ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

**Artisan Technology Group**
(217) 352-9330 | sales@artisantg.com | artisantg.com

**Full-service, independent repair center**
with experienced engineers and technicians on staff.

**We buy your excess, underutilized, and idle equipment**
along with credit for buybacks and trade-ins.

**Custom engineering**
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

**Expert team | Trust guarantee | 100% satisfaction**

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Torque Systems BNR3312APG00HS0008* at our website: *Click HERE*

# TORQUEMASTER™

# BRUSHLESS SERVO MOTORS

# BNR 3300 SERIES



**Series 3300, 325 VDC brushless servo motor — provides fast response, accurate control and high torque-to-inertia ratios**

- Continuous torque ratings up to 34 lb.-in. —with speeds up to 10,000 RPM
- IP65 Sealing available
- NEMA mounting features available
- 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™ BNR 3300 series is no exception.

With fast response, accurate control and high torque-to-inertia ratios, you can count on the TORQUEMASTER 3300 series of servo motors to provide smooth operation throughout a full speed range. The BNR 3300 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 BNR 3300 servo motors provide effective and highly efficient motion control solutions for a wide range of applications—including factory automation, packaging, robotics, machine tools, semi-conductor, medical instrumentation, and more.

## Design Features

TORQUEMASTER BNR 3300 Series servo motors are rated from 12 lb.-in. to 34 lb.-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 to meet your most demanding applications.

Each servo motor in the TORQUEMASTER 3300 Series is ruggedly designed and manufactured for reliable performance. To satisfy many different applications, TORQUEMASTER 3300 Series motors are manufactured to NEMA/IEC specifications. For severe duty environments, the BNR design is also available with IP65 sealing.

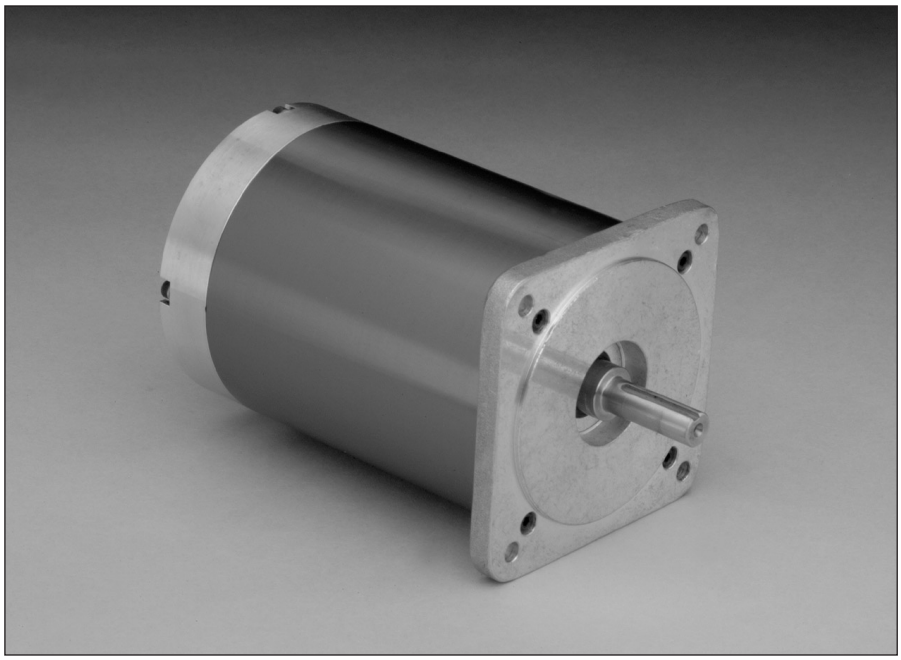
TORQUE SYSTEMS

# BRUSHLESS SERVO MOTORS

# TORQUEMASTER™

# BNR 3300 SERIES

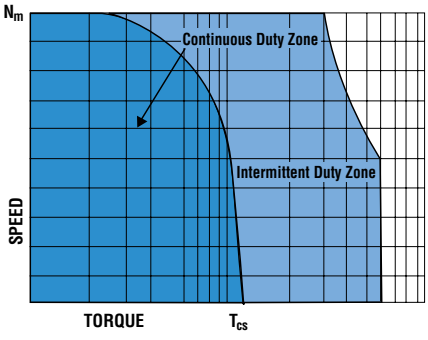
- Continuous torque range of 12 lb.-in. to 34 lb.-in.
- Neodymium magnet construction
- More torque per smaller frame size
- IP65 Sealing available
- Speeds to 10,000 RPM
- High torque-to-inertia ratios
- UL recognition pending



