0.0234	0.0340	0.0425	0.0270	0.0371	0.0539	0.0301	0.0429	0.0537
Back EMF	volts/KRPM	1.91	2.72	3.86	2.45	3.56	4.45	2.82	3.88	5.65	3.15	4.50	5.62
	volts/rad/sec	0.0182	0.0259	0.0369	0.0234	0.0340	0.0425	0.0270	0.0371	0.0539	0.0301	0.0429	0.0537
Terminal Resistance	ohms	0.465	0.939	1.89	0.246	0.507	0.800	0.178	0.347	0.715	0.181	0.366	0.576
Terminal Inductance	mH	0.374	0.758	1.53	0.251	0.531	0.829	0.217	0.410	0.867	0.242	0.493	0.770
Motor Constant	oz-in/šwatt	3.78	3.79	3.80	6.67	6.76	6.73	9.05	8.91	9.02	10.01	10.05	10.03
	Nm/šwatt	0.02672	0.02674	0.02681	0.04713	0.04770	0.04753	0.06394	0.06294	0.06372	0.07071	0.07097	0.07081
Rotor Inertia	oz-in-sec^2	0.51	0.51	0.51	0.99	0.99	0.99	1.50	1.50	1.50	1.90	1.90	1.90
	g-cm^2	36.0	36.0	36.0	69.9	69.9	69.9	105.9	105.9	105.9	134.1	134.1	134.1
Weight	oz	10.0	10.0	10.0	15.0	15.0	15.0	21.0	21.0	21.0	26.0	26.0	26.0
	g	284.0	284.0	284.0	426.0	426.0	426.0	596.4	596.4	596.4	738.4	738.4	738.4
# of Poles		8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Timing		120°	120°	120°	120°	120°	120°	120°	120°	120°	120°	120°	120°
Mech. Time Constant	ms	5.0	5.0	5.0	3.1	3.1	3.1	2.6	2.7	2.6	2.7	2.7	2.7
Electrical Time Constant	ms	0.80	0.81	0.81	1.02	1.05	1.04	1.22	1.18	1.21	1.34	1.35	1.34
Thermal Resistivity	deg. C/watt	5.3	5.3	4.7	4.5	4.2	4.6	4.1	3.8	4.1	3.4	3.3	3.3
Speed/Torque Gradient	rpm/oz-in.	94.4	94.1	93.8	30.3	29.6	29.9	16.5	17.0	16.6	13.5	13.4	13.5

Notes:
1. Motor mounted to a 6" x 6" x 1/4" aluminum plate, still air.
2. Maximum winding temperature of 155°C.
3. Typical electrical specifications at 25°C.
4. Data shown for 8 pole motors. Please consult factory for 4 pole specifications.

* Many other custom mechanical options are available – consult factory.
** Many other winding options are available – consult factory.

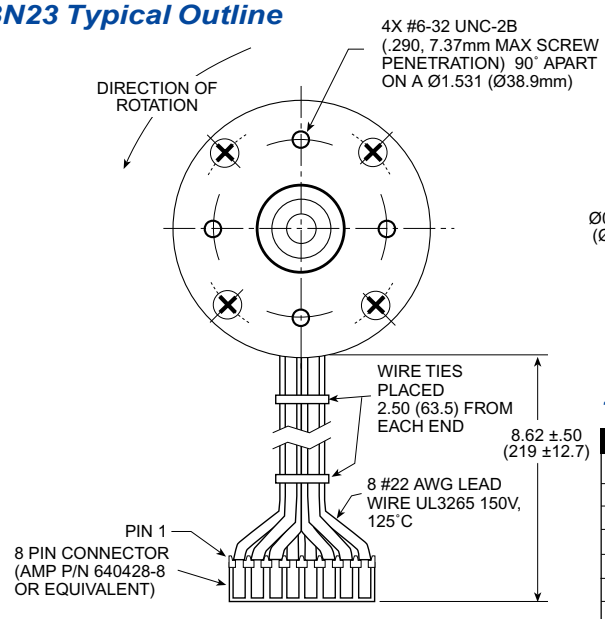
Select your options below and place their code in its corresponding block as shown on page 3.

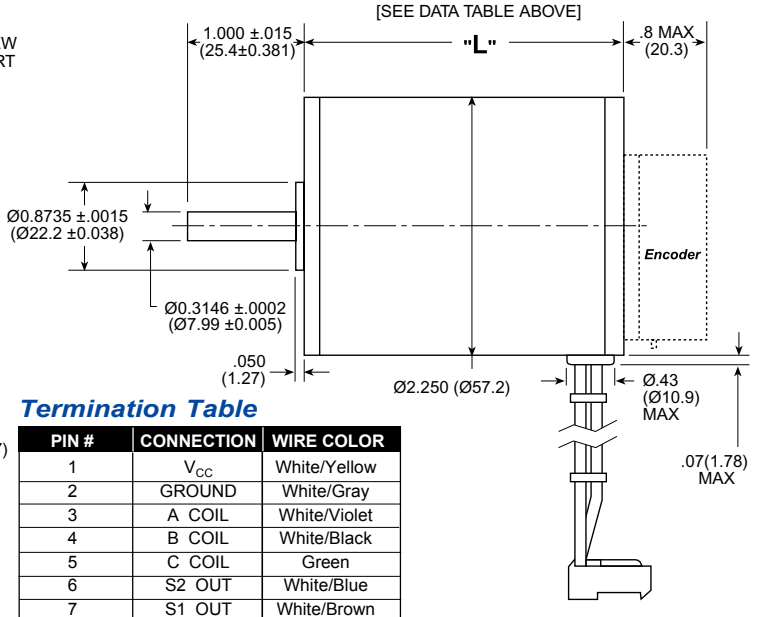
T TERMINATION
L – Leads
C – Connector (std)
M – MS connector

