nexen®

LINEAR MOTION CONTROL PRODUCTS

User Manual

Precision Roller Pinion System

Models RPS16, RPS20, RPS25, RPS32, RPS40

FORM NO. L-21198-A-1204

DANGER

Read this manual carefully before installation and operation.

Follow Nexen's instructions and integrate this unit into your system with care.

This unit should be installed, operated and maintained by qualified personnel ONLY.

Improper installation can damage your system or cause injury or death.

Comply with all applicable codes.

In accordance with Nexen's established policy of constant product improvement, the specifications contained in this manual are subject to change without notice. Technical data listed in this manual are based on the latest information available at the time of printing and are also subject to change without notice.

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ISO 9001 Certified

FORM NO. L-21198-A-1204

Table of Contents

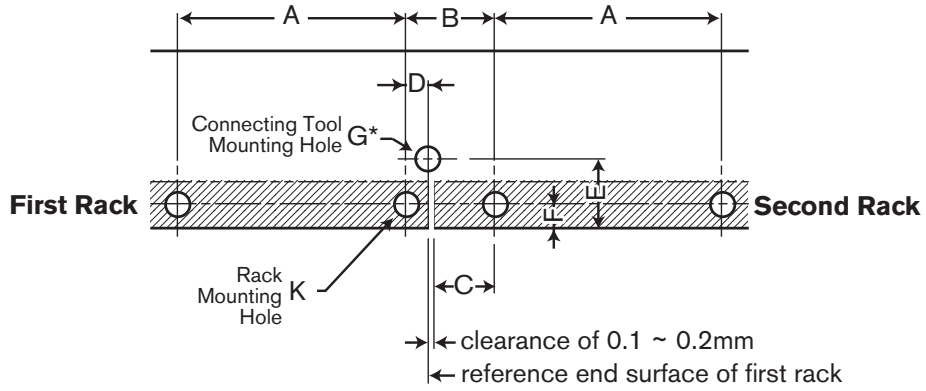
INSTALLATION

The mounting surface for both the rack and the guiding system must be parallel within the specifications shown in the PROPER SYSTEM ALIGNMENT section. This parallelism requirement is best achieved by machining a common bed for both the guiding system and rack in the same operation. (Refer to PROPER SYSTEM ALIGNMENT and Figures 7 & 8 for Possible Mounting Configurations.)

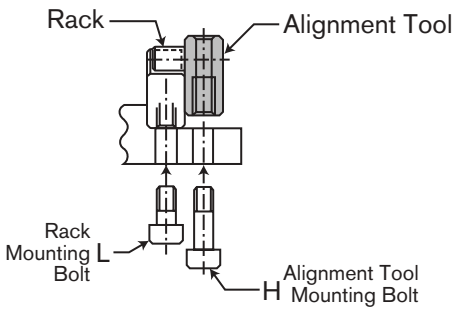
The system operates best when kept free from debris. Nexen recommends orienting the rack so it minimizes debris from collecting on the teeth.

RACK MOUNTING DIMENSIONS

Figure 1



***G**
Through Hole Mounting of Connecting Tool



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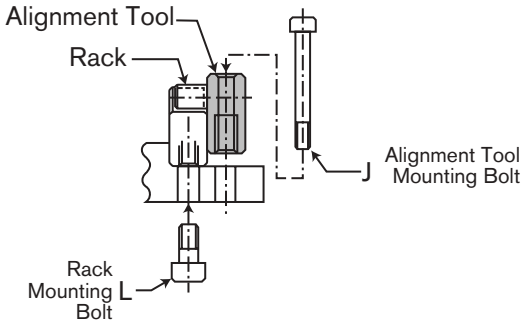
Tapped Hole Mounting of Connecting Tool



Rack Model	rack length	A	B	C	D	E	F	G			H	J	K	L
								Through Hole	Tapped Hole					
									Thread	Depth				
RPS16	half rack	80 [3.15]	32 [1.26]	24 [0.94]	8 [0.31]	24 [0.94]	8 [0.31]	9 [0.35]	M6	12 [0.47]	M8	M6 x 50	9 [0.35]	M8
	full rack		32 [1.26]	24 [0.94]										
RPS20	half rack	80 [3.15]	20 [0.79]	10 [0.39]	10 [0.39]	30 [1.18]	10 [0.39]	11 [0.43]	M8	16 [0.63]	M10	M6 x 60	11 [0.43]	M10
	full rack		40 [1.57]	30 [1.18]										
RPS25	half rack	100 [3.94]	100 [3.94]	62.5 [2.46]	37.5 [1.48]	36 [1.42]	12 [0.47]	14 [0.55]	M10	20 [0.79]	M12	M10 x 75	14 [0.55]	M12
	full rack		100 [3.94]	62.5 [2.46]										
RPS32	half rack	100 [3.94]	112 [4.41]	56 [2.20]	56 [2.20]	44 [1.73]	16 [0.63]	14 [0.55]	M10	20 [0.79]	M12	M10 x 95	14 [0.55]	M12
	full rack		92 [3.62]	36 [1.41]										
RSP40	half rack	160 [6.30]	40 [1.57]	20 [0.79]	20 [0.79]	54 [2.13]	21 [0.83]	14 [0.55]	M10	20 [0.79]	M12	M10 x 95	18 [0.71]	M16
	full rack		40 [1.57]	20 [0.79]										

RACK INSTALLATION

1. Using customer supplied mounting bolts, connect the first rack length to the mounting surface.

2. Measure the distance from tooth peak to mounting surface to ensure they are parallel within ±0.02mm [0.0008 in]. Refer to Table 1 for recommended tightening torque of rack mounting bolts.

2. Align the second rack segment with the first segment along the base of each rack.

3. Lightly tighten the rack mounting bolts on the second rack so it is slightly movable.

4. Insert a connecting jig between the two racks (Refer to Figure 2).

NOTE: Connecting jigs for each rack size are required and available for purchase from Nexen. This jig is required for proper installation of multiple rack sections.

5. Temporarily fasten the connecting jig to the mounting surface using customer supplied mounting bolt.

   Refer to Table 2 for recommended tightening torque for the connecting jig mounting bolts.

6. Adjust the second rack so that the jig pins rest evenly in both racks and the jig is in full contact with the side of both racks (Refer to Figure 3).

7. Fully tighten the mounting bolts on the second rack.

8. Carefully remove the connecting jig, avoiding any rattling of the jig against the rack.

9. Follow steps two through eight for any additional rack lengths. Refer to CUTTING RACK LENGTH if a rack must be shorted to accommodate your application.

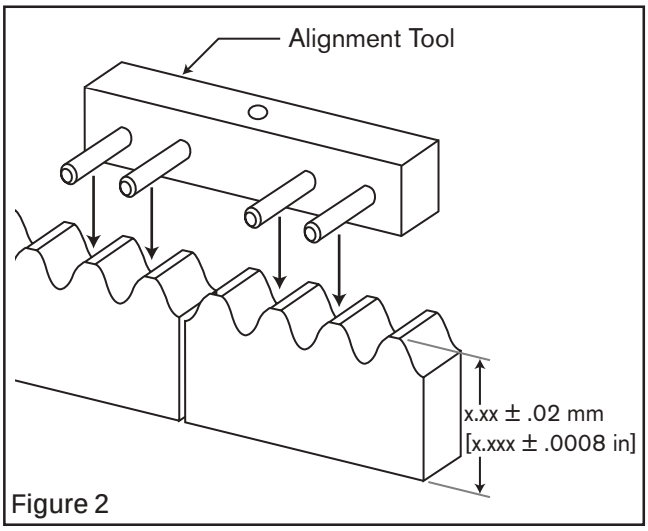


Figure 2

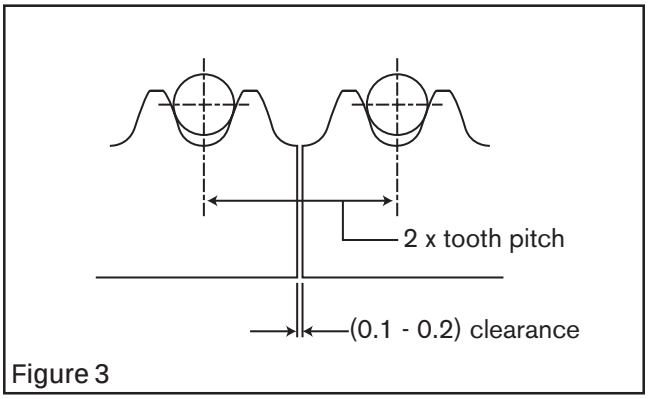


Figure 3

Tables 1 & 2 are located on the following page.

CUTTING RACK LENGTH

NOTE: Nexen will factory-cut nonstandard rack lengths.

Customers may also cut rack lengths to accommodate specific applications. The rack must be cut at the valley of the tooth profile (See Figure 4).

NOTE: Rack teeth are heat treated; it will require an abrasive saw to cut the rack.

Always place the customer-cut rack end at the end of the rack length to avoid any disruptions in the pinion travel.

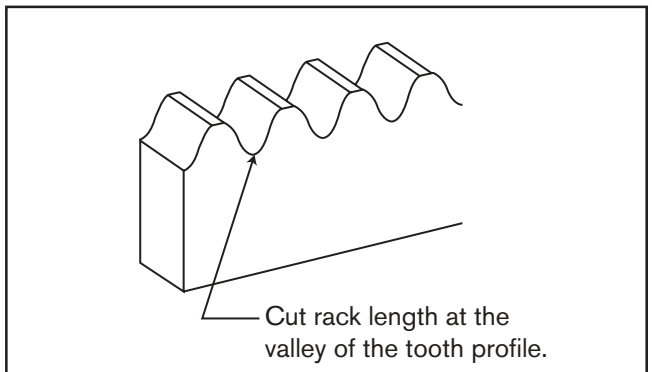


Figure 4

Table 1

RPS Model	Bolt Type	Rack Mounting Bolt Tightening Torque for Socket Head Cap Screws		
		Mounting Material		
		Steel	Cast Iron	Aluminum
RPS16	M8	31 Nm [274.4 in-lb]	20 Nm [177.0 in-lb]	15 Nm [128.3 in-lb]
RPS20	M10	68 Nm [601.9 in-lb]	45 Nm [398.3 in-lb]	33 Nm [292.1 in-lb]
RPS25	M12	120 Nm [1062.1 in-lb]	78 Nm [690.4 in-lb]	58 Nm [513.3 in-lb]
RPS32	M12	120 Nm [1062.1 in-lb]	78 Nm [690.4 in-lb]	58 Nm [513.3 in-lb]
RPS40	M16	196 Nm [1734.7 in-lb]	131 Nm [1159.4 in-lb]	98 Nm [867.4 in-lb]

RPS Model	Bolt Type	Rack Mounting Bolt Tightening Torque for Stainless Steel Screws		
		Mounting Material		
		Steel	Cast Iron	Aluminum
RPS16	M8	19 Nm [168.2 in-lb]	19 Nm [168.2 in-lb]	15 Nm [128.3 in-lb]
RPS20	M10	41 Nm [362.9 in-lb]	41 Nm [362.9 in-lb]	33 Nm [292.1 in-lb]
RPS25	M12	70 Nm [619.6 in-lb]	70 Nm [619.6 in-lb]	58 Nm [513.3 in-lb]
RPS32	M12	70 Nm [619.6 in-lb]	70 Nm [619.6 in-lb]	58 Nm [513.3 in-lb]
RPS40	M16	137 Nm [1212.6 in-lb]	131 Nm [1159.4 in-lb]	98 Nm [867.4 in-lb]

Table 2

RPS Model	Jig Mounting Bolts	
	Bolt Type	Tightening Torque
RPS16	M6	5 Nm [44.3 in-lb]
	M8	8 Nm [70.8 in-lb]
RPS20	M8	8 Nm [70.8 in-lb]
	M10	12 Nm [106.2 in-lb]
RPS25	M10	28 Nm [247.8 in-lb]
	M12	30 Nm [265.5 in-lb]
RPS32	M10	28 Nm [247.8 in-lb]
	M12	30 Nm [265.5 in-lb]
RPS40	M10	32 Nm [283.2 in-lb]
	M12	35 Nm [309.8 in-lb]

ROLLER PINION SETUP

NOTE: Refer to sales drawings for shaft details.

NOTE: Refer PROPER SYSTEM ALIGNMENT and Figures 6 & 7 for Roller Pinion mounting requirements.

NOTE: Pinion should be mounted as close to a bearing as possible for optimal performance.

1. Remove any debris from the shaft, roller pinion and mechanical lock.

NOTE: The RPS is shipped with the mechanical lock already inserted into the roller pinion bore.

2. If the mechanical lock has been removed, insert the cylindrical wedge into the roller pinion bore until it rests against wall of the roller pinon.

3. Insert the inner race of the mechanical lock into the roller pinon bore with one screw hole in the 12 o-clock position (See Figure 5).

NOTE: Ensure that the slots in the two components that make up the mechanical lock are not aligned.

4. Insert the shaft into the bore.

5. Insert the lock bolts into the through holes (threaded holes are for mechanical lock removal).

6. Hand tighten the lock bolts.

7. Equally tighten the lock bolts with 1/4 of the recommended tightening torque. Start tightening at the top bolt and alternate back and forth across the face in a star pattern until all five bolts are tightened (Refer to Figure 5 and Table 3).

8. Finally, tighten the lock bolts at the predetermined torque using a torque wrench.

   Progressive tightening of the lock bolts is important to prevent any misalignment of components while installing the mechanical lock.

NOTE: Runout is minimized if a Dial Indicator is used as the lock bolts are tightened. Place the contact tip of the Dial Indicator on a smooth surface to measure runout (See Figure 6). Runout on this surface must be ± 0.13 mm [±0.005 in] TIR when lock bolts are tightened.

NOTE: Allow pinion to travel along the rack, making sure the sides of the rack do not contact the sides of the pinion.

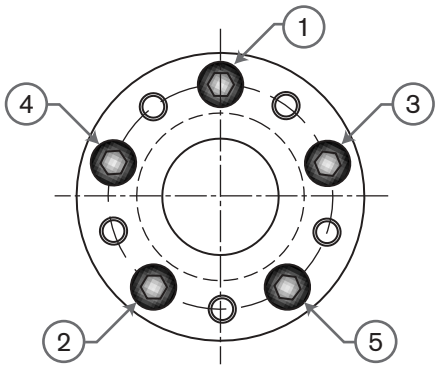


Figure 5 Mechanical Lock Front Face

Table 3

Model	Bolt Type	Tightening Torque
RPS16	M4	3.5 Nm [30.98 in-lb]
RPS20	M5	7.0 Nm [61.96 in-lb]
RPS25	M6	12.0 Nm [106.21 in-lb]
RSP32	M6	12.0 Nm [106.21 in-lb]
RPS40	M6	12.0 Nm [106.21 in-lb]

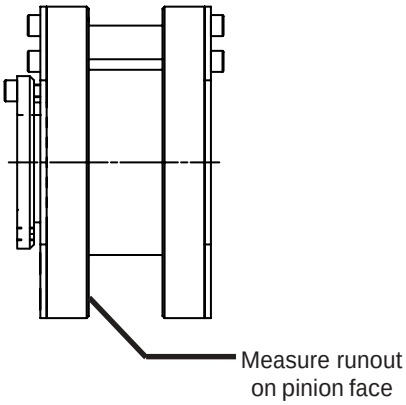


Figure 6

CAUTION

Preload must be applied before putting your system into operation. Refer to APPLYING PRELOAD to properly set preload for your RPS system.

In order to eliminate backlash and minimize wear on the rack, the RPS system must be installed on a straight/flat mounting surface with the shaft parallel (±0.03 mm [0.001in] to the mounting surface and perpendicular to the rack length.

The following requirements must be met to ensure level mounting and proper RPS operation:

a) Mount a linear guide rail on a surface parallel to the RPS Rack mounting surface with the same flatness and grade as the rack mounting surface (Refer to Figure 8).

b) The Pinion Shaft must be parallel (±0.03 mm [0.001 in]) to the mounting surface and the angle between the Pinion Shaft and the rack must be exactly 90° (Refer to Figure 7).

c) The Pinion Shaft must be supported adequately to ensure full contact of roller pins along the face of rack teeth.

Alignment Verification

Proper tooth engagement can be verified by applying machinists blueing to the pinion rollers and rolling the pinion down the length of the rack. The contact pattern should be even across each tooth face when the pinion is properly aligned.

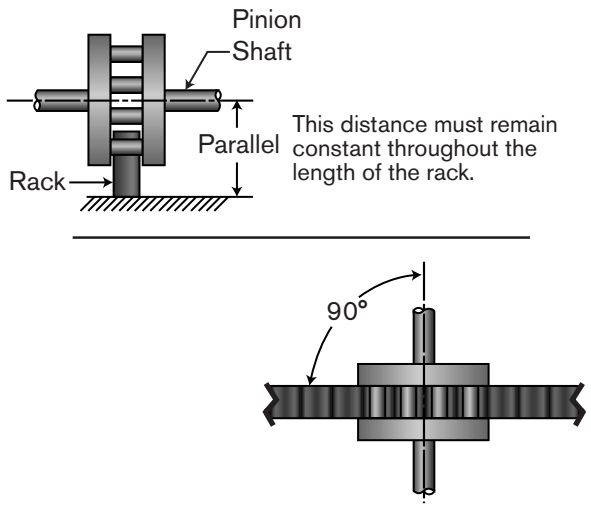
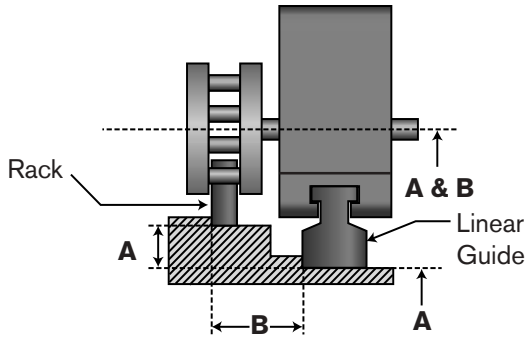


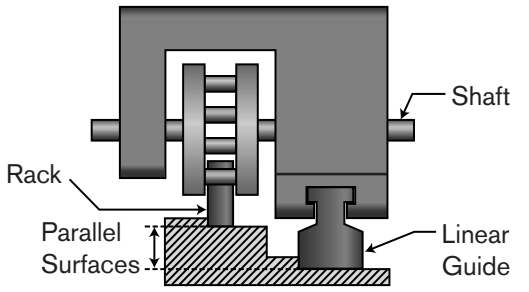
Figure 7 Alignment Requirements

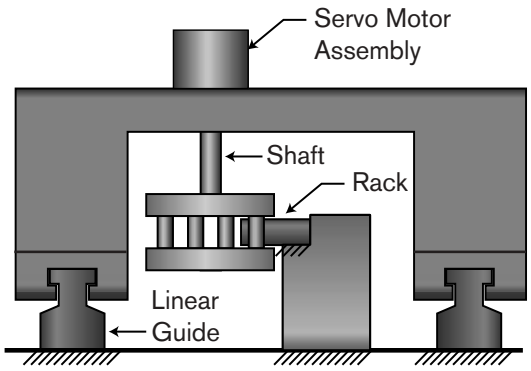


Tolerances Allowed In Roller Pinion Setup*

A dimensions must be Parallel ± 0.03 mm [0.001 in]
B dimensions must be Perpendicular ± 0.03 mm [0.001 in]
*Reference surfaces shown in tolerance key must be parallel and perpendicular to each other within the specifications given. See below for some additional setup options.

Rack and rail mounting surfaces must be flat within ±0.03 mm [±0.001 in]





Systems may be mounted in any angle as long as the rack, guiding system and mounting surface remain parallel with the shaft at a 90° angle from the rack.

Figure 8 Possible Mounting Configurations

APPLYING PRELOAD

To ensure optimal meshing of the roller pins with the rack teeth, the shaft must be preloaded to 0.01 mm [0.0004 in] beyond full engagement.

NOTE: Do not apply excessive preload. Preloading beyond 0.01 mm will decrease product life and increase noise and vibration.

Refer to Figure 9 for suggested preload method.

NOTE: There will be no rotational movement of the pinion when the assembly is stationary if the system is Preloaded properly.

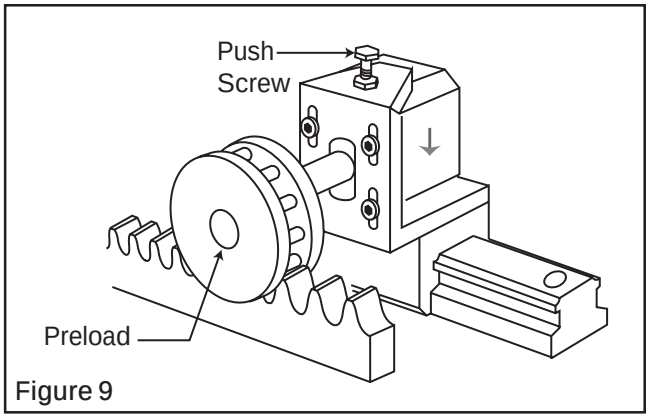


Figure 9

DISENGAGING THE ROLLER PINION

1. Remove the load that the RPS system is transferring.
2. Cut the power source, ensuring that no torque is applied to the roller pinion.
3. Remove preload (Refer to APPLYING PRELOAD section).
4. Gradually loosen the mechanical lock bolts in the same order they were tightened (Refer to Figure 5).

NOTE: Inspect all lock bolts and replace any that show excessive wear.

⚠ DANGER

Failure to properly support the load before disengaging the RPS system could cause serious harm to operators or equipment.

LUBRICATION

Nexen recommends lubricating the RPS rack to ensure smooth operation and long service life.

1. Lubricate the rack by applying a synthetic oil based grease to the pins of the roller pinion. Then glide the roller pinion back and forth over the meter segment of rack five times to distribute the grease.

NOTE: Use THK AFA or equivalent grease. Grease must meet the following Kinematic Viscosity Levels: CST@40C - 25; CST@100C - 5.

2. Repeat step one for each meter of rack

This will distribute lubrication along the rack teeth in all contact areas.

NOTE: Nexen recommends lubricating the rack a minimum of twice a year. Customer may need to re-lubricate more frequently based on environmental conditions and observable tooth wear.

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Nexen warrants that the Products will be free from any defects in material or workmanship for a period of 12 months from the date of shipment. NEXEN MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND ALL IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. This warranty applies only if (a) the Product has been installed, used and maintained in accordance with any applicable Nexen installation or maintenance manual for the Product; (b) the alleged defect is not attributable to normal wear and tear; (c) the Product has not been altered, misused or used for purposes other than those for which it was intended; and (d) Buyer has given written notice of the alleged defect to Nexen, and delivered the allegedly defective Product to Nexen, within one year of the date of shipment.

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The exclusive remedy of the Buyer for any breach of the warranties set out above will be, at the sole discretion of Nexen, a repair or replacement with new, serviceably used or reconditioned Product, or issuance of credit in the amount of the purchase price paid to Nexen by the Buyer for the Products.

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To make a claim under this warranty, the claimant must give written notice of the alleged defect to whom the Product was purchased from and deliver the Product to same within one year of the date on which the alleged defect first became apparent.

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