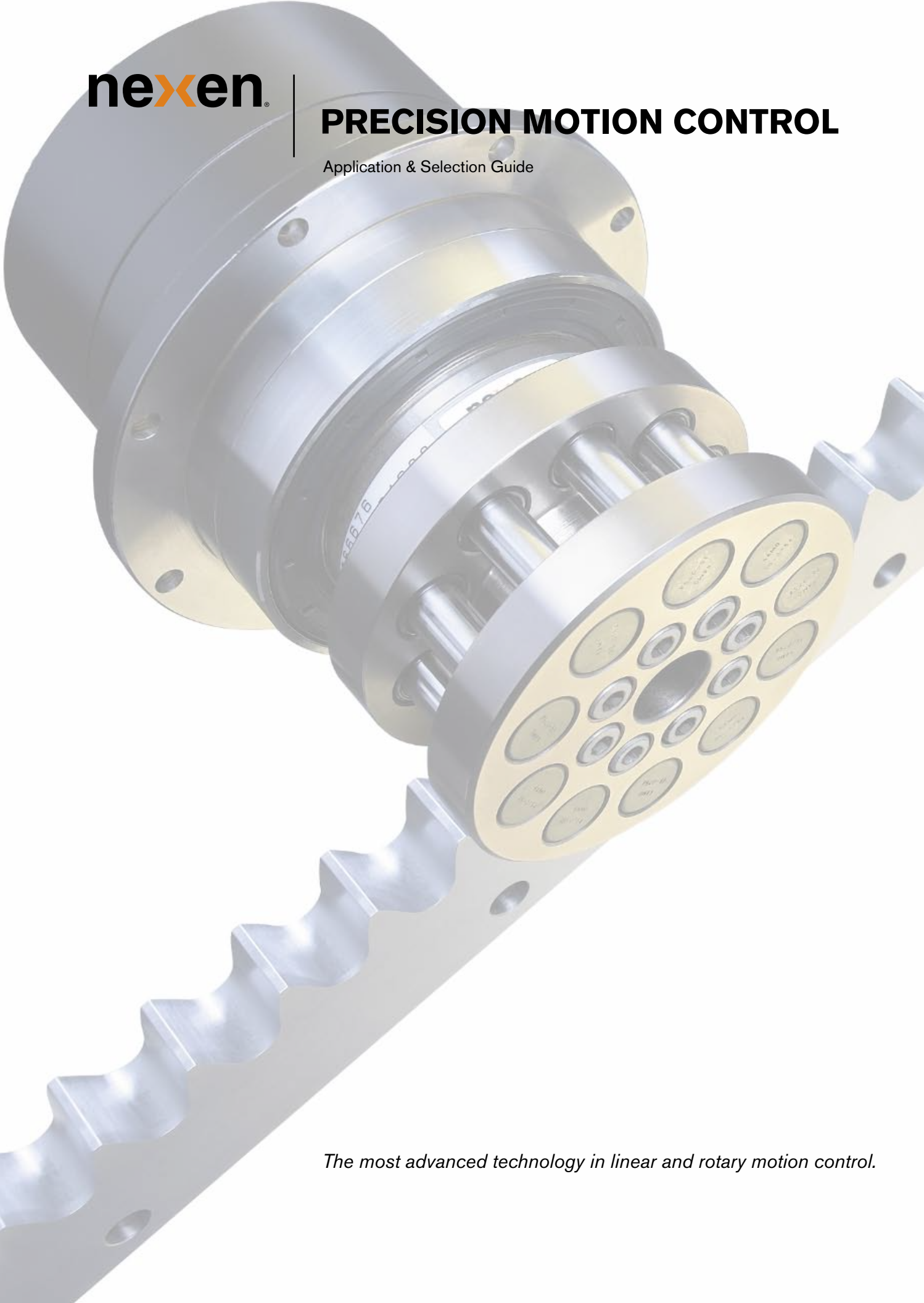




PRECISION MOTION CONTROL

Application & Selection Guide



The most advanced technology in linear and rotary motion control.

Racks

5

Gears

11

Pinions &
Accessories

17

Precision Ring
Drive System

25

System Life &
Calculations

33

Harmonic
Gearhead

41

APPENDIX
Definitions
& Notes

45

ROLLER PINION TECHNOLOGY

RPS ROLLER PINION

Once you have selected your rack/gear, finding the right pinion is easy. Just walk through the steps on the following page and explore the pinion specifications and dimensions.

Pinion Selection Process	18
Pinion Specifications	18
Dimensional Drawings	19
Pinion Accessories	
Preloaders	22
Adapters	22

PATENTED



RPS Pinion Selection

FOUR STEPS TO PINION SELECTION

- 1 Determine your rack/gear size and find the same RPS pinion size. Always use the same size rack/gear and pinion.
- 2 Select the correct series. Gear sizes 16-25 use the yellow, C-series pinions. All other rack/gear models use the B-series.
- 3 Select the material best suited for your application. (Other materials are available upon request.)
Hard Chrome: alloy steel with a thin, dense chrome coating
Nickel: alloy steel with nickel plating
Stainless: stainless steel with or without a hard chrome coating.
- 4 Select Mounting Style: For easy installation and maximum versatility, Nexen recommends using the flange-mounted version when practical.
Shaft Mount
 - Uses a keyless mechanical compression coupling to secure it to the shaft
 - Available in one bore diameter per pinion size**Flange Mount**
 - Conforms to ISO 9409 specifications
 - Nexen adapter preloader options available with this version

Roller Pinion Size	Number of Rollers	Max RPM	Max Torque [†] (Nm) Dynamic Static	Distance per Revolution (mm)	Pitch Circle Diameter (mm)	Product Number	Series	Base Material/Coating	Mount Style	Bore Size (mm)	Mass (kg)	Moment of Inertia kgm ² x10 ⁻⁴
10	10	2400	4.0/6.0	100	31.8	966480	B	Hard Chrome	Shaft	12	0.2	0.4
12	10	4000	9.5/14.3	120	38.2	966490	B	Hard Chrome	Shaft	16	0.3	1.0
16	10	1500	61.1 61.1	160	50.9	966687	B	Nickel	Flange	N/A	0.8	4.0
						966650	B	Nickel	Shaft	20	0.7	3.93
						966759	B	Stainless	Flange	N/A	0.8	4.0
						966761	B	Stainless	Shaft	20	0.7	3.9
						966715	C	Nickel	Flange	N/A	0.9	4.2
						966659	C	Nickel	Shaft	20	0.8	4.12
20	10	1500	92.3 95.5	200	63.7	966675	B	Nickel	Flange	N/A	1.2	10.2
						966660	B	Nickel	Shaft	25	1.3	10.5
						966766	B	Stainless	Flange	N/A	1.2	10.2
						966771	B	Stainless	Shaft	25	1.3	10.5
						966707	C	Nickel	Flange	N/A	1.2	10.2
						966669	C	Nickel	Shaft	25	1.3	10.5
25	10	1820	159.2 176	250	79.6	966673	B	Nickel	Flange	N/A	2.1	25.2
						966670	B	Nickel	Shaft	30	2.1	25.5
						Request	B	Stainless	Flange	N/A	2.1	25.2
						966758	B	Stainless	Shaft	30	2.1	25.2
						966678	C	Nickel	Flange	N/A	2.2	26.8
						966679	C	Nickel	Shaft	30	2.2	26.8
32	12	1719	385.0 440	384	122.2	966677	B	Nickel	Flange	N/A	6.6	168.0
						966680	B	Nickel	Shaft	45	6.4	169.0
						Request	B	Stainless	Flange	N/A	6.6	168.0
						Request	B	Stainless	Shaft	45	6.4	169.0
						966697	B	Nickel	Flange	N/A	15.5	665.0
40	12	750	458.4 916.8	480	152.8	966690	B	Nickel	Shaft	60	12.4	594.0
						Request	B	Stainless	Flange	N/A	15.5	665.0
						Request	B	Stainless	Shaft	60	12.4	594.0
						966700	B	Nickel	Flange	N/A	23.5	1306.0
						966693	B	Nickel	Shaft	60	20.9	1180.0
4014	14	643	1247.8 1871.6	560	178.3	Request	B	Stainless	Flange	N/A	23.5	1306.0
						Request	B	Stainless	Shaft	60	20.9	1180.0
						966774	B	Hard Chrome	Shaft	70	26.0	1790.0

[†] Pinion torque is for reference only. Some rack models are not rated for full pinion torque. When pinion ratings differ from the chosen rack/gear, use the lesser value to determine the capacity of your system.

Common Pinion Attributes (See the Definitions section for more information on these attributes.)

Estimated Life: See System Life & Calculations Section

Operating Temperature: -5° to 40° C

Lubrication Some RPS systems benefit from regular lubrication. Use Nexen **Tooth Grease P/N 853901**

Pinion Dimensions

ADDITIONAL DIMENSIONS

The Pinion dimensions listed here are for selection purposes only. For detailed drawings and CAD models, please visit www.nexengroup.com.

PINION ADAPTERS

Pinion adapters allow the pinion to mount to one frame-size larger of a reducer. Moving up a reducer size is sometimes needed due to reducer availability or motor sizing reasons. All Nexen pinion adapters are made from corrosion resistant materials. For your convenience, we have included pinion adapter dimensions next to each ISO9409 flange mounted pinion. See Table 4 for pinion adapter part numbers.

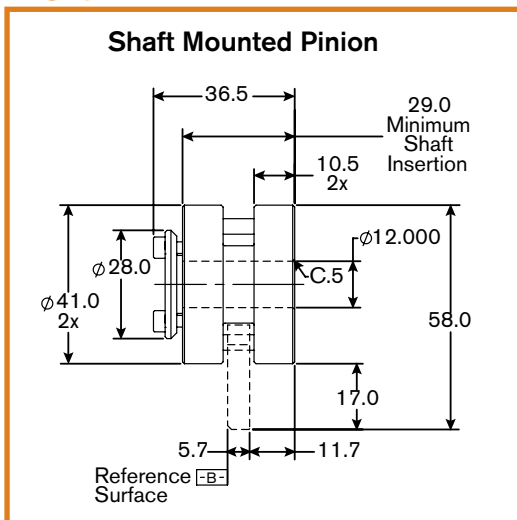
PINION SERIES DIFFERENTIATION

Nexen offers two series of pinions.

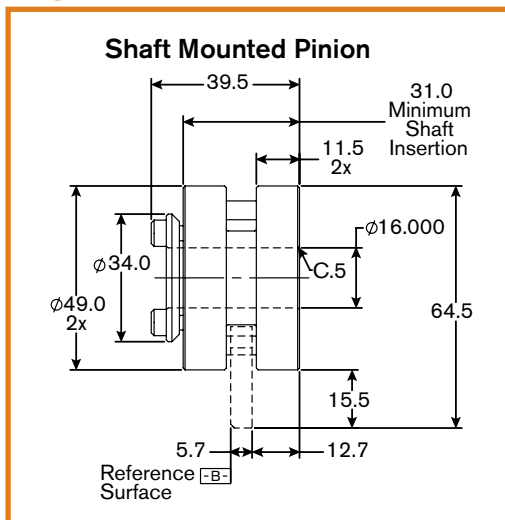
Blue values show attributes of B-series pinions used with all RPS Racks and RPG Gear sizes 32 or larger.

Yellow values are for C-series pinions used with RPG Gears size 25 and smaller.

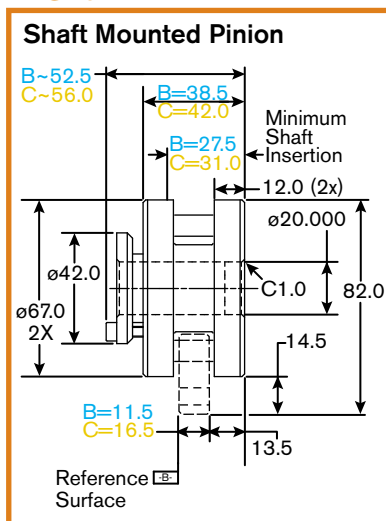
RPS10



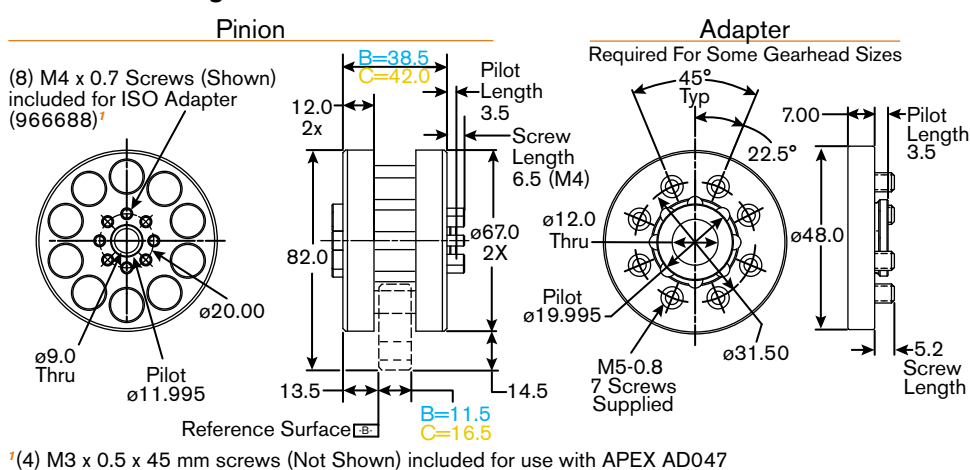
RPS12



RPS16

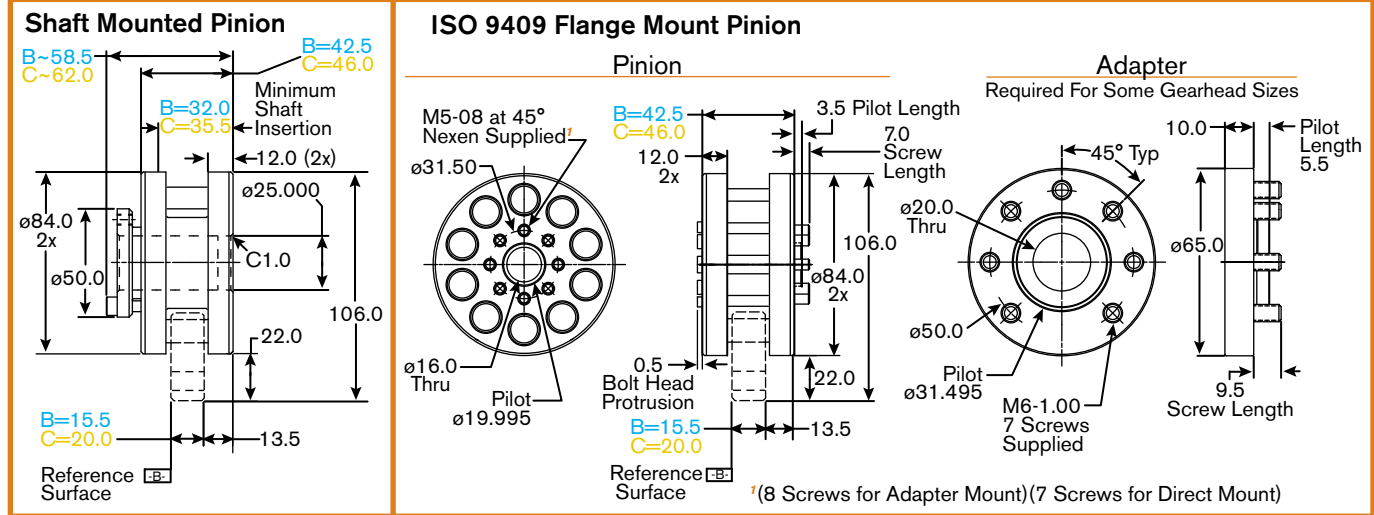


ISO 9409 Flange Mount Pinion

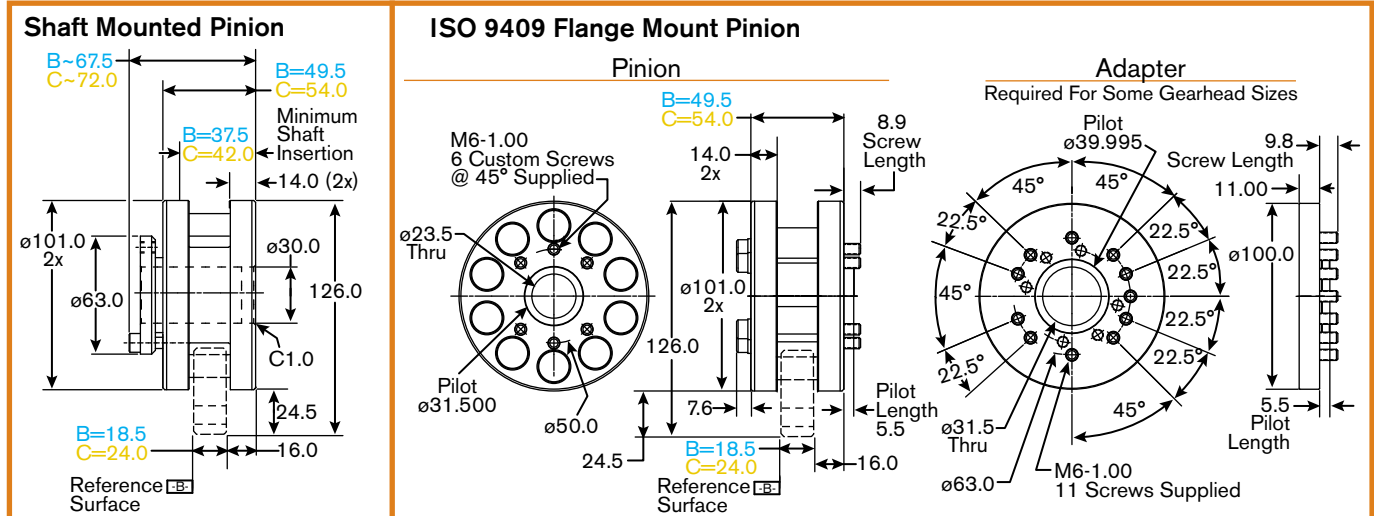


Pinion Dimensions

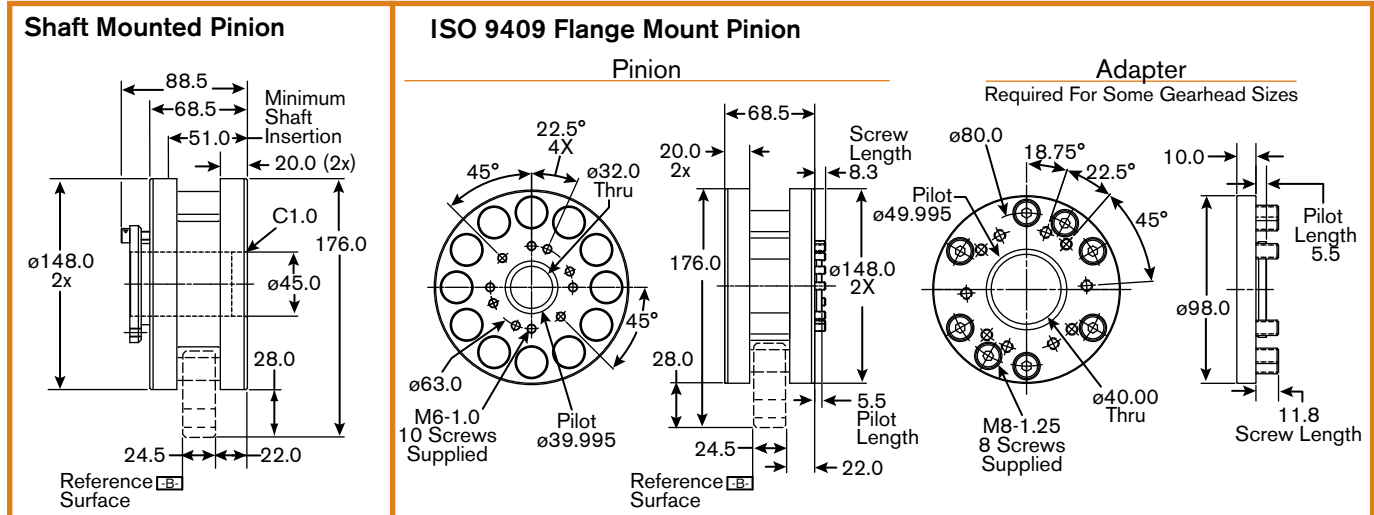
RPS20



RPS25



RPS32



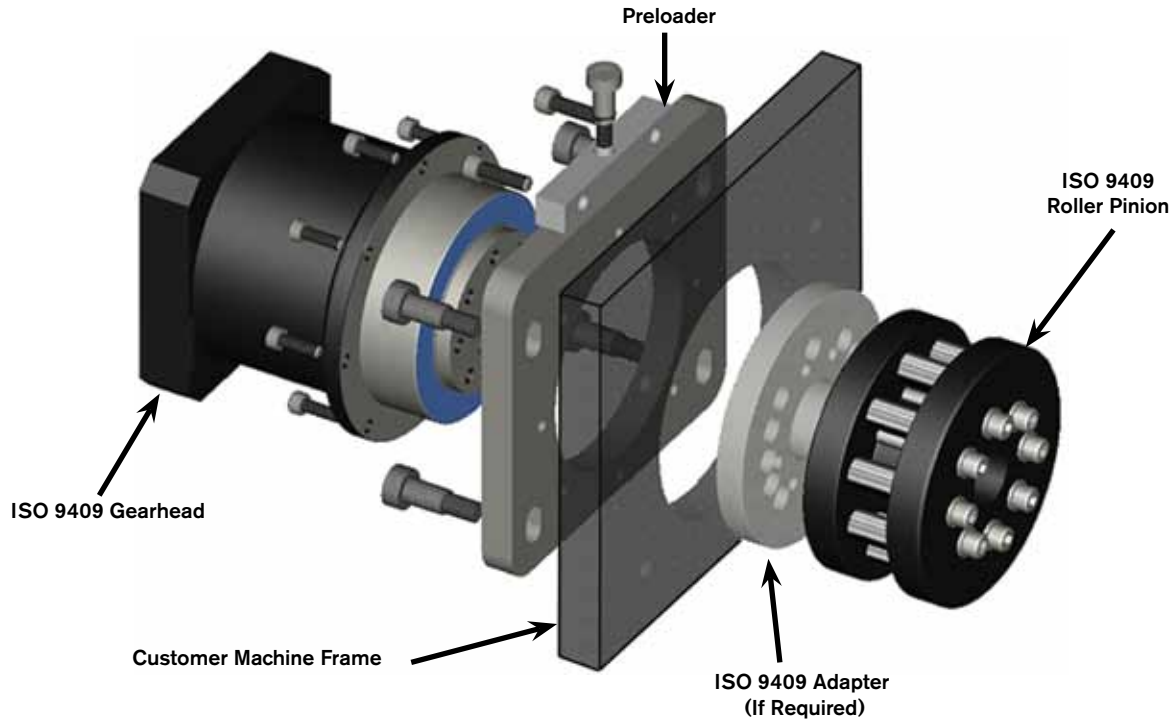
Pinion Preloader

Pair Nexen's Flange-Mount Pinion with our RPS Pinion Preloader for easy integration into your machine design. Preloaders feature an adjuster that allows the pinion to be moved up or down into the rack while keeping the pinion properly oriented to the rack. The pilot in the adjuster plate accommodates common ISO 9409 servo gearhead sizes from your favorite servo gearhead manufacturer.

Preloader and Adapter components are either made from corrosion-resistant stainless steel, nickel, or zinc plating.

FEATURES:

- High-Precision Ground Surfaces
- Allows Perpendicular Movement
- ISO 9409 Compatible
- Corrosion Resistant Materials



SELECTING PINION ADAPTERS AND PRELOADERS

If directly mounting the pinion to the reducer:

Disregard the Adapter column and select the preloader and gearhead for your RPS Pinion size.

If going up a reducer frame size:

Start in the Adapter column and select the compatible pinion, adapter, preloader and gearhead.

Table 4 Gearhead Compatibility Table

Pinion Size	Adapter w/ Pinion (not required in some applications)	Pinion Preloader	Customer Provided Gearhead						
			Alpha/ Wittenstein	APEX	Mijno	Neugart	SEW-Euro	Sumitomo	Stöber
RPS16	N/A	N/A	N/A	AD047	N/A	N/A	N/A	N/A	N/A
RPS20	RPS16 & 966688	960851	TP004	AD064	BDB 085	PLFE/N 64	PSBF221/2	N/A	PH/A/KX 321/2
RPS25	RPS20 & 966676	960850	TP010	AD090	BDB 120	PLFE/N 90	PSBF321/2	PNFX080	PH/A/KX 421/2
RPS32	RPS25 & 966674	960852	TP025	AD110	BDB 145	PLFE/N 110	PSBF521/2	PNFX250	PH/A/KX 521/2
RPS40	RPS32 & 966668	960853	TP050	AD140	BDB 180	PLFN 40	PSBF621/2	PNFX450	PH/A/KX 721/2
RPS4014	RPS40 & 966698	960854	TP110	AD200	BDB 250	PLFN 200	PSBF721/2	N/A	PH/A/KX 821/2
N/A	RPS4014 & 966701	N/A	TP300	AD255	BDB 300	N/A	N/A	N/A	PH/A/KX 912/23

This is a partial list. Other gearheads may apply.

Pinion Accessories

Preloader Details

M6 - 1.0 X 20.0
2 Screws Supplied

Hex 8 mm Wrench

50.0

12.7

M6 - 1.0 X 20.0
24 Screws Supplied

Min - Max
239.6 - 249.5

225.0

112.5

168.0

140.0

R12.0
4x

92.5

15°
Typ

185.0

M8 - 1.25 (8X)
Shoulder Cap Screw
Supplied With Washers

Customer-Supplied
Mounting Surface
See View to Right

12.0
2x

6.0

Gearhead & Pinion Shown
for Reference
(Not Included)

Customer Mounting Surface Details

M6-1.0, 10.0 Deep
2 Holes Located As Shown

Max
22.0

30.0

15.0

M8-1.25 THRU
ø10.013, 4.00 Deep
8 Holes Located as Shown

125.65

99.0
2x

67.5
2x

67.5
2x

99.0
2x

ø193.0

42.5

82.5

122.5

165.0

Mounting Surface

Preloader Details

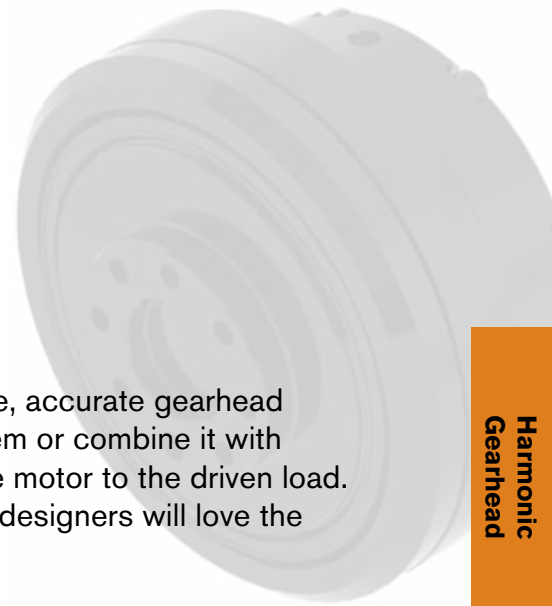
- Hex 8 mm Wrench
- M12 - 1.75 Shoulder Cap Screws 8 Supplied w/ Washers
- M6 - 1.0 X 20.0 2 Screws Supplied
- Min - Max 294.1 - 304.0
- Ø200.0
- R12.0 4x
- 125.0
- 250.0
- 15° Typ
- M8 - 1.25 X 20.0 24 Screws Supplied
- 140.0
- 280.0
- 50.0
- 12.7
- Ø233.0

Customer-Mounted Surface

- Customer-Supplied Mounting Surface See View to Right
- 14.0
- 7.0
- Gearhead & Pinion Shown for Reference (Not Included)

Mounting Surface

- M6-1.0, 10.0 Deep 2 Holes Located As Shown
- M10-1.50 THRU Ø12.013, 4.13 Deep 8 Holes Located As Shown
- 34.0 Max
- 0.03
- 1.6
- 30.0
- 15.0
- 152.65
- Ø225.0
- 43.0
- 108.0
- 173.0
- 216.0
- 87.5 2x
- 123.5 2x
- 87.5 2x
- 123.5 2x



HARMONIC GEARHEAD

Nexen's revolutionary Harmonic Gearhead (HG) is the most durable, accurate gearhead on the market. Use the Harmonic Gearhead with your existing system or combine it with Nexen's RPS Pinion to create a true backlash-free solution from the motor to the driven load. With a 70% reduction in length over standard gearheads, machine designers will love the opportunities available with this space saving product.

- Zero Backlash
- Unmatched Positional Accuracy
- Extremely Short & Rigid
- Large, Rugged, Cross-Roller Output Bearing
- Small Footprint

PATENT PENDING



Harmonic Gearhead Advantages

Nexen's patent pending Harmonic Gearhead utilizes Harmonic Strain-Wave Technology made up of a circular spline, flexspline, and wave generator. As these components rotate, their unique shape and tooth profile allow 30% of the teeth to be engaged simultaneously, for a smooth rotation with high torque and rigidity.

- Zero Backlash
- High Positional Accuracy & Repeatability
- High Efficiency
- High Torque & Rigidity
- Quiet Operation



Harmonic Gearhead with Pinion

Save time and money by taking advantage of Nexen's Harmonic Gearhead with Pinion (HGP). In this model the gearhead comes integrated directly into our RPS pinion for the only drive solution that maintains **zero backlash** from the driving motor shaft through to the driven load for both linear and rotary motion.

*Save up to 70%
or more in
gearhead length.*



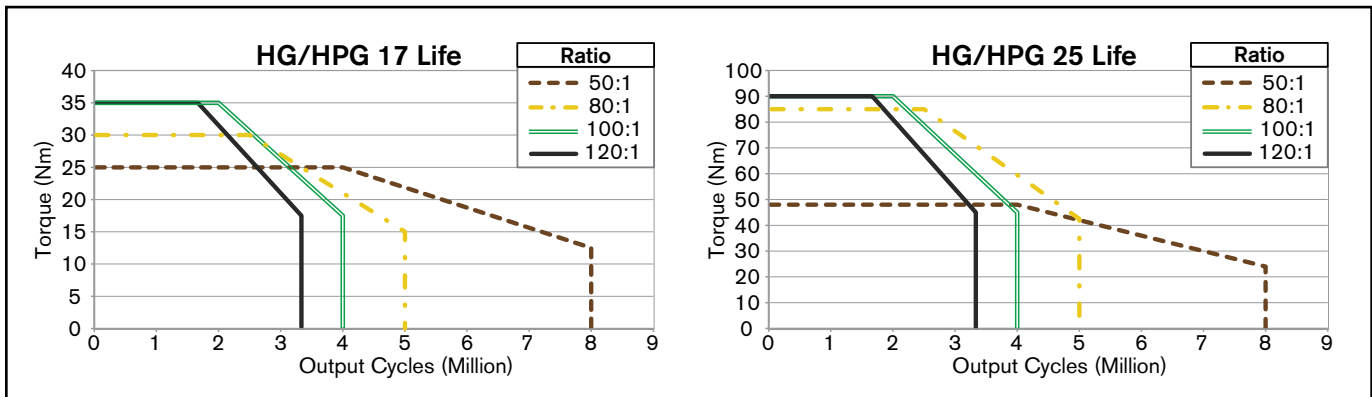
HGP



Standard Two-Stage Planetary

HG & HGP Life Graphs

Harmonic Gearhead life is based on pinion torque, max capacity of the rack and max capacity of the pinion.



Harmonic Gearhead Specifications

Harmonic Gearhead (HG)										
		17				25				
General	Gear Ratio	50:1	80:1	100:1	120:1	50:1	80:1	100:1	120:1	
	Efficiency	See Chart				See Chart				
Input	Single Direction Motion									
	Max Speed	RPM	3500			3500				
	Bidirectional Motion									
	Max Speed	RPM	7300			5600				
	Max Average Speed (Over any 2 Minutes)	RPM	3500			3500				
	Maximum Time in 1 Direction	Hours	1			1				
	Maximum Time Above Average Speed	sec	30			30				
	Maximum Acceleration rate	rad/sec ²	1000			1000				
Output	Backlash	ArcSec	0			0				
	One Way Repeatability	±ArcSec	10			10				
	Full Accuracy with Hysteresis	±ArcSec	60			60				
	Stiffness	kNm/ArcMin	See Chart			See Chart				
	Max Axial Load	kNm/ArcMin	See Chart			See Chart				
	Max Radial Load	kNm/ArcMin	See Chart			See Chart				
	Max Combined Load	kNm/ArcMin	See Chart			See Chart				
	Max Torque	Nm	25	30	35	35	51	85	90	90
	Life	Cycles	See Chart			See Chart				
Part #		969000	969001	969002	969003	969040	969041	969042	969043	

Harmonic Gearhead with Pinion (HGP)												
				17-16		25-20						
General	Integrated Pinion Size			RPS16B				RPS20B				
	Gear Ratio			50:1	80:1	100:1	120:1	50:1	80:1	100:1	120:1	
	Efficiency			See Chart				See Chart				
Input	Single Direction Motion											
	Max Speed			RPM	3500			3500				
	Bidirectional Motion											
	Max Speed			RPM	7300			5600				
	Max Average Speed (Over any 2 Minutes)			RPM	3500			3500				
	Maximum Time in 1 Direction			Hours	1			1				
	Maximum Time Above Average Speed			sec	30			30				
	Maximum Acceleration rate			rad/sec²	1000			1000				
Output	Backlash			µm	0			0				
	One Way Repeatability			±µm	7.5			7.5				
	Full Accuracy with Hysteresis			±µm	30			30				
	Stiffness			nkN/m	See Chart			See Chart				
	Max Thrust Force			N	981	1178	1375	1375	1602	2670	2828	2828
	Max Torque			Nm	25	30	35	35	51	85	90	90
	Life			Cycles	See Chart			See Chart				
Part #				969010	969011	969012	969013	969050	969051	969052	969053	

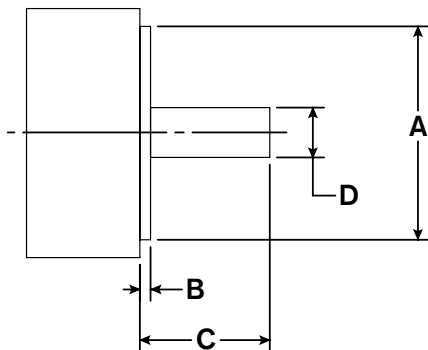
Note: All accuracy data taken at ±2% load.

Harmonic Gearhead Dimensional Drawings

SAMPLE INPUT CONFIGURATION

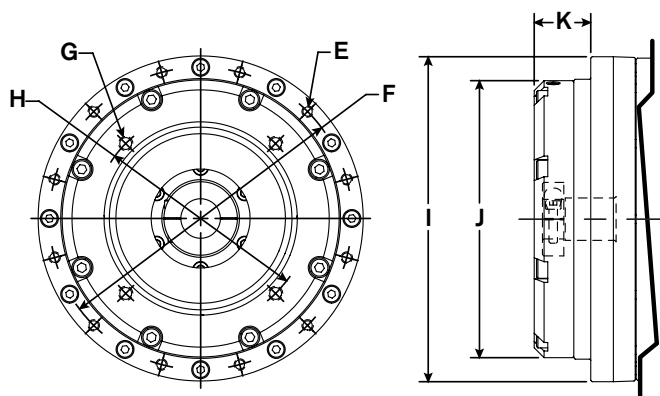
Input will be configured for user servomotor.

Motor Dimensions



MAX SHAFT LENGTH

HGP & HG Input

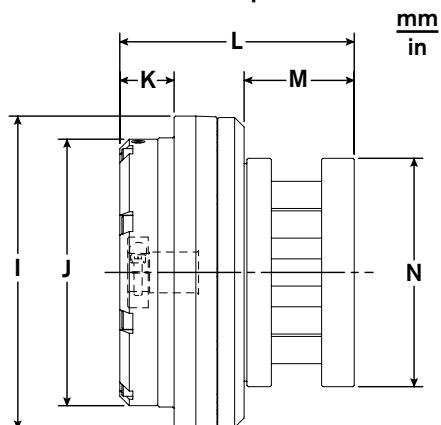


mm
in

	A (h7)	B	C (max)	D (h7)	E	F	G	H	I (h7)	j (h7)	K
HG/HGP 17	40 [1.57]	3.5 [.14]	31.0 [1.22]	9.0 [.35]	M4 x 0.7 12 Holes	86.0 [3.39]	M4 x 0.7 4 Holes	63.0 [2.48]	92.0 [3.62]	75.0 [2.95]	24.0 [0.9]
HG/HGP 25	60 [2.36]	3.0 [.12]	32.5 [1.28]	14 [.55]	M4 x 0.7 12 Holes	107.0 [4.21]	M5 x 0.8 4 Holes	75.0 [2.95]	115.5 [4.55]	99.0 [3.90]	20.0 [0.8]

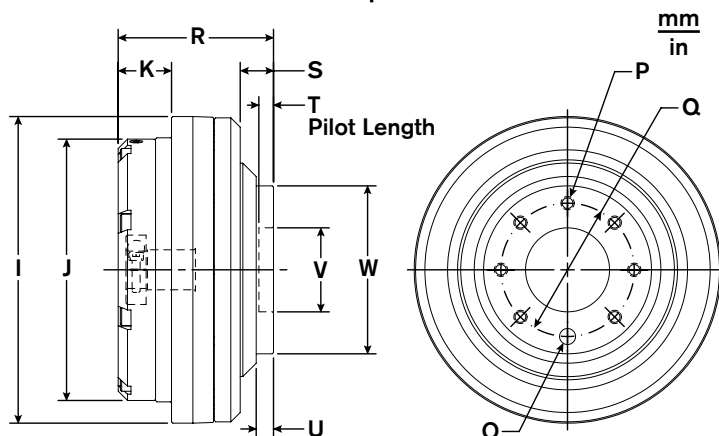
OUTPUT CONFIGURATION

HGP Output

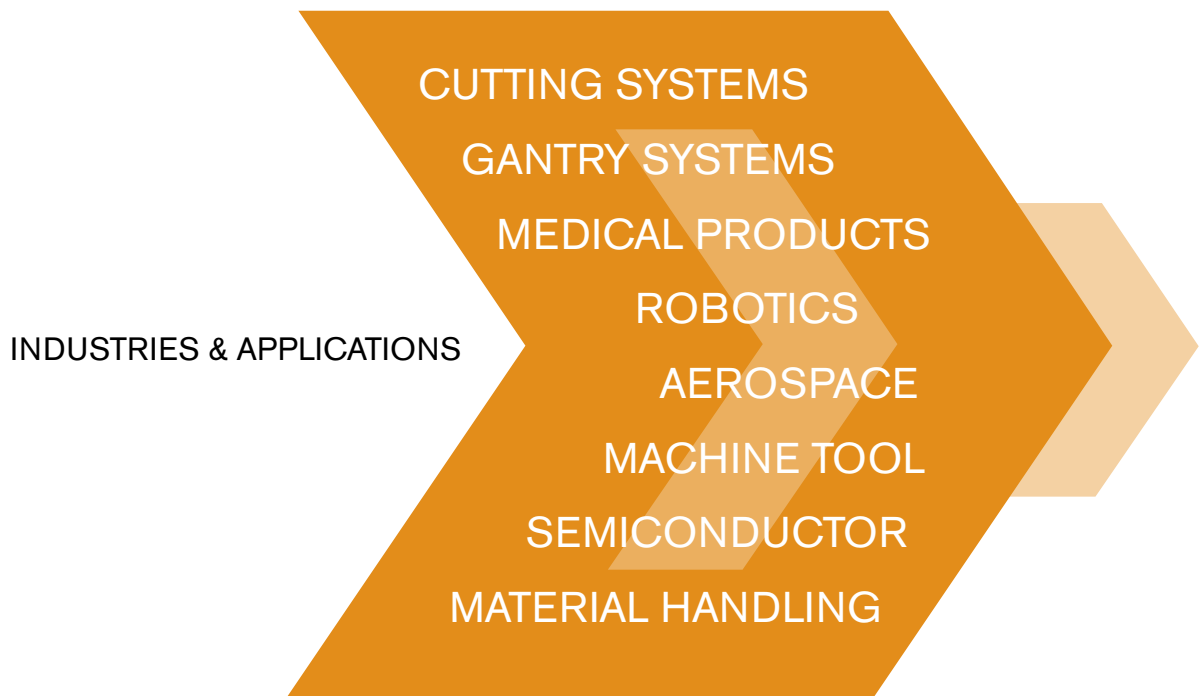


	L	M	N
HGP17	79.8 [3.14]	37.3 [1.47]	67.0 [2.64]
HGP25	86.3 [3.40]	44.0 [1.73]	84.0 [3.31]

HG Output



	O (H7)	P	Q	R	S	T	U	V (H7)	W (h7)
HG17	5.0 [.20]	M5 x .08 7 Holes	31.5 [1.24]	52.0 [2.05]	9.5 [.37]	4.0 [.16]	6.5 [.26]	20.0 [.80]	40.0 [1.57]
HG25	6.00 [.24]	M6 x 1.0 7 Holes	50.0 [1.97]	58.3 [2.30]	16.0 [.63]	6.0 [.20]	6.5 [.26]	31.5 [1.24]	63.0 [2.48]



www.nexengroup.com

In accordance with Nexen's established policy of constant product improvement, the specifications contained in this document are subject to change without notice. Technical data listed in this document are based on the latest information available at the time of printing and are also subject to change without notice. For current information, please consult www.nexengroup.com or contact Nexen's Technical Support Group at the location to the right.

nexen®

Nexen Group, Inc.
560 Oak Grove Parkway
Vadnais Heights, MN 55127

(800) 843-7445
Fax: (651) 286-1099
www.nexengroup.com

Nexen has sales offices throughout the United States, Europe, Japan, and Australia.