F FEEDBACK OPTIONS
H – Hall Effect (std)
R – Resolver
S – Sensorless

O OTHER OPTIONS
D – Drive
E – Encoder
G – Gearhead

BN23 Typical Outline





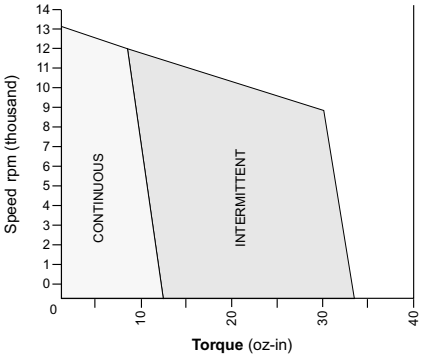
Termination Table

PIN #	CONNECTION	WIRE COLOR
1	V_{CC}	White/Yellow
2	GROUND	White/Gray
3	A COIL	White/Violet
4	B COIL	White/Black
5	C COIL	Green
6	S2 OUT	White/Blue
7	S1 OUT	White/Brown
8	S3 OUT	White

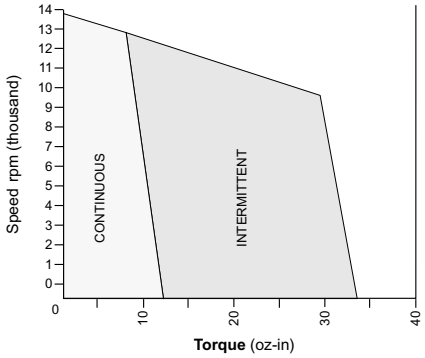
Dimensions are in inches (millimeters)

BN23 PERFORMANCE CURVES

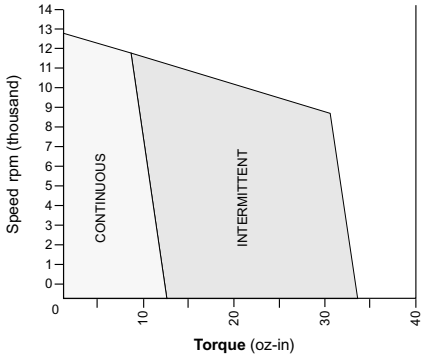
BN23-13PM-01: Continuous & Intermittent Operation at 24 Volt DC



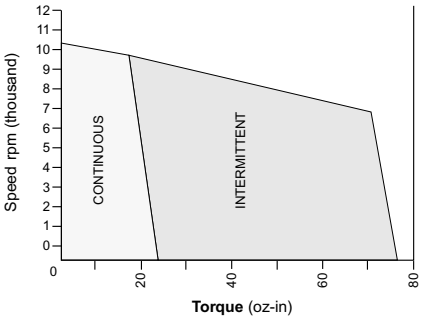
BN23-13PM-02: Continuous & Intermittent Operation at 36 Volt DC



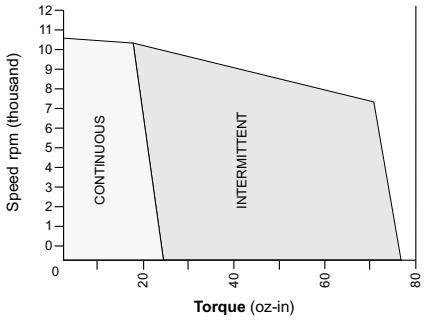
BN23-13PM-03: Continuous & Intermittent Operation at 48 Volt DC



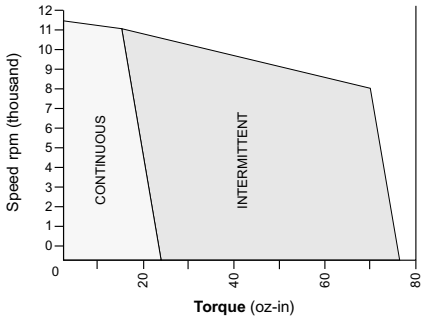
BN23-18PM-01: Continuous & Intermittent Operation at 24 Volt DC



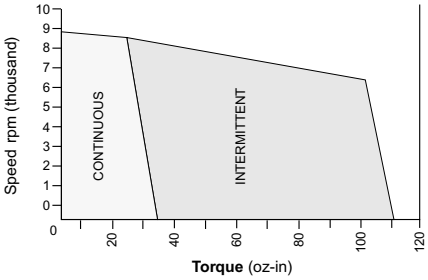
BN23-18PM-02: Continuous & Intermittent Operation at 36 Volt DC



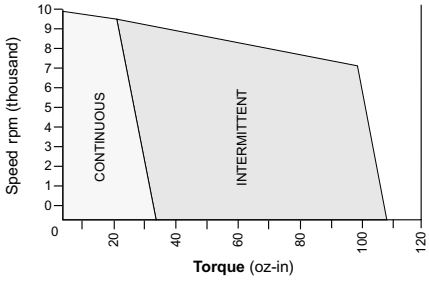
BN23-18PM-03: Continuous & Intermittent Operation at 48 Volt DC



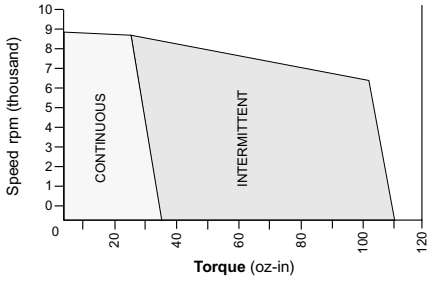
BN23-23PM-01: Continuous & Intermittent Operation at 24 Volt DC



