TORQUEMASTER™

BRUSHLESS SERVO MOTORS

BNL 2300 SERIES

Series 2300, brushless servo motor — provides fast response, accurate control and high torque-to-inertia ratios

- 8 pole brushless design
- Continuous torque ratings up to 140 oz.-in. —with speeds up to 10,000 RPM
- NEMA 23 mounting features standard
- IEC 72 Metric specifications available
- Maximum torque per frame size with high performance Neodymium magnets
- Superior low speed performance
- Numerous custom options available
- CE / UL

CE

Performance Benefits

CMC Torque Systems specializes in the design of high performance brushless servo motors that provide efficiency, flexibility of application, and a long and trouble-free service life. Our TORQUEMASTER® BNL 2300 series is no exception.

With fast response, accurate control and high torque-to-inertia ratios, you can count on the TORQUEMASTER 2300 Series of servo motors to provide smooth operation throughout a full speed range. The BNL 2300 Series delivers smooth and superior low speed performance and maximum power ratings with low thermal resistance for high speed performance. In addition, with maximum torque in a smaller package, you can count on better pricing for a better overall value.

When integrated with high performance brushless amplifiers, TORQUEMASTER BNL 2300 servo motors provide effective and highly efficient motion control solutions for a wide range of applications—including factory automation, packaging, robotics, semi-conductor, medical instrumentation, and more.

Design Features

TORQUEMASTER BNL 2300 Series servo motors are rated from 50 oz.-in. to 140 oz.-in. with speeds and torque stability up to 10,000 RPM—accommodating DC bus voltages up to 325 volts. They utilize the latest in high performance Neodymium, permanent magnet technology, and are available in several standard windings (as well as custom windings) to meet your most demanding applications.

Each servo motor in the BNL 2300 Series is ruggedly designed and manufactured for reliable performance. To satisfy many different applications, TORQUEMASTER 2300 Series motors are manufactured to NEMA/IEC specifications.

TORQUE SYSTEMS

Improving Productivity Worldwide

Cleveland Motion Controls
An IMC Company

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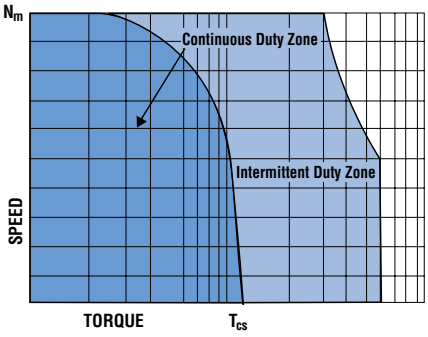
- Continuous torque range of 50 oz.-in. to 140 oz.-in.
- Neodymium magnet construction
- More torque per smaller frame size
- Speeds to 10,000 RPM
- High torque-to-inertia ratios

MOTOR CHARACTERISTICS

SYMBOL	MOTOR PARAMETER	UNITS	BNL2305T	BNL2310T	BNL2315T	BNL2320T
N_m	Max Operating Speed	RPM	10,000	10,000	10,000	10,000
T_C	Max Stall Torque	oz.-in.(Nm)	50 (.353)	100 (.706)	120 (.847)	140 (.99)
T_{Pk}	Peak Torque	oz.-in.(Nm)	250 (1.76)	500 (3.52)	600 (4.23)	700 (4.94)
K_T	Torque Sensitivity	oz.-in./AMP(Nm/Amp)	13.4 (.095)	13.4 (.095)	13.4 (.095)	13.4 (.095)
K_e	Back E.M.F.	Volts/Krpm	10	10	10	10
R_a	Resistance Line to Line	Ohms	1.7	.70	.38	.31
L	Inductance Line to Line	MilliHenry	1.62	.78	.45	.38
J_m	Rotor Inertia	oz.-in.-sec^2 (Kg-m^2)	.001586 .0000112	.002805 .0000198	.00380 .0000268	.004797 .0000338
T_F	Static Friction	oz.-in.(Nm)	2.56 (.018)	2.56 (.018)	2.56 (.018)	2.56 (.018)
W_T	Motor Weight	Lbs(Kg)	1.25 (.57)	1.65	2.05	2.45

TORQUE PERFORMANCE CURVES



NOTE: Continuous torque specifications obtained with motor mounted to an 8.5"x12"x 0.25" aluminum plate at 25°C ambient. Typical values are within ±10% of rating.

Relationship Between K_e & K_T
Torque Systems uses the following important motor performance parameters for the 3 phase square wave and 3 phase sine wave brushless motors in order to properly account for the British Imperial unit system currently used in the US.

K_e = Line-to-line volts-peak / Krpm*
K_T = Pound-inches (lb-in) / peak phase amps
K_e is related to Kt as follows:
K_T = K_e/11.834 for 3 phase square wave current driven amplifiers
K_T = K_e/13.662 for 3 phase sinusoidal wave current driven amplifiers
**Krpm = 1000 rpm*
For "RMS" values, divide peak values by $\sqrt{2}$

STANDARD SPEED/TORQUE CURVE DATA FOR SIZING A SERVO MOTOR

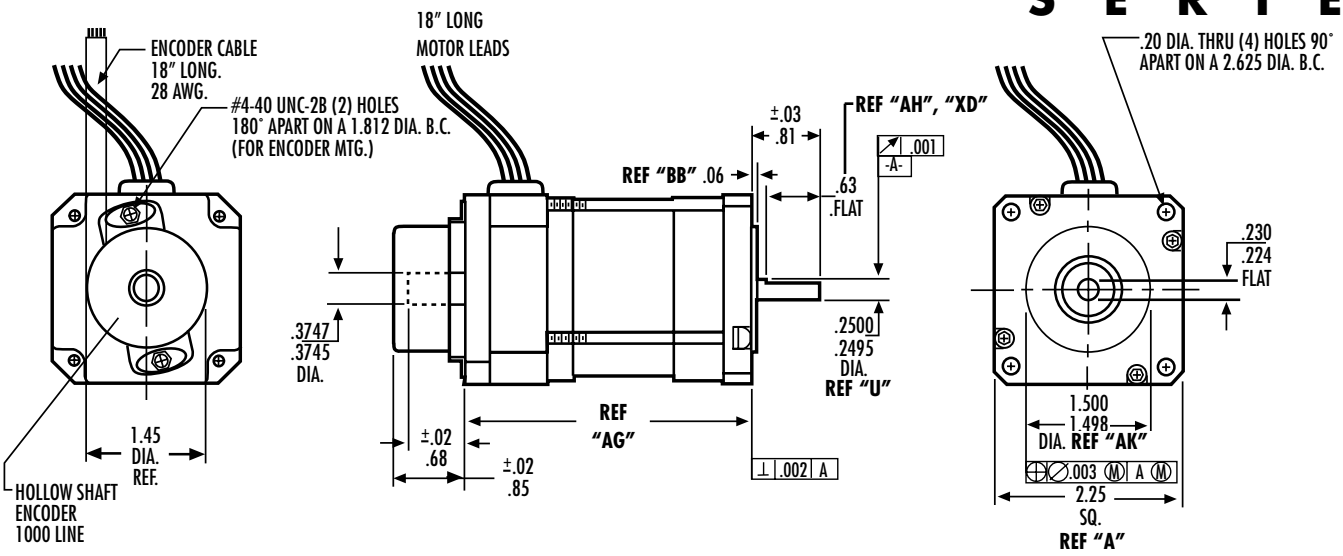
N_m = Maximum speed, continuous operation
T_{cs} = Continuous stall torque

All specifications subject to change without notice.

BRUSHLESS SERVO MOTORS

BNL 2300 SERIES

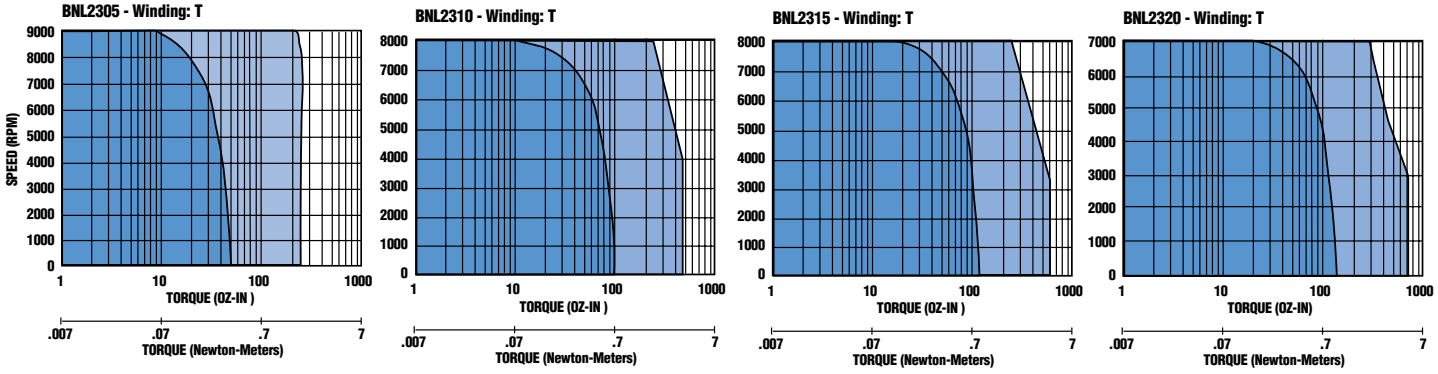
MECHANICAL SPECIFICATIONS



DIMENSION CHART (Dimensions may change depending upon options)

PART NUMBER	AG	A	AK	BB	U	AH	XD
Dimension in inches							
BNL2305	2.47	2.25	1.500	.06	.250 (D)	.81	.63 FLAT (D)
BNL2310	2.97	2.25	1.500	.06	.250 (D)	.81	.63 FLAT (D)
BNL2315	3.47	2.25	1.500	.06	.250 (D)	.81	.63 FLAT (D)
BNL2320	3.97	2.25	1.500	.06	.250 (D)	.81	.63 FLAT (D)
IEC72 (mm)							
BNL2305	62.74	57.15	50j6	1.5	8j6	30	2.0
BNL2310	75.44	57.15	50j6	1.5	8j6	30	2.0
BNL2315	88.14	57.15	50j6	1.5	8j6	30	2.0
BNL2320	100.84	57.15	50j6	1.5	8j6	30	2.0

TORQUE PERFORMANCE CURVES



TORQUE SPEED CURVES OF OTHER WINDINGS AVAILABLE, CONSULT FACTORY.

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BNL ORDERING INFORMATION – (For Standard Options)

BNL23 XX X XX X XXX

STALL TORQUE
05 = 50 oz-in
10 = 100 oz-in
15 = 120 oz-in
20 = 140 oz-in

WINDINGS
T = 10 V/Krpm (Kᴛ = 13.4 oz-in/Amp)
A = 20 V/Krpm (Kᴛ = 26.8 oz-in/Amp)
B = 30 V/Krpm (Kᴛ = 40.5 oz-in/Amp)

COMMUTATION/FEEDBACK (see note 2)
HA = Hall Sensor only
(includes encoder mounting provision)
Encoder Mounting
(2) 4-40 on 1.812 BC; .375 Dia. Shaft

Modular Encoder			Hollow Shaft Encoder		
Commutating	Count	Non-Comm*	Commutating	Count	Non-Comm*
CC =	500	MC	PC =	500	QC
CD =	1000	MD	PD =	1000	QD
CE =	1024	ME	PE =	1024	QE
CF =	2500	MF	PF =	2500	QF
CG =	2000	MG	PG =	2000	QG
–	Special	–	–	Special	–

*includes Hall Sensor Commutation

MOUNTING (see note 1)
A = NEMA 23 Flange with 0.375" Dia. x 0.81" long shaft, .63" long flat
D = NEMA 23 Flange with 0.250" Dia. x 0.81" long shaft, .63" long flat
M = Metric IEC72 Flange w/M8J6 shaft
S = Special Flange and shaft
B = Same as "A", no flat
E = Same as "D", no flat

ENGINEERING MODIFICATIONS

EXAMPLE: BNL23 05 T CD A 000

- MODEL/FRAME
- 50 OZ.-IN. STALL TORQUE
- WINDING
- COMMUTATION
- MOUNTING FEATURES
- ENGINEERING MODIFICATIONS

TERMINATION CHART

MOTOR/CABLE CODE

Function	Wire Color
Motor M1	White
Motor M2	Black
Motor M3	Red
Ground	Green
HALL CONNECTIONS	
+5-24V	Red
Common	Black
H1	Yellow
H2	Orange
H3	Green

Note: Separate drain wires for motor power and halls

Note 1. Hall Sensor Specifications
Voltage = 5V to 24V
Current = 10 ma typical, 25 ma max.
Output = Open collector

Note 2. Com. Encoder
Current = 250 ma

Customize The BNL 2300 To Your Exact Requirements

To satisfy various applications with cost-effective solutions, BNL 2300 Series Motors are readily available with a wide range of standard capabilities. Final designs are often the result of cooperative efforts between the customer's engineering department and CMC. For assistance, call your local CMC distributor or CMC direct. We look forward to meeting your custom requirements.

Notes:

1. Standard BNL2300 motor mounting flanges use NEMA 23 standards but allow oversized shaft diameters to carry the rated torque load. Standard NEMA shaft diameters are typically undersized for most servo ratings and are not recommended. Consult factory regarding acceptable load limits before ordering or applying this option.
2. Standard encoders are dual channel line driver output with a marker pulse and complementary outputs.
3. 120° Electrical Hall Commutation

Ask About Other Motion Control Solutions & Capabilities From Torque Systems

- Brush TorqueMaster® Servo Motors
- PowerMaster® Amplifiers
- Shaft-mounted DataTorque™ Encoders
- Gearboxes/Brakes
- Expert application engineering
- Complete repair & refurbishing services

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