NE Nema Series:
Lightweight, Compact and Low Friction

Parker Bayside's NEMA gearheads feature a high-efficiency spur-gear design, in a light, compact package. Designed to mount directly to the face of NEMA face stepper and servo motors, NEMA gearheads are ideal for applications requiring smooth operation and low starting torque. Ratios from 3:1 to 100:1 are available in NEMA 23, 34 and 42 frame sizes.

3 Frame Sizes
NE23
NE34
NE42

Ratios	
3:1	20:1
5:1	30:1
8:1	50:1
10:1	100:1
15:1	

Performance Specifications

	Units	Ratio	Frame Size NE23	NE34	NE42
Nominal Output Torque, $T_{nom\ r}$	**in-lb**	3	**16**	**64**	**123**
	Nm		2	7	14
	in lb	5	**27**	**107**	**205**
	Nm		3	12	23
	in lb	8-10	**40**	**142**	**250**
	Nm		5	16	28
	in lb	15	**46**	**170**	**300**
	Nm		5	19	34
	in lb	20-100	**50**	**180**	**350**
	Nm		6	20	40
Max. Acceleration Output Torque, $T_{acc\ r}$	**in lb**	3	**24**	**95**	**185**
	Nm		3	11	21
	in lb	5	**40**	**160**	**307**
	Nm		5	18	35
	in lb	8-10	**60**	**210**	**375**
	Nm		7	24	42
	in lb	15	**70**	**255**	**450**
	Nm		8	29	51
	in lb	20-100	**75**	**270**	**525**
	Nm		9	31	59
Nominal Input Speed, $N_{nom\ r}$	RPM	All	4,000	4,000	4,000
Max. Input Speed, N_{maxr}	RPM	All	5,500	5,000	4,500
Standard Backlash (1)	arc min	3, 5, 8, 10	30	25	25
	arc min	15-100	20	20	20
Low Backlash (1)	arc min	3, 5, 8, 10	15	15	15
	arc min	15-100	10	10	10
Efficiency at Nominal Torque	%	All	98%	98%	98%
Moment of Inertia	**oz in sec^2**	All	**0.00007**	**0.0005**	**0.004**
	gm cm sec^2		0.0051	0.0408	0.306
Maximum Weight	**lb**	All	**1.0**	**3.0**	**6.0**
	kg		0.5	1.4	3.0
Radial Load (2)	**lb**	All	**20**	**80**	**200**
	N		90	350	890
Axial Load	**lb**	All	**10**	**30**	**60**
	N		45	135	265

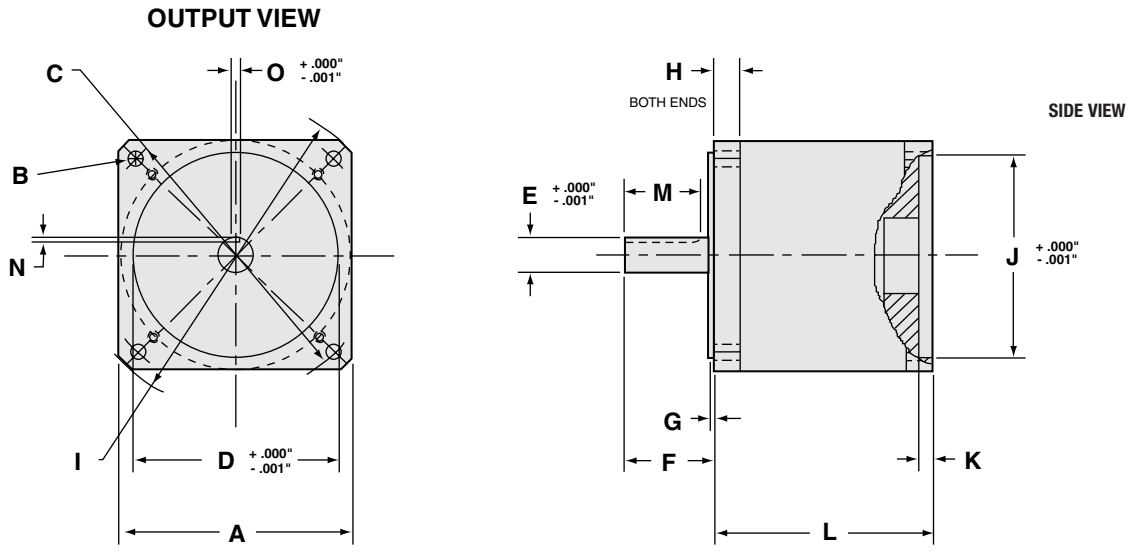
(1) Measured at 2% of rated torque

(2) Radial Loads are measured at 12.7mm (0.5in) from the gearhead mounting surface. These ratings are based on gearhead making more than one revolution on output shaft.