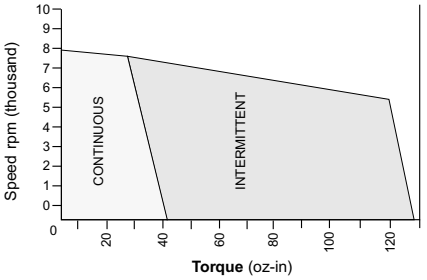
BN23-23PM-02: Continuous & Intermittent Operation at 36 Volt DC



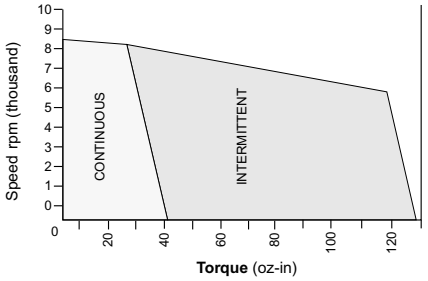
BN23-23PM-03: Continuous & Intermittent Operation at 48 Volt DC



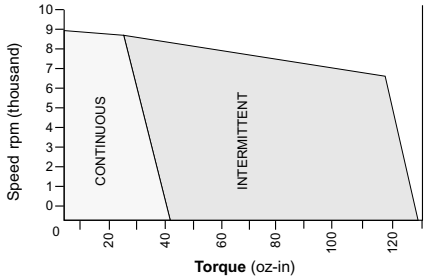
BN23-28PM-01: Continuous & Intermittent Operation at 24 Volt DC



BN23-28PM-02: Continuous & Intermittent Operation at 36 Volt DC



BN23-28PM-03: Continuous & Intermittent Operation at 48 Volt DC



Note:
Intermittent operation is based on a 20% duty cycle of one minute on, four minutes off.
Please contact the factory regarding the duty cycle of your application.

BN34 SPECIFICATIONS

Continuous Stall Torque 83 - 309 oz-in (0.587 - 2.19 Nm)
Peak Torque 326 - 1445 oz-in (2.31 - 10.21 Nm)

Part Number*		BN34-25AF- ☐☐ T F O			BN34-35AF- ☐☐ T F O			BN34-45AF- ☐☐ T F O			BN34-55AF- ☐☐ T F O		
Winding Code**		01	02	03	01	02	03	01	02	03	01	02	03
L = Length	inches	2.50"			3.50"			4.50"			5.50"		
	millimeters	63.5			88.9			114.3			139.7		
Terminal Voltage	volts DC	24.0	50.0	100.0	24.0	50.0	100.0	24.0	50.0	100.0	24.0	50.0	100.0
Peak Torque	oz-in	326.0	326.0	326.0	566.0	697.0	697.0	1070.0	1070.0	1070.0	1445.0	1445.0	1445.0
	Nm	2.3020	2.3020	2.3020	3.9968	4.9219	4.9219	7.5558	7.5558	7.5558	10.2039	10.2039	10.2039
Continuous Stall Torque	oz-in	83.0	93.0	93.0	133.0	159.0	159.0	220.0	224.0	231.0	287.0	306.0	309.0
	Nm	0.5861	0.6567	0.6567	0.9392	1.1228	1.1228	1.5535	1.5818	1.6312	2.0267	2.1608	2.1820
Rated Speed	RPM	7400.0	7330.0	7550.0	5916.0	5930.0	6240.0	3300.0	4710.0	4710.0	2410.0	3910.0	3920.0
	rad/sec	775	768	791	620	621	653	346	493	493	252	409	411
Rated Torque	oz-in	60.0	67.0	66.0	93.0	110.0	106.0	188.0	165.0	170.0	258.0	240.0	240.0
	Nm	0.4237	0.4731	0.4661	0.6567	0.7768	0.7485	1.3276	1.1651	1.2005	1.8219	1.6948	1.6948
Rated Current	Amps	16.40	8.70	4.40	18.74	11.50	5.80	23.0	13.70	7.00	23.30	16.50	8.20
Rated Power	watts	328.0	363.0	368.0	407.0	482.0	489.0	459.0	575.0	592.0	460.0	694.0	696.0
Torque Sensitivity	oz-in/amp	4.19	8.90	17.20	5.24	11.00	21.0	9.20	13.80	27.70	12.40	16.60	33.20
	Nm/amp	0.0296	0.0628	0.1215	0.0370	0.0777	0.1483	0.0650	0.0974	0.1956	0.0876	0.1172	0.2344
Back EMF	volts/KRPM	3.10	6.50	12.80	3.88	8.10	15.50	6.83	10.20	20.50	9.20	12.30	24.50
	volts/rad/sec	0.0296	0.0628	0.1215	0.0370	0.0777	0.1483	0.0650	0.0974	0.1956	0.0876	0.1172	0.2344
Terminal Resistance	ohms	0.069	0.251	0.941	0.057	0.160	0.575	0.069	0.147	0.552	0.086	0.135	0.504
Terminal Inductance	mH	0.129	0.575	2.180	0.143	0.432	1.570	0.200	0.450	1.800	0.271	0.482	1.930
Motor Constant	oz-in/šwatt	15.95	17.76	17.73	21.95	27.50	27.69	35.02	35.99	37.28	42.28	45.18	46.77
	Nm/šwatt	0.11264	0.12544	0.12521	0.15499	0.19419	0.19556	0.24732	0.25417	0.26328	0.29859	0.31904	0.33023
Rotor Inertia	oz-in-sec^2	6.00	6.00	6.00	12.00	12.00	12.00	18.00	18.00	18.00	24.00	24.00	24.00
	g-cm^2	423.4	423.4	423.4	846.8	846.8	846.8	1270.3	1270.3	1270.3	1693.7	1693.7	1693.7
Weight	oz	37.0	37.0	37.0	62.0	62.0	62.0	88.0	88.0	88.0	115.0	115.0	115.0
	g	1050.8	1050.8	1050.8	1760.8	1760.8	1760.8	2499.2	2499.2	2499.2	3266.0	3266.0	3266.0
# of Poles		8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Timing		120°	120°	120°	120°	120°	120°	120°	120°	120°	120°	120°	120°
Mech. Time Constant	ms	3.3	2.7	2.7	3.5	2.2	2.2	2.1	2.0	1.8	1.9	1.7	1.6
Electrical Time Constant	ms	1.87	2.29	2.32	2.51	2.70	2.73	29.0	3.06	3.26	3.15	3.57	3.83
Thermal Resistivity	deg. C/watt	1.6	1.5	1.5	2.5	1.1	1.2	1.1	1.0	1.0	1.1	0.8	0.8
Speed/Torque Gradient	rpm/oz-in.	5.3	4.3	4.3	2.8	1.8	1.8	1.1	1.0	1.0	0.8	0.7	0.6

