






Single Position Torque Limiter



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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	<div data-bbox="553 579 850 632"> DANGER</div> <p>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, cause injury or death. Comply with all applicable codes.</p>	
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This document is the original, non-translated, version.

Conformity Declaration: In accordance with Appendix II B of CE Machinery Directive (2006/42/EC):

A Declaration of Incorporation of Partly Completed Machinery evaluation for the applicable EU directives was carried out for this product in accordance with the Machinery Directive. The declaration of incorporation is set out in writing in a separate document and can be requested if required.

This machinery is incomplete and must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the applicable provisions of the Directive.

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ISO 9001 Certified


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GENERAL SPECIFICATIONS


Specifications	
Torque:	Up to 3130 Nm (27,700 in-lb)
Actuation Pressure:	1 - 5.5 bar (14.5 - 80 psi)
Service Temperature:	4.5 - 104 C (40 - 220 F)
Approximate Weight:	Up to 50.8 kg (112 lbs)

GENERAL SAFETY PRECAUTIONS




CAUTION

Some Torque Limiters can exceed 100 lbs. Use lifting aids and proper lifting techniques when installing, removing, or placing in service.




WARNING

Ensure proper guarding of the Torque Limiter is used. Nexen recommends the machine builder design guarding in compliance with OSHA CFR 1910 "Occupational Safety and Health Hazards".



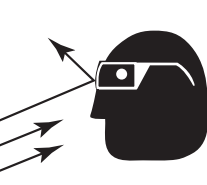
CAUTION

Non-enclosed Torque Limiters have a pinch point between the driving and driven elements of the torque interface. Keep hands clear.




CAUTION

Torque Limiters connect a driving and driven shaft. Keep hands clear.



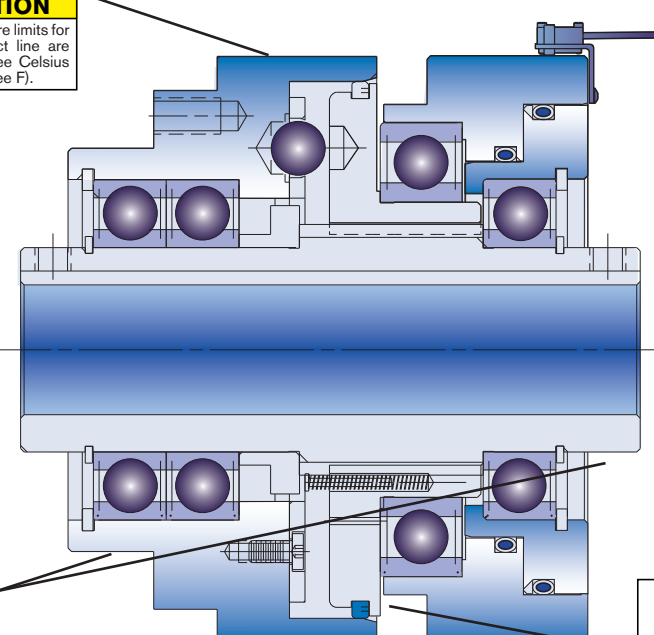
WARNING


Some Torque Limiter models are Spring Loaded. Extreme caution should be used in disassembling and disposing of the unit.



CAUTION


Watch for sharp features when installing and servicing the Torque Limiter. The TL has complex shapes and machined edges.






CAUTION

The temperature limits for the TL product line are 4.5-100 Degree Celsius (40-220 Degree F).



CAUTION

Torque Limiters connect a driving and driven shaft. Keep hands clear.



CAUTION

Non-enclosed Torque Limiters have a pinch point between the driving and driven elements of the torque interface. Keep hands clear.

INTRODUCTION

Nexen's air-engaged, single-position Torque Limiters provide overload protection for power transmission equipment, thus protecting machinery and product from jam-ups and resultant down time expense.

The totally enclosed construction of Nexen's Enclosed Torque Limiter allows for usage in wet or humid conditions and is acceptable for use in federally inspected meat and poultry plants.

A Proximity Sensor (located on the Torque Limiter) senses the onset of an overload condition and releases air pressure at the 3-way valve to provide split second disengagement of the Torque Limiter.

The single position feature resets in the same position when the unit is engaged, providing exact timing of two components.