Specification are subject to change without notice

Dimensions

OUTPUT VIEW

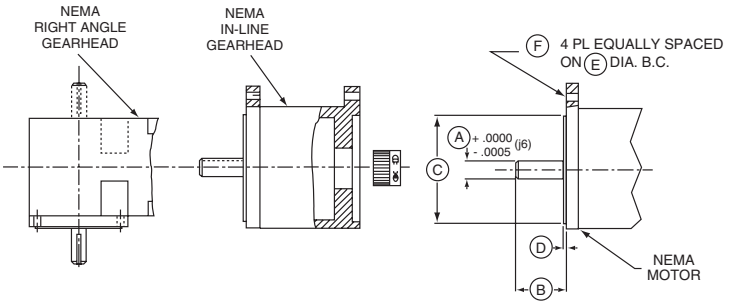


Frame Size	A Square Flange (in)	A (mm)	B Bolt Hole (in)	B (mm)	C Bolt Circle (in)	C (mm)	D Pilot Diameter (in)	D (mm)	E Output Shaft Diameter (in)	E (mm)	F Output Shaft Length (in)	F (mm)	G Pilot Thickness (in)	G (mm)	H Flange Thickness (in)	H (mm)
NE 23	**2.27**	58	**0.195**	5.0	**2.625**	66.7	**1.500**	38.1	**0.375**	9.5	**1.00**	25.4	**0.062**	1.6	**0.19**	5
NE 34	**3.25**	83	**0.218**	5.5	**3.875**	98.4	**2.875**	73.0	**0.500**	12.7	**1.25**	31.8	**0.067**	1.7	**0.38**	10
NE 42	**4.20**	107	**0.281**	7.1	**4.950**	125.7	**2.187**	55.5	**0.625**	15.9	**1.50**	38.1	**0.093**	2.4	**0.50**	13

Frame Size	I Housing Diameter (in)	I (mm)	J Input Pilot Diameter (in)	J (mm)	K Input Pilot Depth (in)	K (mm)	L Housing Length (in)	L (mm)	M Keyway Length (in)	M (mm)	N Keyway Depth (in)	N (mm)	O Keyway Width (in)	O (mm)
NE 23	**3.00**	76	**1.501**	38.13	**0.125**	3.2	**2.30**	58	**0.75 flat**	19 flat	**0.015 flat**	0.4 flat	**—**	—
NE 34	**4.38**	111	**2.876**	73.05	**0.200**	5.1	**3.00**	76	**1.06**	27	**0.072**	1.8	**0.124**	3.15
NE 42	**5.63**	143	**2.188**	55.58	**0.187**	4.7	**3.75**	95	**1.13**	29	**0.108**	2.7	**0.187**	4.75

MOUNTING TO NEMA-FRAMED MOTORS: DIRECT MOUNT

Gearheads attach directly to motors with NEMA mounting dimensions (see table). Parker Bayside's clamp-on-pinion and mounting hardware are included with gearheads, so your motor can be up and running in a matter of minutes.



NEMA DIMENSIONS

	Dimension	Motor Mounting Dimensions					
		NE23		NE34		NE42	
		in	(mm)	in	(mm)	in	(mm)
A	Motor Shaft Diameter	0.250	(6.4)	.375/.500	(9.5/12.7)	0.625	(15.9)
B	Motor Shaft Length	0.810	(20.6)	1.250	(31.8)	1.380	(35.1)
C	Pilot Diameter	1.500	(38.1)	2.875	(73.0)	2.186	(55.5)
D	Pilot Length	0.063	(1.6)	0.063	(1.6)	0.093	(2.4)
E	Mounting Bolt Circle	2.625	(66.7)	3.875	(98.4)	4.950	(125.7)
F	Bolt Hole Size	0.195	(5.0)	0.218	(5.5)	0.281	(7.1)

All dimensions are in inches (millimeters).