Notes:
1. Motor mounted to a 10" x 10" x 1/4" aluminum plate, still air.
2. Maximum winding temperature of 155°C.
3. Typical electrical specifications at 25°C.

* Many other custom mechanical options are available – consult factory.
** Many other winding options are available – consult factory.

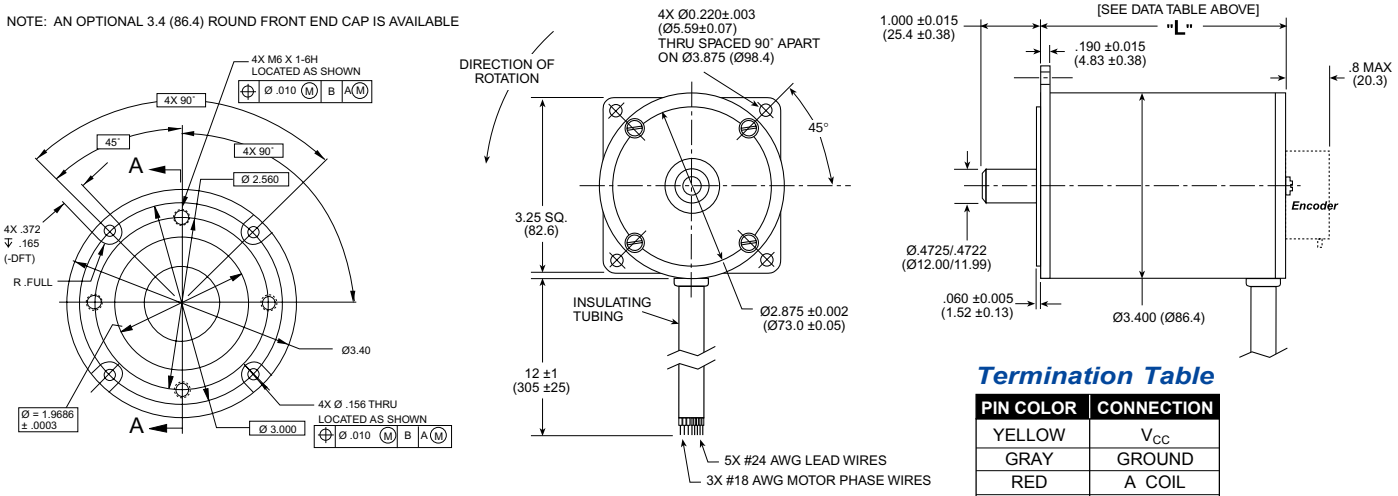
Select your options below and place their code in its corresponding block as shown on page 3.

T TERMINATION
L – Leads (std)
C – Connector
M – MS connector

F FEEDBACK OPTIONS
H – Hall Effect (std)
R – Resolver
S – Sensorless

O OTHER OPTIONS
D – Drive
E – Encoder
G – Gearhead

BN34 Typical Outline



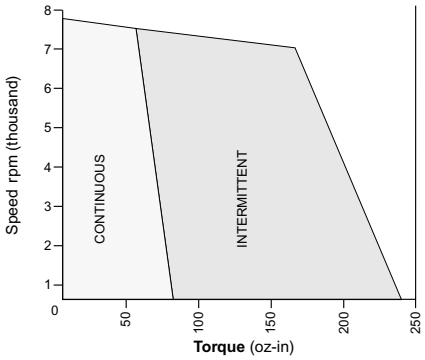
Dimensions are in inches (millimeters)

Termination Table

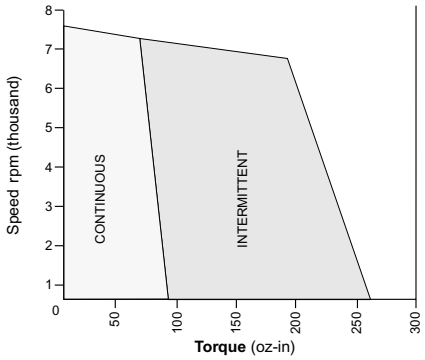
PIN COLOR	CONNECTION
YELLOW	V_{CC}
GRAY	GROUND
RED	A COIL
BLACK	B COIL
GREEN	C COIL
BLUE	S2 OUT
BROWN	S1 OUT
ORANGE	S3 OUT

BN34 PERFORMANCE CURVES

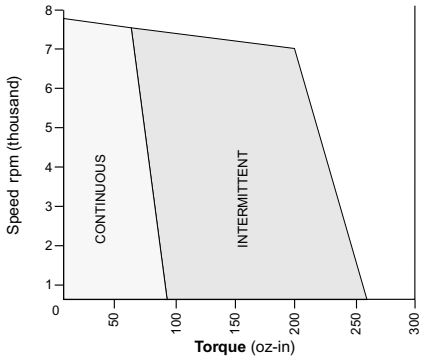
BN34-25AF-01: Continuous & Intermittent Operation at 24 Volt DC