## MOTOR CHARACTERISTICS

| SYMBOL | MOTOR PARAMETER | UNITS | BNR3312A | BNR3324D | BNR3334E |
|---|---|---|---|---|---|
| $N_m$ | Max Operating Speed | RPM | 10,000 | 7000 | 5800 |
| $T_C$ | Max Stall Torque | lb.-in.(Nm) | 12 (1.4) | 24 (2.7) | 34 (3.8) |
| $T_{Pk}$ | Peak Torque | lb.-in.(Nm) | 60 (6.78) | 110 (12.4) | 150 (16.95) |
| $K_T$ | Torque Sensitivity | lb.-in./AMP(Nm/Amp) | 1.69 (.19) | 4.22 (.47) | 5.07 (.57) |
| $K_e$ | Back E.M.F. | Volts/Krpm | 20 | 50 | 60 |
| $R_a$ | Resistance Line to Line | Ohms | 1.24 | 2.6 | 2.1 |
| L | Inductance Line to Line | Millihenry | 2 | 5.1 | 4.7 |
| $J_m$ | Rotor Inertia | lb.-in.-sec$^2$ (Kg-m$^2$) | 0.0008 (0.00009) | 0.0015 (0.00017) | 0.00196 (0.0011) |
| $T_F$ | Static Friction | lb.-in.(Nm) | 0.10 (.011) | 0.10 (.011) | .125 (.014) |
| $F_i$ | Viscous Friction | Lb-In/Krpm | .075 | 0.094 | 0.156 |
| $R_{th}$ | Thermal Resistance | Deg C/Watt | 1.2 | 0.92 | 0.8 |
| $T_m$ | Mechanical Time Const. | Millisec. | 3.2 | 1.98 | 1.41 |
| $T_e$ | Electrical Time Const. | Millisec. | 1.5 | 2.0 | 3.6 |
| $W_T$ | Motor Weight | Lbs(Kg) | 6 (2.71) | 8 (3.62) | 9.5 (4.30) |

## TORQUE PERFORMANCE CURVES




**NOTE:** Continuous torque specifications obtained with motor mounted to an 8.5"x12"x 0.50" steel 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