MOUNTING TO NON-NEMA FRAMED MOTORS: ADAPTER MOUNT

For motors with non-NEMA dimensions, Parker Bayside supplies a mounting kit including a clamp-on-pinion, adapter plate and all necessary hardware. When ordering, simply provide the part number or outline drawing of your motor, and the gearhead will be shipped ready to mount.

How to Order

Order Numbering Example: N E 3 4 - 0 1 0 - X X X L B

FRAME SIZE
23
34
42

RATIO
003 020
005 030
008 050
010 100
015
(all ratios are exact)

SPECIAL
(Factory Issued)

OPTIONAL
LOW BACKLASH

1. Pick frame size and ratio.
2. Pick options.
3. Specify motor, make and model for mounting kit.

NEMA gearheads are supported by a worldwide network of offices and local distributors. Call **1-800-305-4555** for application engineering assistance or for the name of your local distributor. Information can also be obtained at **www.baysidemotion.com** or **www.parkermotion.com**

Specifications are subject to change without notice.

Specials are Standard at Parker Bayside

Parker Bayside has geared our design and manufacturing capabilities to make custom or modified gearheads quickly and inexpensively.

"Standard" specials include many of the products shown on this page. In addition, we have designed hundreds of gearheads for a wide variety of applications, including military, aerospace, food processing, paper mills and other specialized applications. Or, if you simply need a smaller shaft or a different gear ratio, we can accommodate modifications quickly and easily.

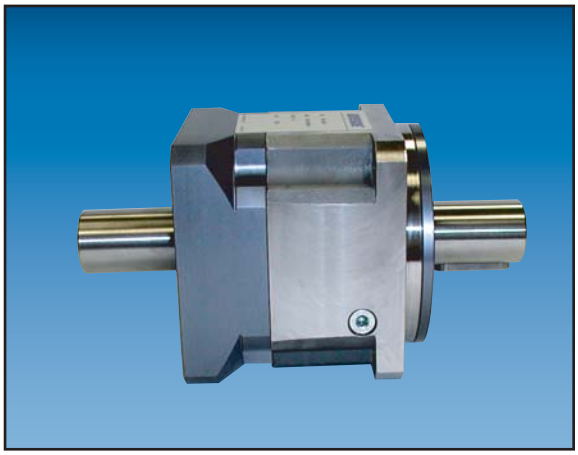
Linear Slide

Gearheads ready to mount to linear slides.
Most belt driven linear slides need a gearhead to reduce inertia. Parker Bayside has pre-engineered in-line and right-angle gearheads to mount directly to most popular linear slides, eliminating the need for couplings or adapters. Standard gearheads are available for the following linear slides: (partial list)

- Parker Daedal
- THK
- Hauser
- IKO
- Bishop Wiscarver
- INA
- NSK
- Star Linear
- Item Products
- Tol-o-Matic
- Warner Rapidtrak
- Warner Tollo

Input Shaft / Speed Reducer

Increased design flexibility.
Stealth gearheads are available with an input-shaft option. The input-shaft option allows more design flexibility, as options like brakes, encoders, or safety couplings can be used between the motor and the gearhead. Also, non-standard or oversized motors can be easily attached to a Stealth gearhead via an input shaft. Standard input shaft options are available for each model and frame size.



Stainless Steel Gearmotor

Washdown motors for harsh conditions.
Parker's high-performance washdown series servo motors were co-designed with engineers from the world's largest food-processing plants to guarantee the right solution for the most demanding applications. Ideal for above-food-line applications, our IP67-rated stainless steel brushless servo motors feature a non-corrosive housing for extremely long life, field-serviceable seals for easy maintainability, multiple ratios, a paint-free exterior, a shaft PTFE seal, conduit fittings, a 316 SST single-piece housing and high-density copper-fill and rare-earth magnets.

Military Spec Gearheads

Mil-spec quality at commercial prices.
Parker Bayside has extensive experience in military and aerospace applications. The Stealth Bomber, M1 Tank and the Space Shuttle all use Parker Bayside gearheads. Parker Bayside's quality system has been approved by NASA and the US Government to MIL-I-45208A. In today's world of tight military budgets, Parker Bayside can give you a mil-spec gearhead at commercial pricing.

Special Environment

Put a Parker Bayside gearhead anywhere!
Parker Bayside can supply gearheads to operate in the harshest environments:

Vacuum - Available as a standard option to 10^{-7} Torr vacuum ratings.

Clean Room - Special gearheads for Class 100 clean room applications.