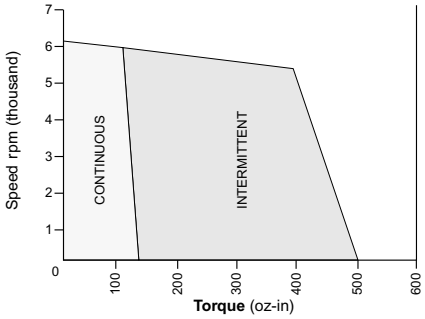
BN34-25AF-02: Continuous & Intermittent Operation at 50 Volt DC



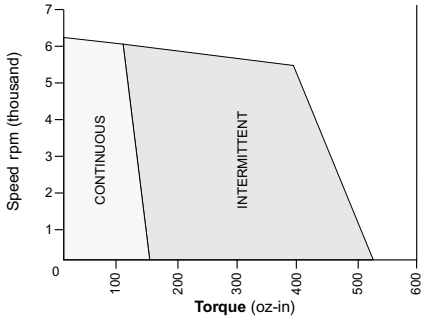
BN34-25AF-03: Continuous & Intermittent Operation at 100 Volt DC



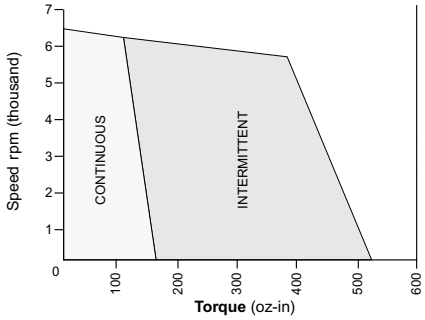
BN34-35AF-01: Continuous & Intermittent Operation at 24 Volt DC



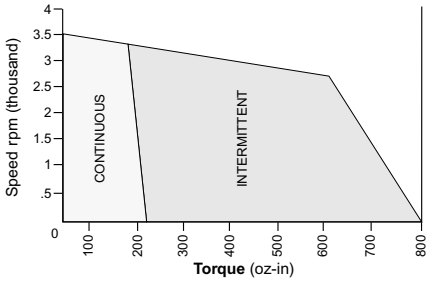
BN34-35AF-02: Continuous & Intermittent Operation at 50 Volt DC



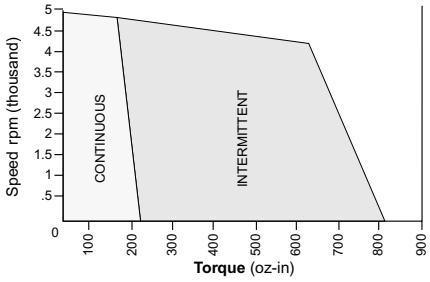
BN34-35AF-03: Continuous & Intermittent Operation at 100 Volt DC



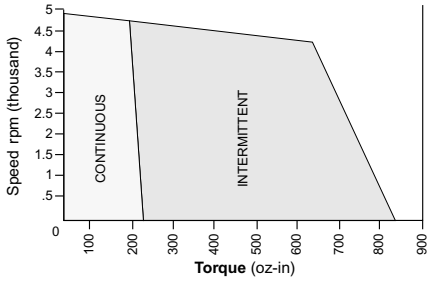
BN34-45AF-01: Continuous & Intermittent Operation at 24 Volt DC



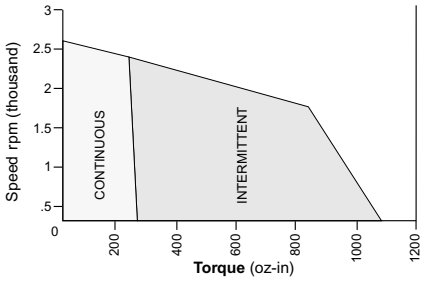
BN34-45AF-02: Continuous & Intermittent Operation at 50 Volt DC



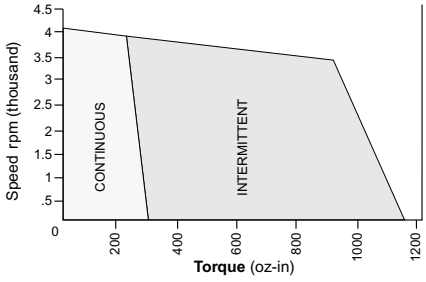
BN34-45AF-03: Continuous & Intermittent Operation at 100 Volt DC



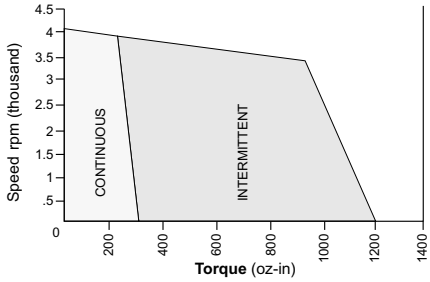
BN34-55AF-01: Continuous & Intermittent Operation at 24 Volt DC



BN34-55AF-02: Continuous & Intermittent Operation at 50 Volt DC



BN34-55AF-03: Continuous & Intermittent Operation at 100 Volt DC



Note:
Intermittent operation is based on a 20% duty cycle of one minute on, four minutes off.
Please contact the factory regarding the duty cycle of your application.

BN42 SPECIFICATIONS

Continuous Stall Torque 144 - 519 oz-in (1.02 - 3.67 Nm)
Peak Torque 609 - 2560 oz-in (4.30 - 18.1 Nm)

Part Number*		BN42-23AF- ☐☐ T F O			BN42-33AF- ☐☐ T F O			BN42-43AF- ☐☐ T F O			BN42-53AF- ☐☐ T F O		
Winding Code**		01	02	03	01	02	03	01	02	03	01	02	03
L = Length	inches	2.30"			3.30"			4.30"			5.30"		
	millimeters	58.4			83.8			109.2			134.6		
Terminal Voltage	volts DC	24.0	50.0	100.0	24.0	50.0	100.0	24.0	50.0	100.0	24.0	50.0	100.0
Peak Torque	oz-in	609.0	609.0	609.0	1248.0	1248.0	1248.0	1906.0	1906.0	1906.0	2560.0	2560.0	2560.0
	Nm	4.3005	4.3005	4.3005	8.8128	8.8128	8.8128	13.4592	13.4592	13.4592	18.0774	18.0774	18.0774
Continuous Stall Torque	oz-in	144.0	156.0	155.0	266.0	281.0	287.0	387.0	398.0	407.0	496.0	510.0	519.0
	Nm	1.0169	1.1016	1.0945	1.8784	1.9843	2.0267	2.7328	2.8105	2.8740	3.5025	3.6014	3.6649
Rated Speed	RPM	6050.0	5950.0	6140.0	3710.0	4710.0	4710.0	2380.0	3840.0	3840.0	1740.0	2820.0	2820.0
	rad/sec	634	623	643	389	493	493	249	402	402	182	295	295
Rated Torque	oz-in	102.0	113.0	110.0	213.0	198.0	200.0	340.0	290.0	296.0	451.0	413.0	419.0
	Nm	0.7203	0.7979	0.7768	1.5041	1.3982	1.4123	2.4009	2.0478	2.0902	3.1847	2.9164	2.9588
Rated Current	Amps	22.60	11.70	5.90	28.90	16.20	8.20	29.70	19.20	9.80	29.20	20.20	10.20
Rated Power	watts	456.0	497.0	499.0	584.0	690.0	697.0	598.0	824.0	841.0	580.0	861.0	874.0
Torque Sensitivity	oz-in/amp	5.20	11.00	21.40	8.41	14.00	28.00	12.90	17.20	34.30	17.40	23.10	46.30
	Nm/amp	0.0367	0.0777	0.1511	0.0594	0.0989	0.1977	0.0911	0.1215	0.2422	0.1229	0.1631	0.3269
Back EMF	volts/KRPM	3.80	8.20	15.80	6.22	10.40	20.70	9.52	12.70	25.40	12.80	17.10	34.20
	volts/rad/sec	0.0367	0.0777	0.1511	0.0594	0.0989	0.1977	0.0911	0.1215	0.2422	0.1229	0.1631	0.3269
Terminal Resistance	ohms	0.040	0.154	0.584	0.039	0.095	0.364	0.052	0.084	0.320	0.065	0.106	0.408
Terminal Inductance	mH	0.090	0.408	1.540	0.115	0.318	1.270	0.178	0.316	1.260	0.241	0.428	1.710
Motor Constant	oz-in/šwatt	26.00	28.03	28.00	42.59	45.42	46.41	56.57	59.35	60.63	68.25	70.95	72.49
	Nm/šwatt	0.18360	0.19794	0.19775	0.30072	0.32075	0.32772	0.39947	0.41907	0.42817	0.48194	0.50102	0.51186
Rotor Inertia	oz-in-sec^2	18.00	18.00	18.00	35.00	35.00	35.00	52.00	52.00	52.00	70.00	70.00	70.00
	g-cm^2	1270.3	1270.3	1270.3	2470.0	2470.0	2470.0	3669.6	3669.6	3669.6	4939.9	4939.9	4939.9
Weight	oz	65.0	65.0	65.0	104.0	104.0	104.0	143.0	143.0	143.0	182.0	182.0	182.0
	g	1846.0	1846.0	1846.0	2953.6	2953.6	2953.6	4061.2	4061.2	4061.2	5168.8	5168.8	5168.8
# of Poles		8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Timing		120°	120°	120°	120°	120°	120°	120°	120°	120°	120°	120°	120°
Mech. Time Constant	ms	3.8	3.2	3.2	2.7	2.4	2.3	2.3	2.1	2.0	2.1	2.0	1.9
Electrical Time Constant	ms	2.25	2.65	2.64	2.95	3.35	3.49	3.42	3.76	3.94	3.71	4.04	4.19
Thermal Resistivity	deg. C/watt	1.2	1.2	1.2	1.0	0.9	0.9	0.9	0.8	0.8	0.9	0.7	0.7
Speed/Torque Gradient	rpm/oz-in.	2.0	1.7	1.7	0.7	0.7	0.6	0.4	0.4	0.4	0.3	0.3	0.3

Notes:
1. Motor mounted to a 10" x 10" x 1/4" aluminum plate, still air.
2. Maximum winding temperature of 155°C.
3. Typical electrical specifications at 25°C.

* Many other custom mechanical options are available – consult factory.
** Many other winding options are available – consult factory.

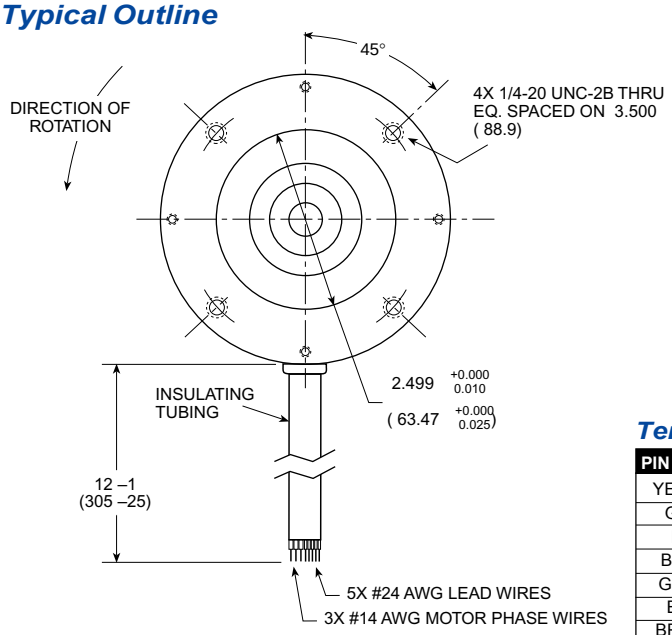
Select your options below and place their code in its corresponding block as shown on page 3.