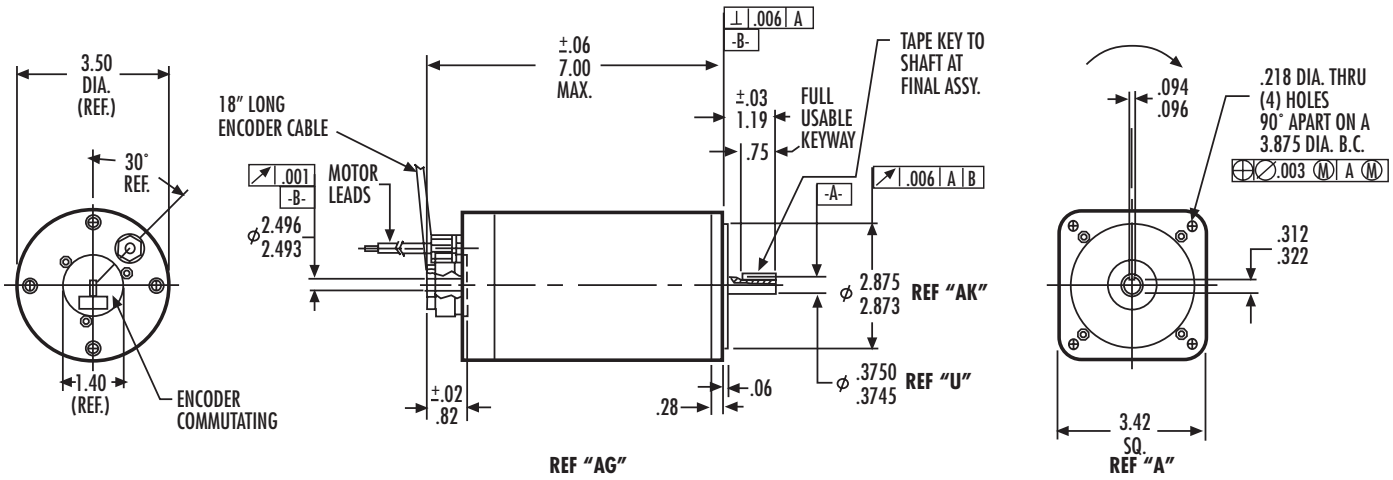
**$T_{cs}$** = Continuous stall torque

All specifications subject to change without notice.

# BRUSHLESS SERVO MOTORS

# BNR 3300 SERIES

## MECHANICAL SPECIFICATIONS




## DIMENSION CHART

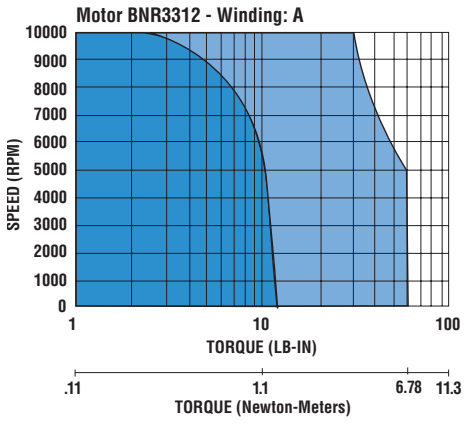
| PART NUMBER | AG | A | AK | BB | U | | AH | | XD | S | R |
|---|---|---|---|---|---|---|---|---|---|---|---|
| STD (inch) | | | | | STD | NEMA 34 | STD | NEMA 34 | | | |
| BNR3312 | 6.40 | 3.42 | 2.875 | .06 | .500 | .375 | 1.00 | 1.19 | .62 | .125 | .420/.413 |
| BNR3324 | 7.40 | 3.42 | 2.875 | .06 | .500 | .375 | 1.00 | 1.19 | .62 | .125 | .420/.413 |
| BNR3334 | 8.40 | 3.42 | 2.875 | .06 | .500 | .375 | 1.00 | 1.19 | .62 | .125 | .420/.413 |

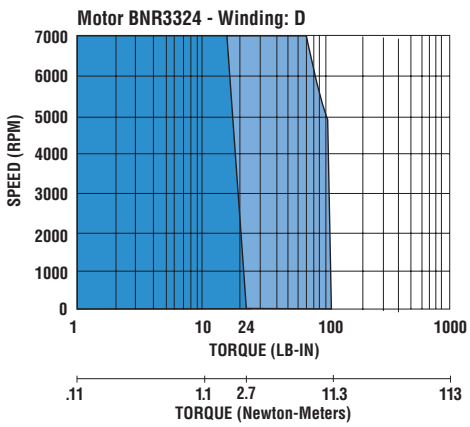
All dimensions meet NEMA 34 specifications except where indicated as standard.

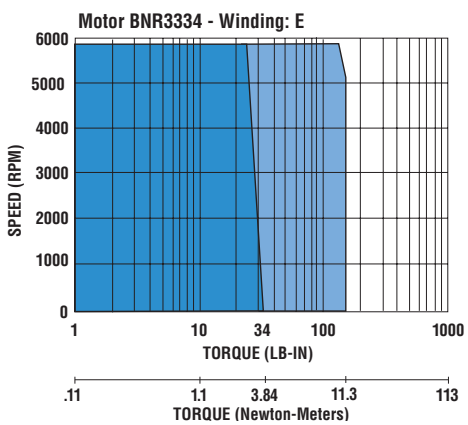
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Metric IEC 72 (mm) | | | | | | | | | |
| BNR3312 | 162.6 | 86.9 | 60j6 | 2.5 | 15j6 | 30 | 23 | 5.0 | 12 |
| BNR3324 | 187.9 | 86.9 | 60j6 | 2.5 | 15j6 | 30 | 23 | 5.0 | 12 |
| BNR3334 | 213.4 | 86.9 | 60j6 | 2.5 | 15j6 | 30 | 23 | 5.0 | 12 |