High Temperature - Special lubricants and seals for temperatures up to 250° Celsius.

Radiation - Gearheads customized to operate within radioactive environments.

Food Grade - Gearheads customized to operate within food-handling environments.

Parker Bayside Gearhead Selection

Selecting a gearhead for a particular application involves the consideration of a number of interrelated parameters. These are:

- Speed
- Continuous torque
- Repetitive peak torque or acceleration torque
- Emergency stop torque
- Duty cycle
- Ambient temperature
- Radial and axial shaft load

Parker Bayside has prepared the following procedure that will provide a straightforward method for selecting a gearhead that will provide an L-10 life of 10,000 hours.

In this procedure, two rating factors must be used, which derate the gearhead to compensate for thermal and application related torque effects.

- **K_T** - The Torque Thermal Factor

This factor derates the transmitted torque to prevent case temperature from exceeding 100 degrees C.
The Thermal Factors given in the table are for ambient temperature 25 degrees C, medium-size indoor space, with the gearheads mounted to a metal base with a surface area more than 3 times larger than the gearhead surface area.

TORQUE THERMAL FACTOR, K_T

		Output Speed, (RPM)									
Frame Size	**Ratio**	**100**	**200**	**400**	**600**	**800**	**1,000**	**1,500**	**2,000**	**2,500**	**3,000**
PV40		1	1	1	1	1	1	—	—	—	—
PS, PX, PV, RS60		1	1	1	1	1	1	—	—	—	—
PS, PX, PV, RS90		1	1	1	1	1	1.2	—	—	—	—
PS, PX, RS115		1	1	1	1	1.2	1.5	—	—	—	—
PS, RS142		1	1	1	1.3	1.7	—	—	—	—	—
PS, RS180	1 stage (1)	1	1	1.5	2.3	—	—	—	—	—	—
	2 stage (2)	1.1	1.5	—	—	—	—	—	—	—	—
PS, RS220	1 stage (1)	1	1.2	2.1	3.2	—	—	—	—	—	—
	2 stage (2)	1.3	2.5	—	—	—	—	—	—	—	—
PS ,RS300	1 stage (1)	1	1.5	3.1	—	—	—	—	—	—	—
	2 stage (2)	1.9	—	—	—	—	—	—	—	—	—
R_90	1	1	1	1	1	1	1	1	1	1.25	1.5
	2-30	1	1	1	1	1	1	1.1	—	—	—
R_115	1	1	1	1	1	1	1	1	1.3	1.7	—
	2-30	1	1	1	1	1	1.3	2	—	—	—
R_142	1	1	1	1	1	1	1.3	2	2.7	3.4	—
	2-30	1	1	1	1	1.3	1.6	—	—	—	—
R_180	1	1	1	1	1	1.3	1.7	2.5	3.4	—	—
	2-30	1	1	1	1.4	1.8	2.3	—	—	—	—
R_220	1	1	1	1.2	1.8	2.4	3.0	4.5	—	—	—
	2-30	1	1	1.3	2.0	2.6	—	—	—	—	—

(1) Data given for PS 3:1 to 10:1 and all RS ratios (2) Data given for PS ratios above 10:1

- **K_S** - The Shock Factor

This factor is used to derate the transmitted torque for applications where the application is not well defined, has random duty cycles or experiences varying peak torques subjecting the gear teeth to torques above the estimated torques.

A K_S has been defined for four general application categories, as shown below, and is independent of gearhead size. If your application does not fit into one of these categories, contact Parker Bayside to discuss your requirements.

	Load Type	**Application**	**K_S**
Known Load Data		All Industries	1.00
	Light	Textiles, liquid mixers, can filling, food, conveyors, plastics, fans	1.25
Unknown Load Data	Moderate	Paper mills, rubber industry, sugar industry, metal mills, lumber, robotics	1.50

9 Step Procedure

1 Load Parameters

Evaluate the following requirements of the load:

Load inertia
Acceleration time (t_{acc})
Continuous run time (t_{cont})
Deceleration time (t_{dec})
Dwell time (t_{dwell})
Maximum continuous speed (N_{cont})

From these, calculate:

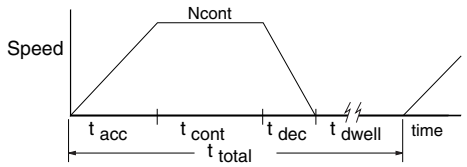
Acceleration torque (T_{acc})
Continuous run torque (T_{cont})
Deceleration torque (T_{dec})
Dwell torque (T_{dwell})*

*Although not used in the following torque calculations, torque requirements during dwell (zero speed) must be considered when selecting gearhead size.

2 Duty Cycle

Determine if the application is to be considered as **intermittent** or **continuous** by calculating the duty cycle as follows:

$$\text{Duty Cycle} = \frac{(t_{acc} + t_{cont} + t_{dec})}{t_{total}} \times 100$$

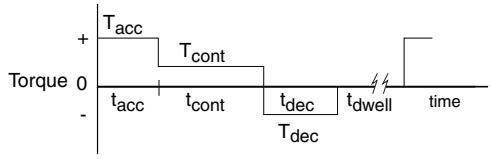


If the duty cycle is< 60%, and $(t_{acc} + t_{cont} + t_{dec})$ is less than 20 minutes, the motion is considered to be **intermittent**.

If the duty cycle is ≥ 60%, or $(t_{acc} + t_{cont} + t_{dec})$ is greater than 20 minutes, the motion is considered to essentially be **continuous**.

3 Calculate the Root Mean Cube Output Torque, T_{mean}.

$$T_{mean} = \sqrt[3]{\frac{\left[\frac{(T_{acc}^3)(N_{cont})(t_{acc})}{2} + (T_{cont}^3)(N_{cont})(t_{cont}) + \frac{(T_{dec}^3)(t\ dec)}{2}\right]}{\left[\frac{(N_{cont})(t_{acc})}{2} + (N_{cont})(t\ cont) + \frac{(N_{cont})(t\ dec)}{2}\right]}}$$



4 Select a gearhead type; PS, PX, RS, Multi-drive, NE or NR (Match gearhead frame size to motor frame size)

5 Review the catalogue listings and determine the gearhead size (40 thru 300) which can meet the following criteria:

$T_{mean} \leq T_{nomr}$
T_{acc} and $T_{dec} \leq T_{accr}$

6 Determine the maximum rated input speed (N_{maxr}) for the selected gearhead.

7 Using $N_{cont.}$ and N_{maxr} from step 6, determine the maximum allowable ratio as:

$$\text{Max ratio} = \frac{N_{maxr}}{N_{cont.}}$$

8 Select an actual ratio from the catalogue listing and calculate the mean input speed, N_{meani} and the maximum input speed, N_{maxi}, as follows:

$$N_{meani} = \left(\frac{\frac{(N_{cont})(t\ acc)}{2} + (N\ cont)(t\ cont) + \frac{(N\ cont)(t\ dec)}{2}}{t\ acc + t\ cont + t\ dec} \right) (\text{RATIO})$$

$$N_{maxi} = (N_{cont})(\text{RATIO})$$

Note: Reflected inertia requirement may determine the actual ratio, as long as it does not exceed the maximum value calculated in STEP 7.

9

	CONTINUOUS MOTION	INTERMITTENT MOTION
Select factor	K_T and K_S	K_S
Calculate	$(T_{mean})(K_T)(K_S)$	$(T_{mean})(K_S)$
Determine that	$T_{nomr} > \mathbf{(T_{mean})(K_T)(K_S)}$	$T_{nomr} > \mathbf{(T_{mean})(K_S)}$

- Compare the required accelerate and decelerate torques, T_{acc} / T_{dec}, to the rated accelerate torque, T_{accr} .

T_{accr} must be greater than the larger of T_{acc} or T_{dec}.

- Check the Emergency Stop Torque rating.
- Compare N_{meani} with the nominal rated speed, N_{nomr}.

N_{nomr} must be greater than N_{meani}

- Compare the maximum input speed N_{maxi} with the maximum input speed rating, N_{maxr}.

N_{maxr} must be greater than N_{maxi}

- Verify radial and axial shaft load.
- If any of these comparisons are not met, then:
  - Choose a larger gearhead
  - Reevaluate the ratio
  - Reevaluate the torque
  - Reevaluate the speed
  - Reevaluate the duty cycle
  - Reevaluate shaft load

SELECTION PROCESS IS COMPLETE!

This gearhead selection is made available as an aid to selection of Parker Bayside Gearheads.
The values are merely an estimate and Parker Bayside cannot accept the responsibility for their interpretation. Parker Bayside standard product warranty supersedes all life estimates.