T TERMINATION
L – Leads (std)
C – Connector
M – MS connector

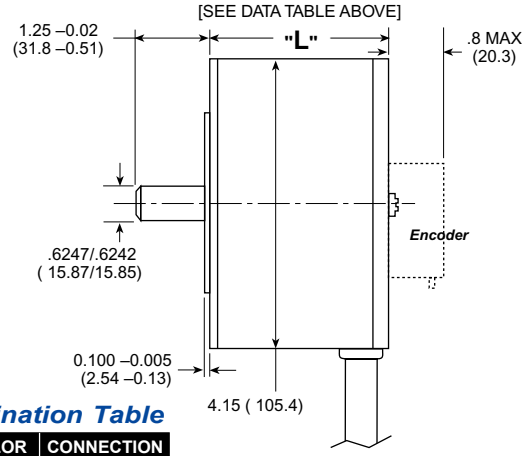
F FEEDBACK OPTIONS
H – Hall Effect (std)
R – Resolver
S – Sensorless

O OTHER OPTIONS
D – Drive
E – Encoder
G – Gearhead

BN42 Typical Outline



NOTE: AN OPTIONAL 4.15 (105.4) SQUARE FRONT END CAP IS AVAILABLE



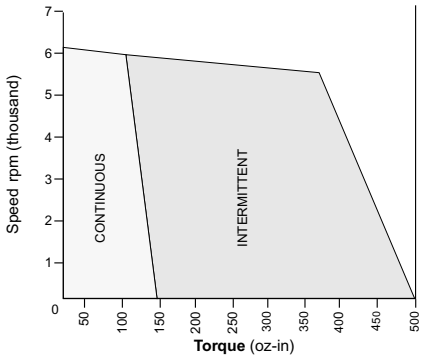
Termination Table

PIN COLOR	CONNECTION
YELLOW	V_{CC}
GRAY	GROUND
RED	A COIL
BLACK	B COIL
GREEN	C COIL
BLUE	S2 OUT
BROWN	S1 OUT
ORANGE	S3 OUT

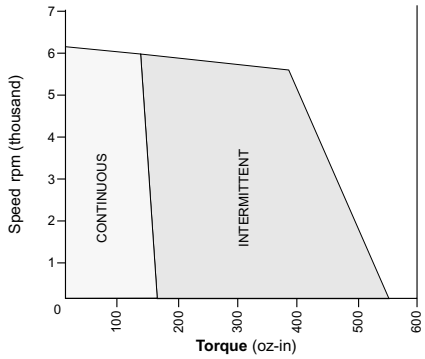
Dimensions are in inches (millimeters)

BN42 PERFORMANCE CURVES

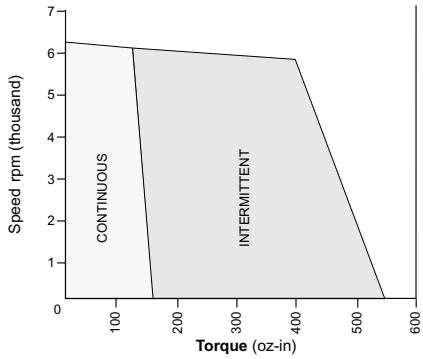
BN42-23AF-01: Continuous & Intermittent Operation at 24 Volt DC



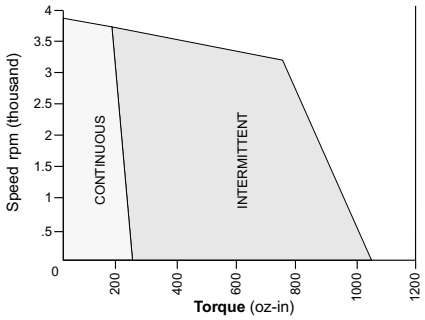
BN42-23AF-02: Continuous & Intermittent Operation at 50 Volt DC



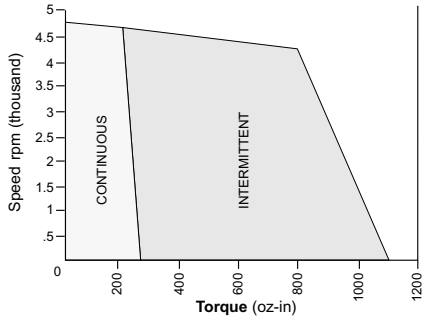
BN42-23AF-03: Continuous & Intermittent Operation at 100 Volt DC



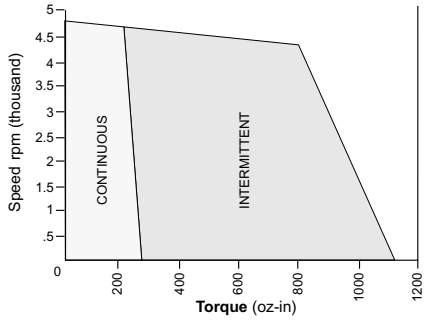
BN42-33AF-01: Continuous & Intermittent Operation at 24 Volt DC



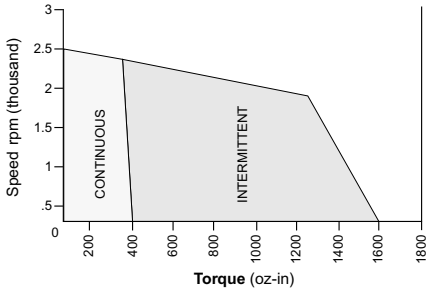
BN42-33AF-02: Continuous & Intermittent Operation at 50 Volt DC



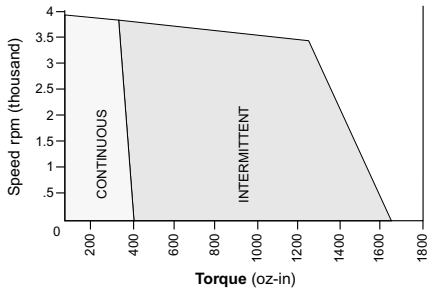
BN42-33AF-03: Continuous & Intermittent Operation at 100 Volt DC



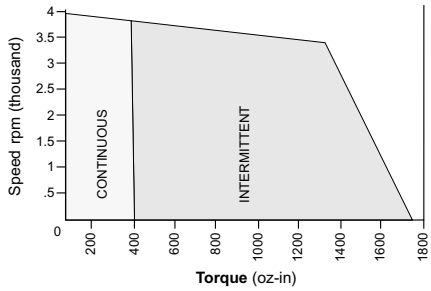
BN42-43AF-01: Continuous & Intermittent Operation at 24 Volt DC



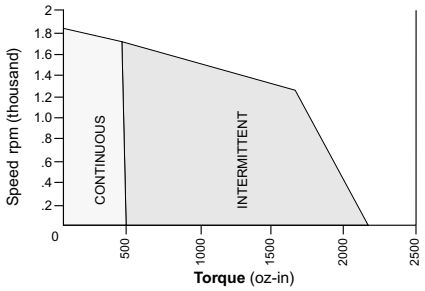
BN42-43AF-02: Continuous & Intermittent Operation at 50 Volt DC



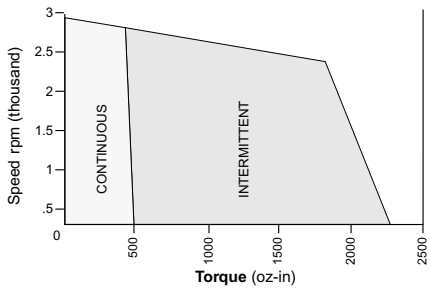
BN42-43AF-03: Continuous & Intermittent Operation at 100 Volt DC



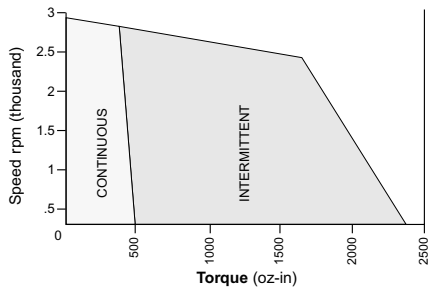
BN42-53AF-01: Continuous & Intermittent Operation at 24 Volt DC



BN42-53AF-02: Continuous & Intermittent Operation at 50 Volt DC



BN42-53AF-03: Continuous & Intermittent Operation at 100 Volt DC



Note:
Intermittent operation is based on a 20% duty cycle of one minute on, four minutes off.
Please contact the factory regarding the duty cycle of your application.

About Us

Blacksburg Operation
Division Headquarters
Location: Blacksburg, VA
Core business description:
Design and manufacture slip ring assemblies, military fractional horsepower DC motors, integrated motion technology systems, resolvers, fiber optic components, and security devices for military/aerospace and commercial markets.

Springfield Operation -
Special Devices
Location: Springfield, PA
Core business description:
Design and manufacture aircraft navigation and engine instrumentation, LCD engine instrumentation, custom military display systems, precision (high-end) electromechanical fractional horsepower actuators, navigation and directional gyros, and Emergency Locator Transmitters (ELTs).

Murphy Operation -
Clifton Precision
Location: Murphy, NC
Core business description:
Design and manufacture fractional horsepower brush and brushless DC motors and drives for commercial applications; synchro and resolver products for military/aerospace customers.

Poly-Scientific Division Offices

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540 552-3011
800 336-2112
FAX 540 953-1841

- Slip Ring Products
- Military/Aerospace Motors and Resolvers
- Fiber Optic Products
- Integrated Motion Technology

Murphy Operation
1995 NC HWY 141
Murphy, NC U.S.A.
28906-0160

828 837-5115
800-577-8685
FAX 828 837-0846

- Clifton Precision® Motors & Resolvers
- Brushless Motor Drive Electronics
- Military/Aerospace Synchros and Resolvers

Springfield Operation
750 West Sproul Rd.
Springfield, PA
U.S.A.
19064-4084

610 328-4000
FAX 610 328-4016

- Actuators
- Instruments & Displays
- Search & Rescue Products

International Sales

Litton Precision Products International (LPPI)

Australia	Sydney	61-2-9460-3666	Fax 61-2-9460-3777
	Essendon	61-613-9375-3838	Fax 61-613-9370-0061
Cntl./E. Europe	Czech Republic	420-5-47125-340	Fax 420-5-47125-348
England	Bucks	44-1628-404714	Fax 44-1628-472438
France	Le Chesnay	33-1-39238300	Fax 33-1-39555068
Germany	Munich	49-89-92204-0	Fax 49-89-985-184
Holland	Krimpen a/d Yssel	31-180-59-6888	Fax 31-180-59-6899
Italy	Milan	39-0224-7916-215	Fax 39-0224-40669
Japan	Tokyo (Westrex)	813-3211-6791	Fax 813-3211-6797
Spain	Madrid	3491-344-0144	Fax 3491-344-0102
Sweden	Stockholm	46-8-7430585	Fax 46-8-643 52 20
Switzerland	Zurich	41-1-313-1001	Fax 41-1-313-1255

Sales and marketing of Litton electronic and electromechanical components, and integrated motion technologies.

Litton

Poly-Scientific

When it has to turn, turn to Litton.™

Litton Poly-Scientific is an innovative motion technology products company with design and manufacturing capabilities for slip rings, brush & brushless DC motors and drives, fiber optics, actuators and integrated rotary assemblies.