NOTE: Dimension AG includes commutation feedback device and/or a secondary feedback device as shown on ordering information.
With internal brake option add 2.0" to dimension "AG"

## TORQUE PERFORMANCE CURVES




*TORQUE SPEED CURVES OF OTHER WINDINGS AVAILABLE, CONSULT FACTORY.*

# BRUSHLESS SERVO MOTORS

# TORQUEMASTER™

# BNR 3300 SERIES

## TERMINATION CHART

### MOTOR/CABLE CODE

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

**Note:** Separate drain wires for motor power and halls

### ENCODER WIRING CONNECTION CODE

| Function | Wire Color |
|---|---|
| Encoder Output A | Green |
| Encoder Output $\bar{A}$ | Brown |
| Encoder Output B | Orange |
| Encoder Output $\bar{B}$ | Yellow |
| Encoder Output M | White |
| Encoder Output $\bar{M}$ | Blue |
| Encoder +5 VDC | Red |
| Encoder Common | Black |
| Case Ground | Drain |

**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 BNR 3300 To Your Exact Requirements

To satisfy various applications with cost-effective solutions, BNR 3300 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.

## BNR ORDERING INFORMATION – (For Standard Options)

**BNR 3 312 A HA B 0 P A A 000**

FRAME SIZE
3 = 3.38" Dia.

STALL TORQUE
312 = 12 lb-in
324 = 24 lb-in
334 = 34 lb-in

WINDINGS
A = 20 V/Krpm
D = 50 V/Krpm
E = 60 V/Krpm

COMMUTATION/FEEDBACK (see note 2)
HA = Hall Sensor only
RA = Resolver, 12 Arc Min
PA = Resolver, 7 Arc Min
SP = Special

| Commutating Encoders | | Line Count | | Modular Encoders* |
|---|---|---|---|---|
| CC | = | 500 | = | MC |
| CD | = | 1000 | = | MD |
| CE | = | 1024 | = | ME |
| CF | = | 2500 | = | MF |
| SC | = | Special | = | MS |

*Modular Encoder selection includes Hall Sensor Commutation

BRAKE (Internal) (see note 3)
0 = None
B = 30 lb-in brake

MATING CONNECTORS
0 = None

TERMINATIONS
C = Connector, MS3102A-20-4P Motor
MS3102A-22-14P Feedback
H = Heyco seal-tite w/1.5 ft shielded cable
P = Pipe Tap (NPT) w/1.5 ft shielded cable

MOUNTING (see note 1)
A = 3.42" Sq. Flange with .500" Dia. x 1.00" long shaft
D = NEMA 34 Flange with 0.375" Dia. x 1.19" long shaft
M = Metric IEC72 Flange w/12j6 Dia. shaft
S = Special Flange and shaft

SEALING
0 = None
A = per IP65 w/o shaft seal
B = per IP65 w/shaft seal

ENGINEERING MODIFICATIONS

**EXAMPLE:** BMR 3 324 A RA B 0 C A A 000

- MODEL/FRAME
- 24 LB-IN STALL TORQUE
- WINDING
- COMMUTATION
- BRAKE
- MATING CONNECTORS
- TERMINATIONS
- MOUNTING FEATURES
- SEALING
- ENGINEERING MODIFICATIONS

Notes:

1. Standard BMR3300 motor mounting flanges use NEMA 34 standards but have 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 CMC 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. Brakes are for holding static loads and not designed to stop moving loads. Standard coils are 24 volts DC.

## Customize The BNR 3300 Series To Your Exact Requirements

To satisfy various applications with cost-effective solutions, BNR 3300 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.

TORQUE SYSTEMS

6 Enterprise Road, Billerica, MA 01821-5734
Call: 800-669-5112 or 978-667-5100
Fax: 888-295-5550 or 978-667-4989

**Visit Us: www.torquesystems.com**

Cleveland Motion Controls
An IMC Company

© 2002 Cleveland Motion Controls All Rights Reserved. Litho USA 07/02 3M SMD-DSBNR3300

**Artisan Technology Group** is an independent supplier of quality pre-owned equipment

## Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

## We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

## Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP