

BN23 Specifications

Inside Rotor
Brushless Motors

BN23 SPECIFICATIONS - *Continuous Stall Torque 14.6 - 54.3 oz-in (0.103 - 0.384 Nm) Peak Torque 35 - 186 oz-in (0.2472 - 1.3134 Nm)*

Part Number*		BN23-13MG- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			BN23-18MG- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			BN23-23MG- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			BN23-28MG- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		
Winding Code**		01	02	03	01	02	03	01	02	03	01	02	03
L = Length	inches	1.40			1.90			2.40			2.90		
	millimeters	35.6			48.3			60.9			73.7		
Terminal Voltage	volts DC	24	36	48	24	36	48	24	36	48	24	36	48
Peak Torque	oz-in	35	35	35	88	88	88	143	143	143	186	186	186
	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	14.6	17.7	14.2	30.7	31.4	35.2	42.8	44.7	42.9	50.4	54.3	53.2
	Nm	0.103	0.125	0.100	0.217	0.221	0.248	0.303	0.315	0.303	0.356	0.384	0.376
No-Load Speed		12,200	12,500	12,300	9,100	9,700	10,200	8,100	8,800	8,200	7,300	7,500	8,100
Rated Speed	RPM	8650	9060	9190	6460	7000	7130	6060	6700	6250	5340	5590	6140
	rad/sec	906	949	962	676	733	747	635	702	655	559	585	643
Rated Torque	oz-in	14.2	16.1	12.1	29.7	29.8	32.9	40.3	42.3	41.8	49.1	51.9	48.8
	Nm	0.100	0.114	0.085	0.210	0.210	0.232	0.285	0.299	0.295	0.347	0.366	0.345
Rated Current	Amps	5.80	4.30	2.38	7.75	5.43	4.88	9.47	7.44	5.00	10.45	7.66	5.85
Rated Power	watts	91	108	82	142	154	174	181	210	193	194	215	222
Torque Sensitivity	oz-in/amp	2.55	3.78	5.18	3.40	4.90	6.25	3.85	5.35	7.79	4.26	6.30	7.80
	Nm/amp	0.018	0.027	0.037	0.024	0.035	0.044	0.027	0.038	0.055	0.030	0.044	0.055
Back EMF	volts/KRPM	1.89	2.80	3.83	2.51	3.62	4.62	2.85	3.96	5.76	3.15	4.66	5.77
	volts/rad/sec	0.018	0.027	0.037	0.024	0.035	0.044	0.027	0.038	0.055	0.030	0.044	0.055
Terminal Resistance	ohms	0.465	0.939	1.890	0.246	0.507	0.800	0.178	0.347	0.715	0.181	0.366	0.576
Terminal Inductance	mH	0.350	0.758	1.53	0.275	0.580	0.930	0.220	0.420	0.900	0.230	0.490	0.770
Motor Constant	oz-in/sq.rt.watt	3.74	3.90	3.77	6.86	6.88	6.99	9.13	9.08	9.21	10.01	10.41	10.28
	Nm/sq.rt.watt	0.026	0.028	0.027	0.048	0.049	0.049	0.064	0.064	0.065	0.071	0.074	0.073
Rotor Inertia	oz-in-sec ² x10 ⁻³	0.51	0.51	0.51	0.99	0.99	0.99	1.5	1.5	1.5	1.9	1.9	1.9
	g-cm ²	36	36	36	70	70	70	106	106	106	134	134	134
Weight	oz	8.3	8.4	8.3	13.6	13.7	13.8	19.1	19.1	19.1	24.4	24.7	24.5
	g	234.0	238.0	234.0	386.0	389.0	391.0	542.0	542.0	542.0	693.0	699.0	694.0
# 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	5.20	4.7	5.1	3.0	3.0	2.9	2.5	2.6	2.5	2.7	2.5	2.5
Electrical Time Constant	ms	0.75	0.81	0.81	1.12	1.14	1.16	1.24	1.21	1.26	1.27	1.34	1.34
Thermal Resistivity	deg. C/watt	2.28	2.34	3.44	2.49	2.67	1.81	2.36	1.89	2.35	1.93	1.80	1.86
Speed/Torque Gradient	rpm/oz-in	250.0	213.7	257.0	88.9	90.6	93.3	50.6	49.6	46.7	39.9	36.8	40.2

Notes:

- Motor mounted to a 6 x 6 x 1/4 inches aluminum plate, still air.
- Maximum winding temperature of 155°C.
- Typical electrical specifications at 25°C.
- Data shown for 8 pole motors. Please consult factory for 4 pole specifications.
- Motor Terminal Voltages are representative only; motors may be operated at voltages other than those listed in the table. For assistance please contact our applications engineer.
- For MS (military style) connector, please specify connector housing and terminal.
- Data for informational purposes only. Should not be considered a binding performance agreement. For specific applications, please contact the factory.

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

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

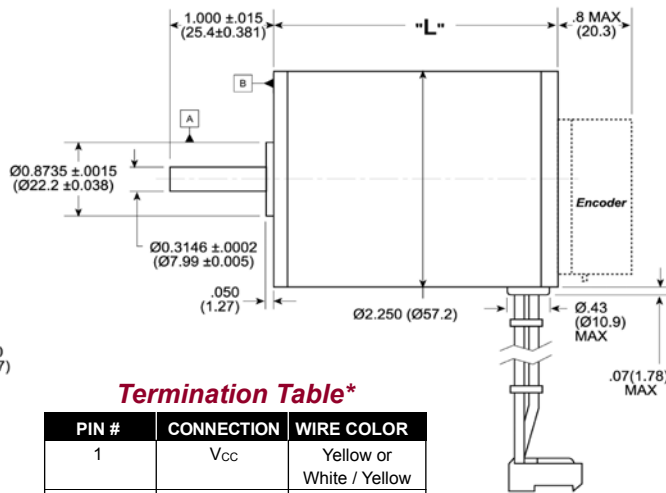
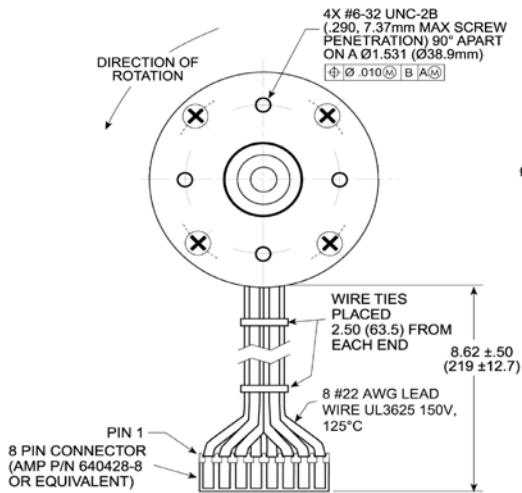
Select your options below and place their code in its corresponding block as shown on page 5.

- | | | |
|--|---|--|
| <input checked="" type="checkbox"/> TERMINATION | <input checked="" type="checkbox"/> FEEDBACK OPTIONS | <input checked="" type="checkbox"/> OTHER OPTIONS |
| L – Leads (std) | H – Hall Effect (std) | E – Encoder |
| C – Connector | R – Resolver | G – Gearhead |
| M – MS connector | S – Sensorless | |

BN23 Housed / Frameless

Inside Rotor
Brushless Motors

BN23 Typical Outline - Housed



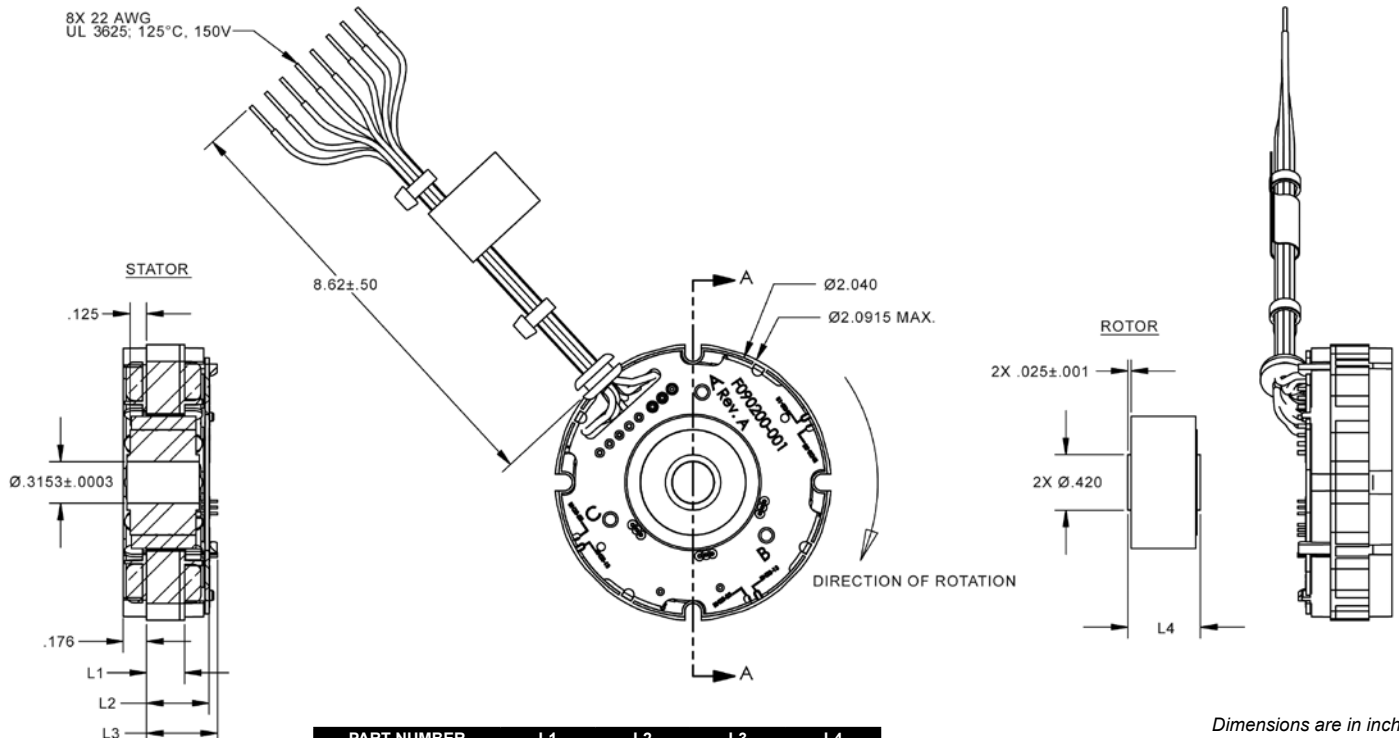
Termination Table*

PIN #	CONNECTION	WIRE COLOR
1	Vcc	Yellow or 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)

*We reserve the right to use solid color wires or white wires with color trace.

BN23 Typical Outline - Frameless



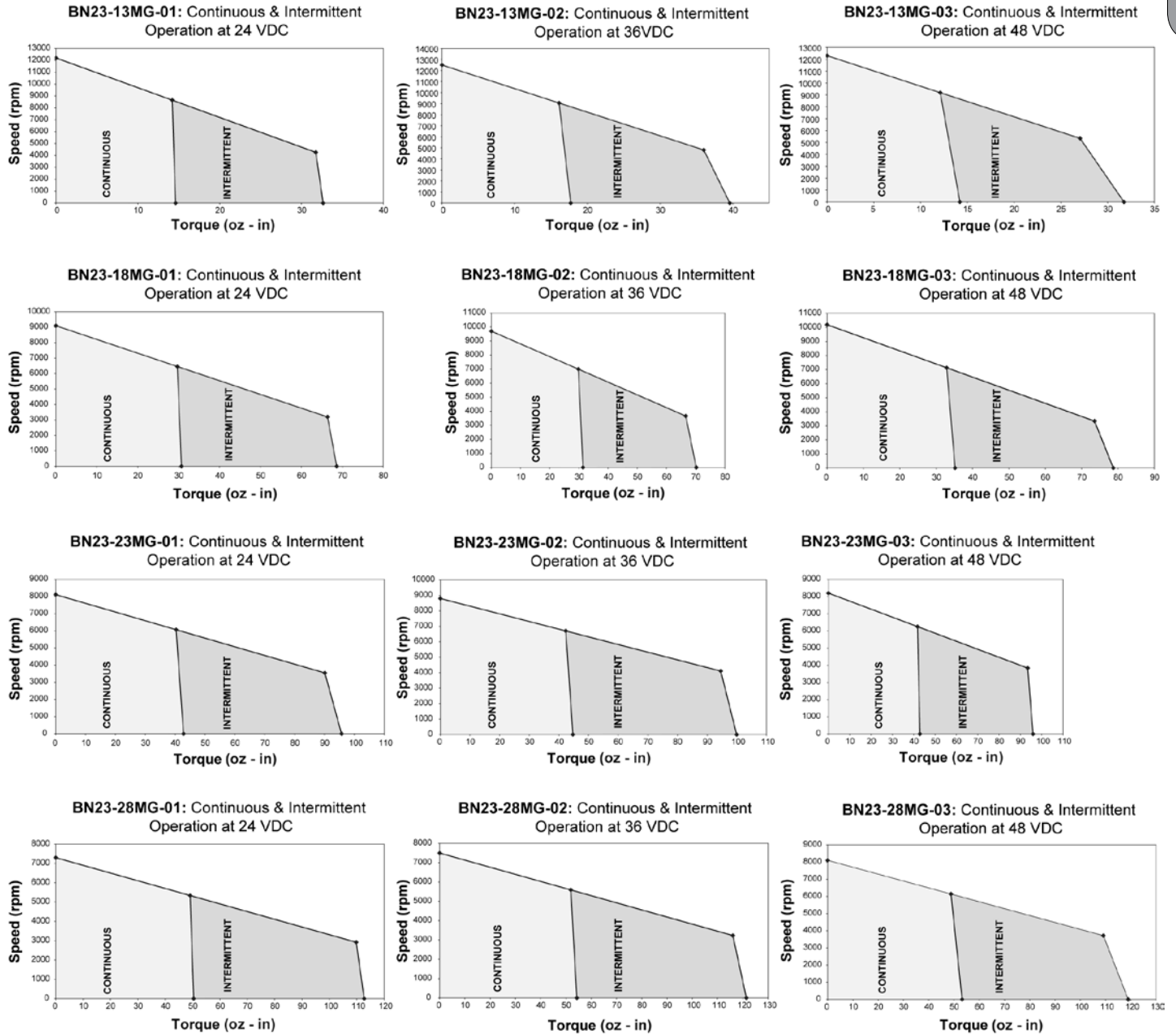
PART NUMBER	L1	L2	L3	L4
BN23-13ZMG-XXLH	0.288	0.474	0.550	0.550
BN23-18ZMG-XXLH	0.788	0.974	1.050	1.050
BN23-23ZMG-XXLH	1.288	1.470	1.550	1.550
BN23-28ZMG-XXLH	1.788	1.970	2.050	2.050

Note: For electrical performance see page 17.

Dimensions are in inches

BN23 Performance Curves

BN23 Performance Curves



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 EU Specifications

Inside Rotor
Brushless Motors

BN23 EU SPECIFICATIONS - *Continuous Stall Torque 14.6 - 54.3 oz-in (0.103 - 0.384 Nm)*
Peak Torque 35 - 186 oz-in (0.2472 - 1.3134 Nm)

Part Number*		BN23-13EU- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			BN23-18EU- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			BN23-23EU- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			BN23-28EU- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		
Winding Code**		01	02	03	01	02	03	01	02	03	01	02	03
L = Length	inches	1.40			1.90			2.40			2.90		
	millimeters	35.6			48.3			60.9			73.7		
Terminal Voltage	volts DC	24	36	48	24	36	48	24	36	48	24	36	48
Peak Torque	oz-in	35	35	35	88	88	88	143	143	143	186	186	186
	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	14.6	17.7	14.2	30.7	31.4	35.2	42.8	44.7	42.9	50.4	54.3	53.2
	Nm	0.103	0.125	0.100	0.217	0.221	0.248	0.303	0.315	0.303	0.356	0.384	0.376
No-Load Speed		12,200	12,500	12,300	9,100	9,700	10,200	8,100	8,800	8,200	7,300	7,500	8,100
Rated Speed	RPM	8650	9060	9190	6460	7000	7130	6060	6700	6250	5340	5590	6140
	rad/sec	906	949	962	676	733	747	635	702	655	559	585	643
Rated Torque	oz-in	14.2	16.1	12.1	29.7	29.8	32.9	40.3	42.3	41.8	49.1	51.9	48.8
	Nm	0.100	0.114	0.085	0.210	0.210	0.232	0.285	0.299	0.295	0.347	0.366	0.345
Rated Current	Amps	5.80	4.30	2.38	7.75	5.43	4.88	9.47	7.44	5.00	10.45	7.66	5.85
Rated Power	watts	91	108	82	142	154	174	181	210	193	194	215	222
Torque Sensitivity	oz-in/amp	2.55	3.78	5.18	3.40	4.90	6.25	3.85	5.35	7.79	4.26	6.30	7.80
	Nm/amp	0.018	0.027	0.037	0.024	0.035	0.044	0.027	0.038	0.055	0.030	0.044	0.055
Back EMF	volts/KRPM	1.89	2.80	3.83	2.51	3.62	4.62	2.85	3.96	5.76	3.15	4.66	5.77
	volts/rad/sec	0.018	0.027	0.037	0.024	0.035	0.044	0.027	0.038	0.055	0.030	0.044	0.055
Terminal Resistance	ohms	0.465	0.939	1.890	0.246	0.507	0.800	0.178	0.347	0.715	0.181	0.366	0.576
Terminal Inductance	mH	0.350	0.758	1.53	0.275	0.580	0.930	0.220	0.420	0.900	0.230	0.490	0.770
Motor Constant	oz-in/sq.rt.watt	3.74	3.90	3.77	6.86	6.88	6.99	9.13	9.08	9.21	10.01	10.41	10.28
	Nm/sq.rt.watt	0.026	0.028	0.027	0.048	0.049	0.049	0.064	0.064	0.065	0.071	0.074	0.073
Rotor Inertia	oz-in-sec ² x10 ⁻³	0.51	0.51	0.51	0.99	0.99	0.99	1.5	1.5	1.5	1.9	1.9	1.9
	g-cm ²	36	36	36	70	70	70	106	106	106	134	134	134
Weight	oz	8.3	8.4	8.3	13.6	13.7	13.8	19.1	19.1	19.1	24.4	24.7	24.5
	g	234.0	238.0	234.0	386.0	389.0	391.0	542.0	542.0	542.0	693.0	699.0	694.0
# 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	5.20	4.7	5.1	3.0	3.0	2.9	2.5	2.6	2.5	2.7	2.5	2.5
Electrical Time Constant	ms	0.75	0.81	0.81	1.12	1.14	1.16	1.24	1.21	1.26	1.27	1.34	1.34
Thermal Resistivity	deg. C/watt	2.28	2.34	3.44	2.49	2.67	1.81	2.36	1.89	2.35	1.93	1.80	1.86
Speed/Torque Gradient	rpm/oz-in	250.0	213.7	257.0	88.9	90.6	93.3	50.6	49.6	46.7	39.9	36.8	40.2

Notes:

- Motor mounted to a 6" x 6" x 1/4" aluminum plate, still air.
- Maximum winding temperature of 155°C.
- Typical electrical specifications at 25°C.
- Data shown for 8 pole motors. Please consult factory for 4 pole specifications.
- Motor Terminal Voltages are representative only; motors may be operated at voltages other than those listed in the table. For assistance please contact our applications engineer.
- For MS (military style) connector, please specify connector housing and terminal.
- Data for informational purposes only. Should not be considered a binding performance agreement. For specific applications, please contact the factory.

*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 5.

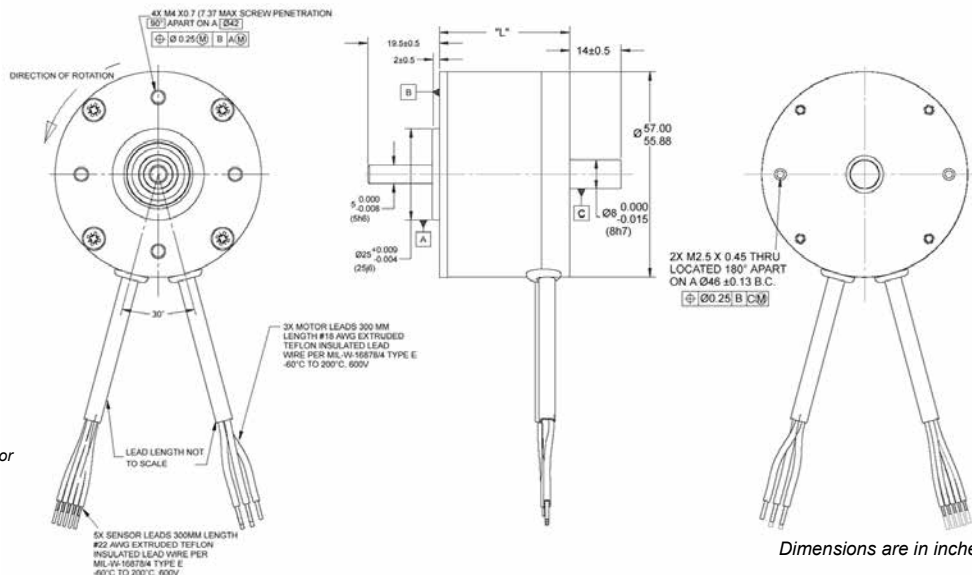
- | | | |
|---|--|---|
| <input type="checkbox"/> TERMINATION | <input type="checkbox"/> FEEDBACK OPTIONS | <input type="checkbox"/> OTHER OPTIONS |
| L – Leads (std) | H – Hall Effect (std) | E – Encoder |
| C – Connector | R – Resolver | G – Gearhead |
| M – MS connector | S – Sensorless | |

BN23 EU Typical Outline

Termination Table*

COLOR	CONNECTION
VIOLET	A COIL
GREEN	C COIL
BLACK	B COIL
GRAY	HALL GND
YELLOW	HALL V _{CC}
WHITE	HALL S3
BLUE	HALL S2
BROWN	HALL S1

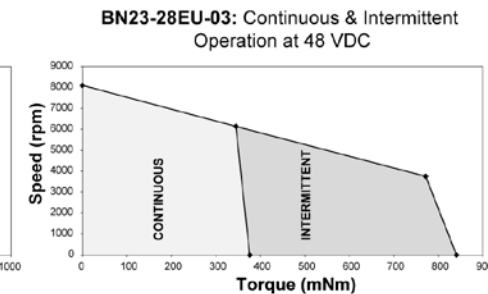
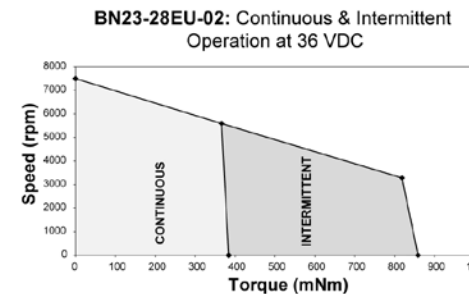
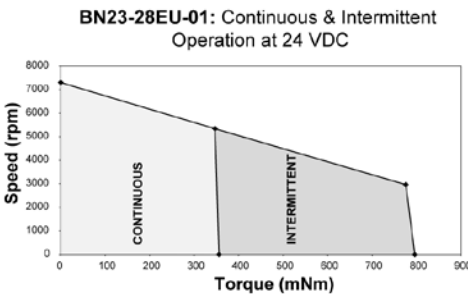
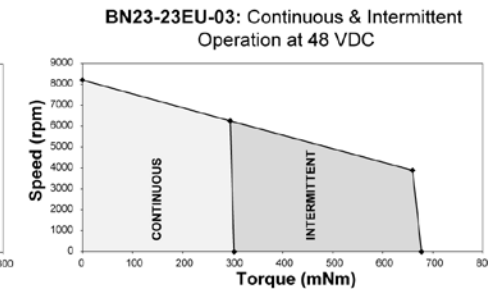
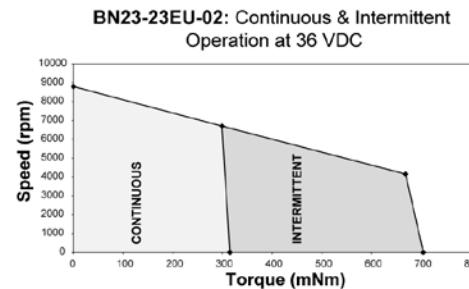
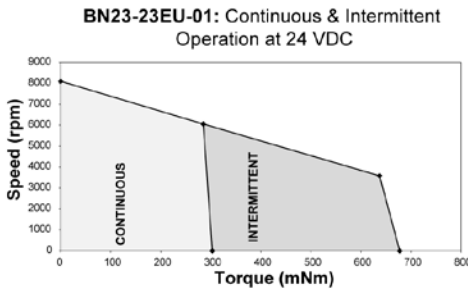
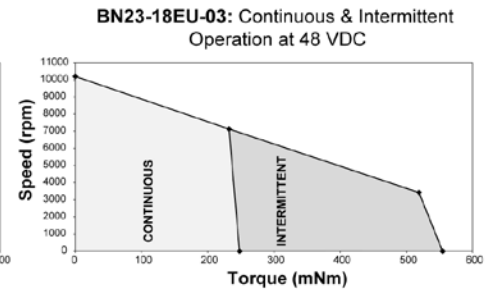
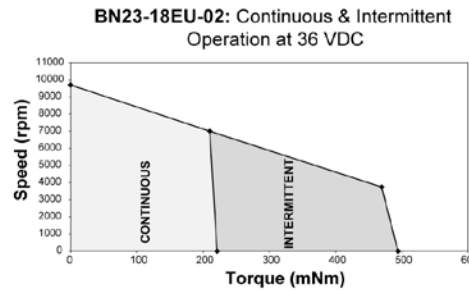
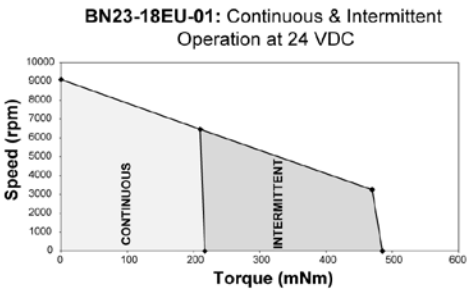
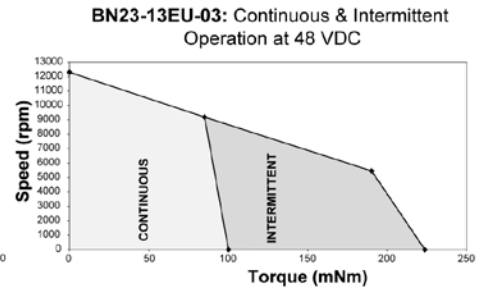
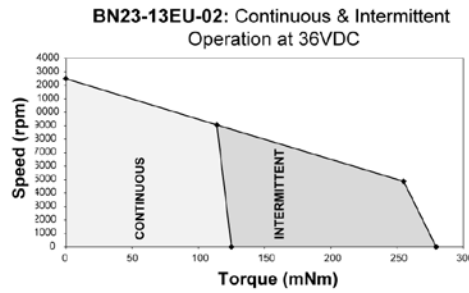
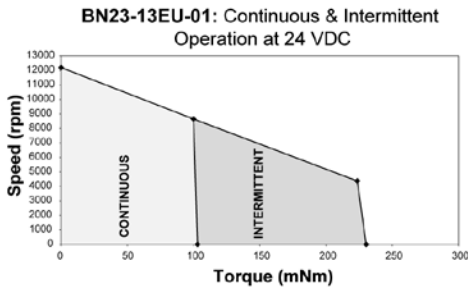
*We reserve the right to use solid color wires or white wires with color trace.



Dimensions are in inches (millimeters)

BN23 EU Performance Curves

BN23 EU Performance Curves



S/T Gradient = 35.4 rpm/mNm

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 IP65 Specifications

BN23 IP65 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*		BN23-13IP- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			BN23-18IP- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			BN23-23IP- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			BN23-28IP- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		
Winding Code**		01	02	03	01	02	03	01	02	03	01	02	03
L = Length	inches	2.43			2.93			3.43			3.93		
	millimeters	61.72			74.42			87.12			99.82		
Terminal Voltage	volts DC	24	36	48	24	36	48	24	36	48	24	36	48
Peak Torque	oz-in	35	35	35	88	88	88	143	143	143	186	186	186
	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	14.6	17.7	14.2	30.7	31.4	35.2	42.8	44.7	42.9	50.4	54.3	53.2
	Nm	0.103	0.125	0.100	0.217	0.221	0.248	0.303	0.315	0.303	0.356	0.384	0.376
No-Load Speed		12,200	12,500	12,300	9,100	9,700	10,200	8,100	8,800	8,200	7,300	7,500	8,100
Rated Speed	RPM	8650	9060	9190	6460	7000	7130	6060	6700	6250	5340	5590	6140
	rad/sec	906	949	962	676	733	747	635	702	655	559	585	643
Rated Torque	oz-in	14.2	16.1	12.1	29.7	29.8	32.9	40.3	42.3	41.8	49.1	51.9	48.8
	Nm	0.100	0.114	0.085	0.210	0.210	0.232	0.285	0.299	0.295	0.347	0.366	0.345
Rated Current	Amps	5.80	4.30	2.38	7.75	5.43	4.88	9.47	7.44	5.00	10.45	7.66	5.85
Rated Power	watts	91	108	82	142	154	174	181	210	193	194	215	222
Torque Sensitivity	oz-in/amp	2.55	3.78	5.18	3.40	4.90	6.25	3.85	5.35	7.79	4.26	6.30	7.80
	Nm/amp	0.018	0.027	0.037	0.024	0.035	0.044	0.027	0.038	0.055	0.030	0.044	0.055
Back EMF	volts/KRPM	1.89	2.80	3.83	2.51	3.62	4.62	2.85	3.96	5.76	3.15	4.66	5.77
	volts/rad/sec	0.018	0.027	0.037	0.024	0.035	0.044	0.027	0.038	0.055	0.030	0.044	0.055
Terminal Resistance	ohms	0.465	0.939	1.890	0.246	0.507	0.800	0.178	0.347	0.715	0.181	0.366	0.576
Terminal Inductance	mH	0.350	0.758	1.53	0.275	0.580	0.930	0.220	0.420	0.900	0.230	0.490	0.770
Motor Constant	oz-in/sq.rt.watt	3.74	3.90	3.77	6.86	6.88	6.99	9.13	9.08	9.21	10.01	10.41	10.28
	Nm/sq.rt.watt	0.026	0.028	0.027	0.048	0.049	0.049	0.064	0.064	0.065	0.071	0.074	0.073
Rotor Inertia	oz-in-sec ² x10 ⁻³	0.51	0.51	0.51	0.99	0.99	0.99	1.5	1.5	1.5	1.9	1.9	1.9
	g-cm ²	36	36	36	70	70	70	106	106	106	134	134	134
Weight	oz	8.3	8.4	8.3	13.6	13.7	13.8	19.1	19.1	19.1	24.4	24.7	24.5
	g	234.0	238.0	234.0	386.0	389.0	391.0	542.0	542.0	542.0	693.0	699.0	694.0
# 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	5.20	4.7	5.1	3.0	3.0	2.9	2.5	2.6	2.5	2.7	2.5	2.5
Electrical Time Constant	ms	0.75	0.81	0.81	1.12	1.14	1.16	1.24	1.21	1.26	1.27	1.34	1.34
Thermal Resistivity	deg. C/watt	2.28	2.34	3.44	2.49	2.67	1.81	2.36	1.89	2.35	1.93	1.80	1.86
Speed/Torque Gradient	rpm/oz-in	250.0	213.7	257.0	88.9	90.6	93.3	50.6	49.6	46.7	39.9	36.8	40.2

Notes:

- Motor mounted to a 6" x 6" x 1/4" aluminum plate, still air.
- Maximum winding temperature of 155°C.
- Typical electrical specifications at 25°C.
- Motor Terminal Voltages are representative only; motors may be operated at voltages other than those listed in the table. For assistance please contact our applications engineer.
- Calculated (theoretical) speed/torque gradient.
- For MS (military style) connector, please specify connector housing and terminal.
- Data for informational purposes only. Should not be considered a binding performance agreement. For specific applications, please contact the factory.

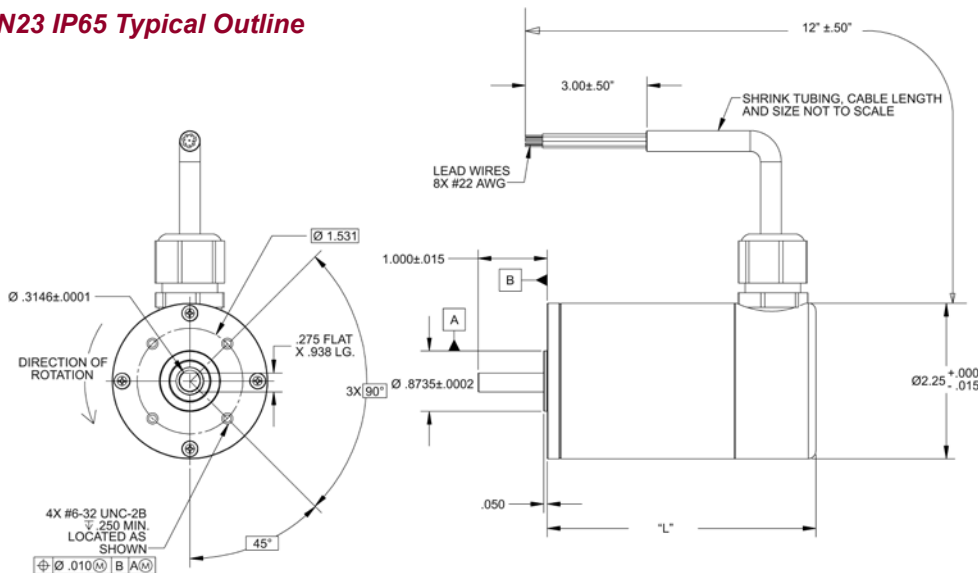
*Many other custom mechanical options are available – consult factory.

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

Select your options below and place their code in its corresponding block as shown on page 5.

- TERMINATION** **FEEDBACK OPTIONS** **OTHER OPTIONS**
 L – Leads (std) H – Hall Effect (std) G – Gearhead
 C – Connector
 M – MS connector

BN23 IP65 Typical Outline



Termination Table*

COLOR	CONNECTION
VIOLET	A COIL
GREEN	C COIL
BLACK	B COIL
GRAY	HALL GND
YELLOW	HALL V _{CC}
WHITE	HALL S3
BLUE	HALL S2
BROWN	HALL S1

*We reserve the right to use solid color wires or white wires with color trace.

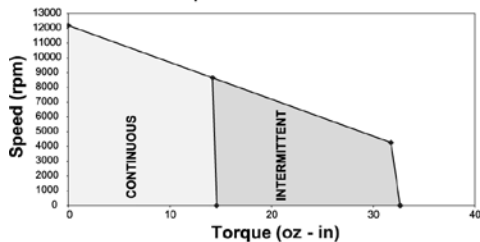
Dimensions are in inches

REVISED 05/19

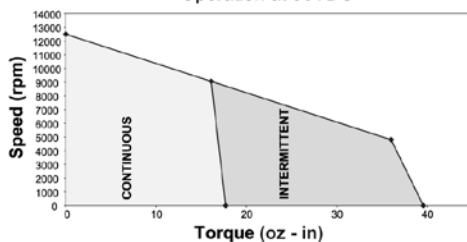
BN23 IP65 Performance Curves

BN23 IP65 Performance Curves

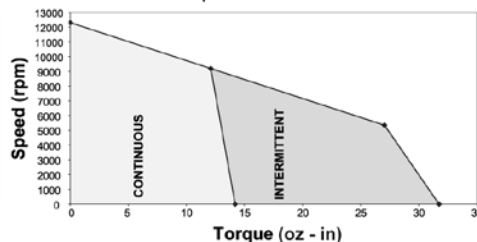
BN23-13IP-01: Continuous & Intermittent Operation at 24 VDC



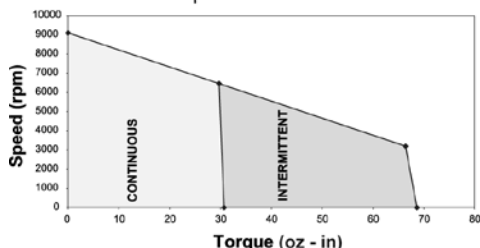
BN23-13IP-02: Continuous & Intermittent Operation at 36VDC



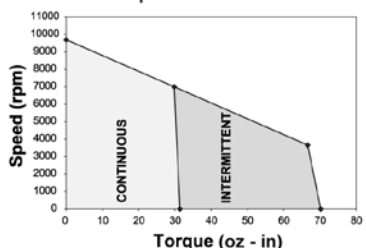
BN23-13IP-03: Continuous & Intermittent Operation at 48 VDC



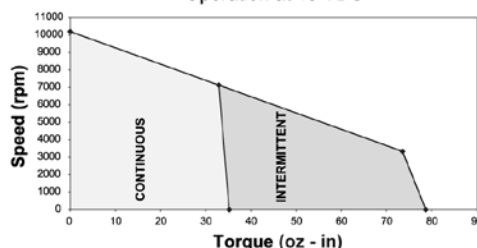
BN23-18IP-01: Continuous & Intermittent Operation at 24 VDC



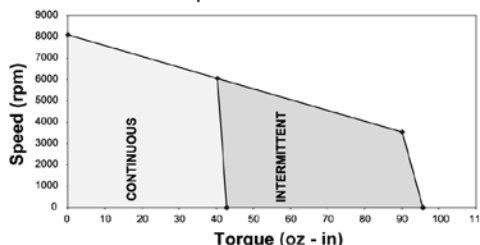
BN23-18IP-02: Continuous & Intermittent Operation at 36 VDC



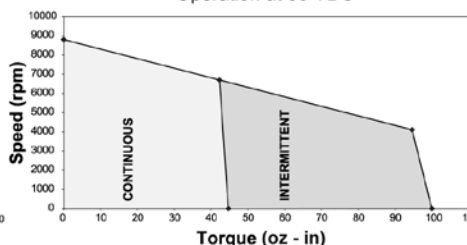
BN23-18IP-03: Continuous & Intermittent Operation at 48 VDC



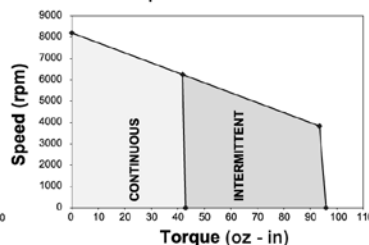
BN23-23IP-01: Continuous & Intermittent Operation at 24 VDC



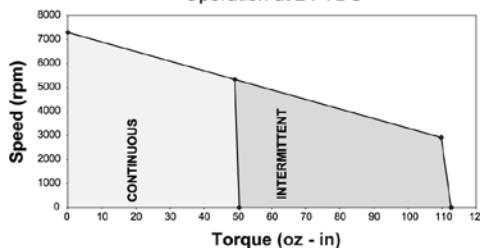
BN23-23IP-02: Continuous & Intermittent Operation at 36 VDC



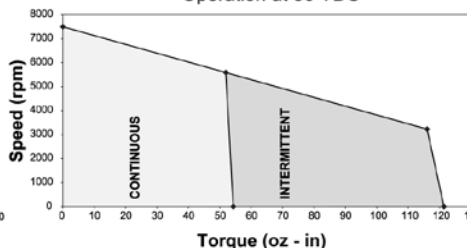
BN23-23IP-03: Continuous & Intermittent Operation at 48 VDC



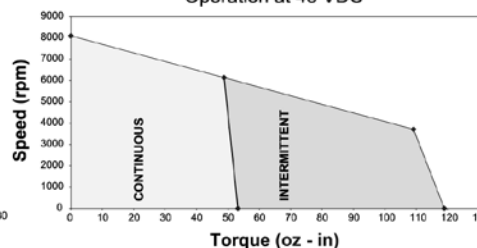
BN23-28IP-01: Continuous & Intermittent Operation at 24 VDC



BN23-28IP-02: Continuous & Intermittent Operation at 36 VDC



BN23-28IP-03: Continuous & Intermittent Operation at 48 VDC



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.