HUB PREPARATION

NOTE: This section pertains only to units with a customer machined bore. If your Torque Limiter has been bored by Nexen, proceed with **INSTALLATION**.

TL-A

After the Hub has been finished bored, drill and tap the Hub for Set Screws. Set Screw locations are over the keyway, and at 90° of the keyway. Models TL10-A and TL15-A require two Set Screws located on the Drive Flange end of the Hub. Models TL20-A and higher require two Set Screws located on both ends of the Hub (Refer to Table 1 for Set Screw sizes).

TABLE 1

SET SCREW SIZES			
MODEL	US	METRIC	QTY
TL10-A10	10-24	M5-0.8	2
TL15-A	10-24	M5-0.8	2
TL20-A	1/4-20	M6-1.0	4
TL30-A	5/16-24	M6-1.0	4
TL40-A	3/8-24	M10-1.5	4
TL50-A	3/8-24	M10-1.5	4
TL60-A	1/2-13	M12-1.75	4
TL70-A	1/2-13	M12-1.75	4
TL80-A	1/2-13	M12-1.75	4

TL-AC

After the Hub has been finished bored, make four saw cuts in the Drive Flange end of the Hub. Locate the first saw cut 45° from the keyway and the other three saw cuts at 90° increments from the first saw cut (Refer to Table 2 for saw cut dimensions).

TABLE 2

SAW CUT DIMENSIONS		
MODEL	CUT WIDTH	CUT DEPTH
TL20-AC	0.06" [1.52 mm]	0.96" [25.4 mm]
TL30-AC	0.06" [1.52 mm]	0.96" [25.4 mm]
TL40-AC	0.06" [1.52 mm]	0.96" [25.4 mm]
TL50-AC	0.06" [1.52 mm]	0.96" [25.4 mm]
TL60-AC	0.06" [1.52 mm]	0.96" [25.4 mm]
TL70-AC	0.06" [1.52 mm]	0.96" [25.4 mm]
TL80-AC	0.06" [1.52 mm]	0.96" [25.4 mm]

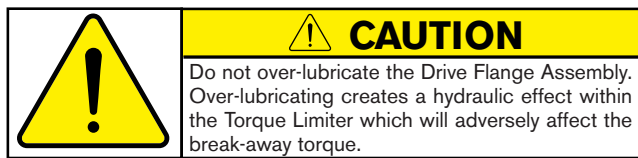
TORQUE LIMITER ASSEMBLY

NOTE: When assembling the Torque Limiter, align the Hub keyway with balls as shown (See Figure 1).

1. While fully supporting the two Ball Bearings (Item 21), press the Hub (Item 7) into the Drive Flange Assembly (Item 19) (See Figure 2).



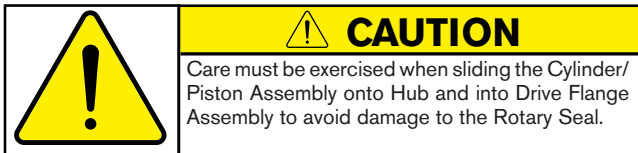
2. Install the Retaining Ring (Item 6) (See Figure 2).



3. Lubricate the Drive Flange Assembly (Item 19) (See LUBRICATION).
4. Install the Compression Springs (Items 17) and Spring Stiffener Pins (Item 16) into the Drive Ring (Item 10) (See Figure 3).

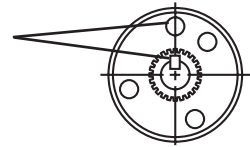
NOTE: The back of the Rotary Seal must be installed facing the Drive Flange Assembly end of Torque Limiter (See Figure 4).

5. Install the Rotary Seal (Item 15) (See Figures 4 and 5).
6. Lubricate the Hub spline with NEVER-SEEZ®.

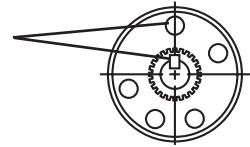


7. While fully supporting the inner race of the Ball Bearing (Item 21), press the Cylinder/Piston Assembly onto the Hub of the Torque Limiter (See Figure 5).
8. Install Retaining Ring (Item 6) (See Figure 5).

Align this ball detent with Hub keyway on TL10 and TL15.



Align this ball detent with Hub keyway on TL20 through TL60.



Align this ball detent with Hub keyway on TL70 and TL80.

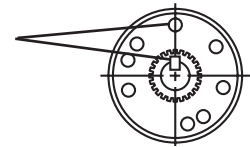


FIGURE 1

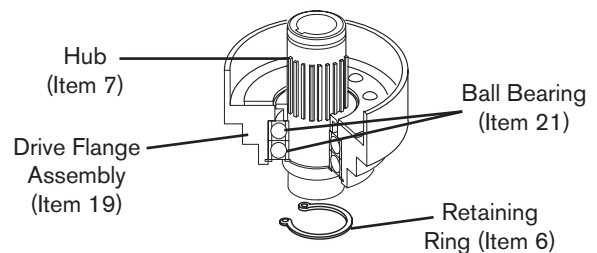


FIGURE 2

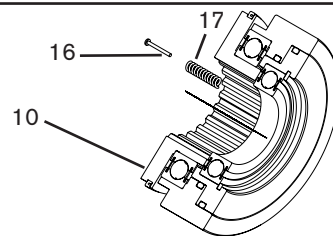


FIGURE 3

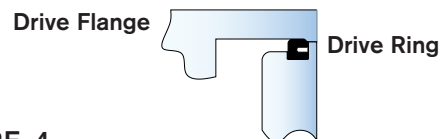


FIGURE 4

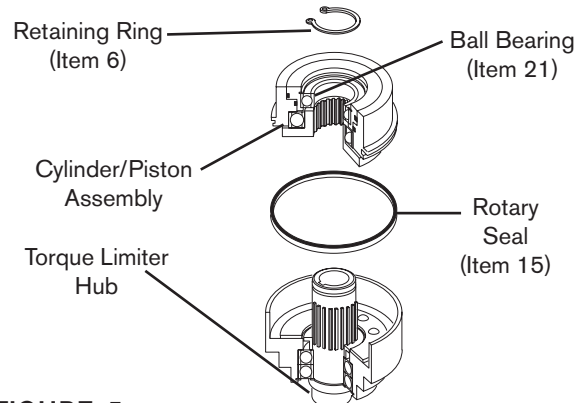


FIGURE 5

INSTALLATION

TORQUE LIMITER

1. Using customer supplied cap screws, fasten a sheave or sprocket to the Torque Limiter (See Figure 6).

NOTE: Nexen recommends using a red anaerobic thread locking compound on pilot mounting holes.

2. Slide the Clamping Collar (Item 1 Model TL-AC) onto the Hub of the Torque Limiter (See Figure 6).
3. Insert a customer supplied key into the shaft keyway.
4. Align the keyway of the Torque Limiter with the shaft and key; then, slide the Torque Limiter onto the shaft (See Figure 6).
5. Tighten the Clamping Collar (Item 1 Model TL-AC) or Set Screws (Item 1 Model TL-A) to the recommended torque (See Tables 3 and 4).

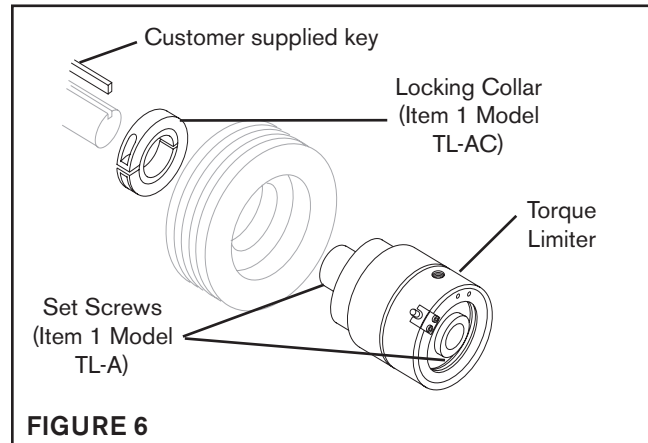


TABLE 3

CLAMPING COLLAR SCREW TORQUE SPECIFICATIONS	
TL20-A	15 Ft. Lbs. [20.3 Nm]
TL30-A	33 Ft. Lbs. [44.7 Nm]
TL40-A	33 Ft. Lbs. [44.7 Nm]
TL50-A	58 Ft. Lbs. [78.4 Nm]
TL60-A	58 Ft. Lbs. [78.4 Nm]
TL70-A	58 Ft. Lbs. [78.4 Nm]
TL80-A	58 Ft. Lbs. [78.4 Nm]

TABLE 4

SET SCREW TORQUE SPECIFICATIONS	
TL20-A	7 Ft. Lbs. [9.5 Nm]
TL30-A	14 Ft. Lbs. [19 Nm]
TL40-A	24 Ft. Lbs. [32.5 Nm]
TL50-A	24 Ft. Lbs. [32.5 Nm]
TL60-A	51 Ft. Lbs. [69 Nm]
TL70-A	51 Ft. Lbs. [69 Nm]
TL80-A	51 Ft. Lbs. [69 Nm]

PROXIMITY SENSOR

NOTE: A ground wire is not required.

1. Install the Dowel Pin (Item 4) into the Torque Limiter (See Figure 7).
2. Using Cap Screws (Item 54), secure the Limit Switch (Item 55) to the Mounting Bracket (Item 3) (See Figure 7) using Mounting Plate (Item 57).
3. Using Cap Screws (Item 2), mount the Mounting Bracket (Item 3) onto the Torque Limiter (See Figure 7).

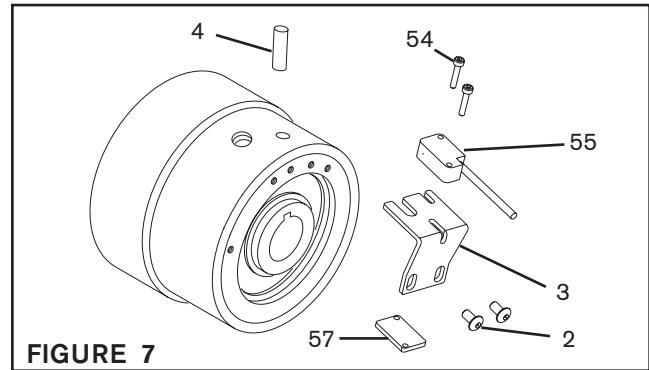


FIGURE 7

AIR CONNECTIONS

All Nexen pneumatically actuated devices require clean and dry air, which meet or exceeds ISO 8373.1: 2001 Class 4.4.3 quality.

	<p>CAUTION</p> <p>Do not use rigid pipe and tubing when making air line connections. Torque on the air line caused by bearing drag may be relieved by resting the air line on a support parallel to the torque limiter center-line. Align the air inlet port to the six o'clock down position to allow condensation in the air chamber to drain out of the exhaust port.</p>
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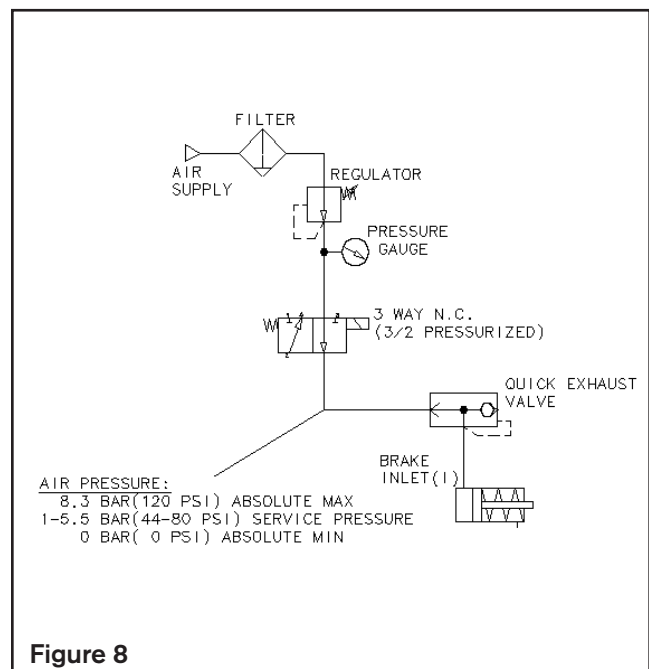
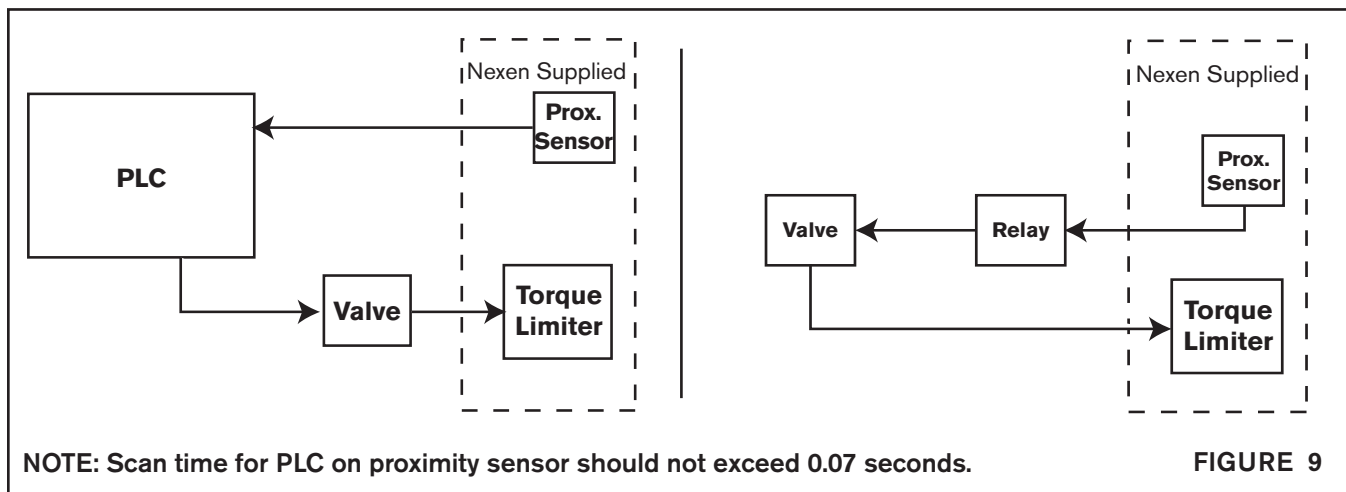


Figure 8

ELECTRICAL CONNECTIONS



The supplied Proximity Sensor is shown operating in two typical scenarios in Figure 9. It is the responsibility of the system integrator to ensure the limits of the Proximity Sensor Specifications are followed for integration into a robust system. See Figure 10 for Proximity Sensor wiring schematic, and Table 5 for Electrical Specifications.

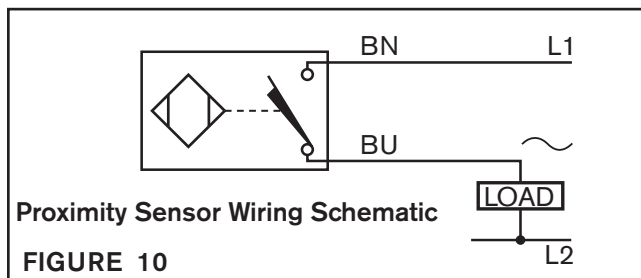


TABLE 5

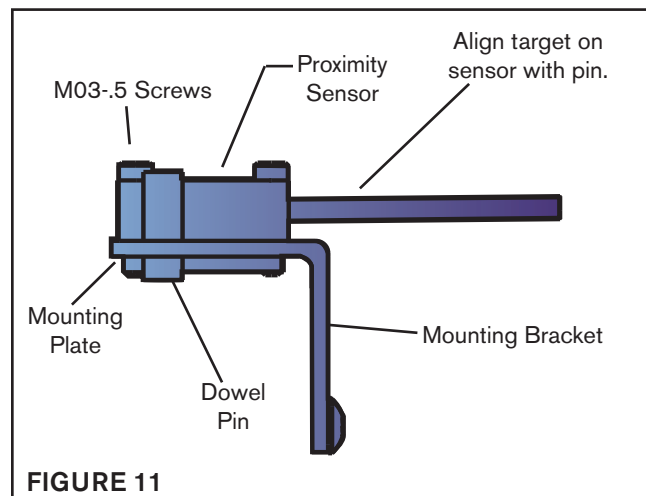
PROXIMITY SENSOR SPECIFICATIONS	
Voltage	20-250 VAC, 10-300 VDC
Line Frequency	40-60 Hz
Voltage Drop Across Conducting Sensor	<6.0 V at 100 mA
Continuous Load Current	<100 mA
Off-State (Leakage) Current	<1.7 mA
Minimum Load Current	3.0 mA
Maximum Inrush Current	1.0 A (<30 ms, 15% Duty Cycle)

ADJUSTMENTS

PROXIMITY SENSOR

NOTE: The Nexen Torque Limiter is equipped with a proximity sensor to detect torque overloads. It is important that the sensor be positioned so the dowel pin just moves into the sensor's field of view when the Torque Limiter is engaged. At this time, the proximity sensor's output circuit will be closed. When the Torque Limiter is overloaded, the dowel pin will move immediately outside the proximity sensor's field of view and its output circuit will open.

1. Apply air pressure to the Torque Limiter.
2. Rotate the Drive Flange Assembly until the positioning balls are seated into the detents.
3. Slide the Proximity Sensor (Item 55) on the Bracket (Item 3) until the LED on the Proximity Sensor is illuminated.
4. Tighten the screws securing the Proximity Sensor to the Mounting Bracket.



5. Run the machine to verify proper operation of the Torque Limiter.
6. If nuisance tripping occurs, realign the proximity sensor with the Dowel Pin until it operates properly.

LUBRICATION

Note: Nexen pneumatically actuated devices require clean, pressure regulated air for maximum performance and life. Nexen pneumatically operated devices pneumatic seals are lubricated life, and do not require additional lubrication.

However, some customers prefer to use an air line lubricator, which injects oil into the pressurized air, forcing an oil mist into the air chamber. This is acceptable, but care must be taken to ensure once an air mist lubrication system is used, it is continually used over the life of the product as the oil mist may wash free the factory installed lubrication.

Locate the lubricator above and within ten feet of the Torque Limiter, and use low viscosity oil such as SAE-10.

Synthetic lubricants are not recommended.



Nexen's Torque Limiter bearings are shielded and pre-lubricated, and require no further lubrication.

The Drive Flange Assembly has been pre-lubricated and does not require additional lubrication at start up. The amount of lubrication is sufficient to maintain the proper coefficient of friction at the Balls and Detents.

The Drive Flange Assembly must be disassembled if lubrication becomes necessary (See PARTS REPLACEMENT). Spread recommended lubricants evenly (about 1/8" [3.2 mm] thick by 1/8" [3.2 mm] wide) over Drive Flange Balls, Ball Track, and Drive Ring Detents (See Table 6 for recommended lubricants).

TABLE 6

RECOMMENDED LUBRICANTS
Chevron SRI Amoco Rykon Premium Grease #2 Exxon Unirex #2 Shell Dolium Grease #2 Texaco Premium #2

	 CAUTION Do not over-lubricate the Drive Flange Assembly. Over-lubrication creates a hydraulic effect within the Torque Limiter that will adversely affect the break-away torque.
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LUBRICATOR DRIP RATE SETTINGS

NOTE: Settings are for Nexen supplied lubricators. If you are not using a Nexen lubricator, calibration must replicate the following procedure:

1. Close and disconnect the air line from the unit.
2. Turn the Lubricator Adjustment Knob counterclockwise three complete turns.
3. Open the air line.
4. Close the air line to the unit when a drop of oil forms in the Lubricator Sight Gage.
5. Connect the air line to the unit.
6. Turn the Lubricator Adjustment Knob clockwise until closed.
7. Turn the Lubricator Adjustment Knob counterclockwise one-third turn.
8. Open the air line to the unit.

OPERATION



WARNING

Never exceed maximum operating speeds listed for your product. (See Table 7).

INTERFACE DESIGN

The Torque Limiter interface consists of five opposing balls and detents that are not equally spaced and engage in one rotational position. This feature provides exact timing or registry of machine components connected on the drive and driven side of the Torque Limiter. If an overload occurs, the torque limiter interfaces separate to completely disconnect drive components from driven components.

RE-SETTING PROCEDURE

1. Shut down the machine drive.
2. Apply air pressure to the Torque Limiter.
3. Rotate Drive Flange Assembly by hand or in "jog" mode until the balls are engaged in the detents.



CAUTION

The balls will not find the detents without sufficient resistance of the drive flange downstream to prevent it from rotating.

4. Restart the machine drive.

NOTE: Machine must come to a complete stop before Torque Limiter can be reengaged. Torque Limiter may run in excess of 200° F [93°C] as measured on the Air Chamber until Rotary Seal has worn in.

TABLE 7

MODEL	MAXIMUM OPERATING SPEEDS
TL20-A, TL20-AC	1800 RPM
TL30-A, TL30-AC	1650 RPM
TL40-A, TL40-AC	1350 RPM
TL50-A, TL50-AC	1200 RPM
TL60-A, TL60-AC	1050 RPM
TL70-A, TL70-AC	950 RPM
TL80-A, TL80-AC	800 RPM



CAUTION

The temperature limits for the TL product line are 4.5-100 Degree Celsius (40-220 Degree F).

TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	SOLUTION
Failure to engage.	Insufficient air pressure to the Torque Limiter.	Check the air lines for leaks and replace damaged air lines.
	Damaged or leaking O-ring Seals.	Replace the O-ring Seals.
Failure to disengage.	Broken Compression Springs.	Replace the Compression Springs.
	Air not exhausting from the Quick Exhaust Shuttle Valve.	Replace the Quick Exhaust Shuttle Valve.
Ratcheting.	Insufficient air pressure to the Torque Limiter.	Check the air lines for leaks and replace damaged air lines.
	Damaged or leaking O-ring Seals.	Replace the O-ring Seals.
Nuisance tripping.	Proximity Sensor not properly adjusted.	Adjust the Proximity Sensor(See ADJUSTMENTS).

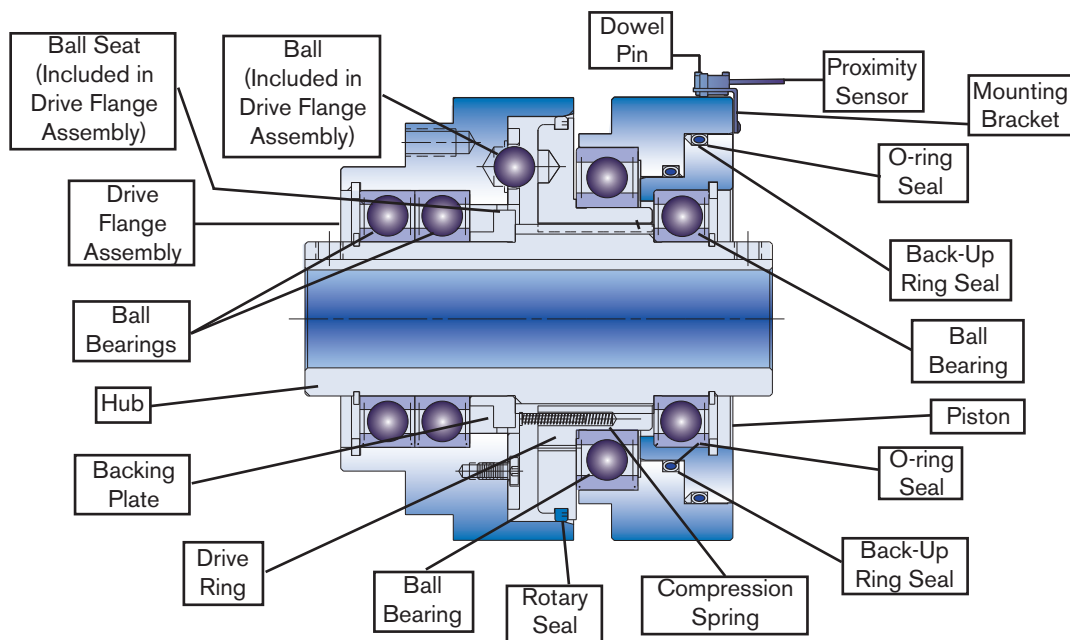
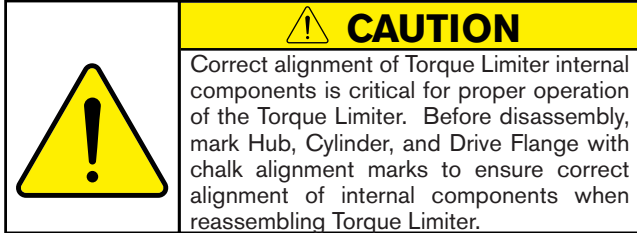


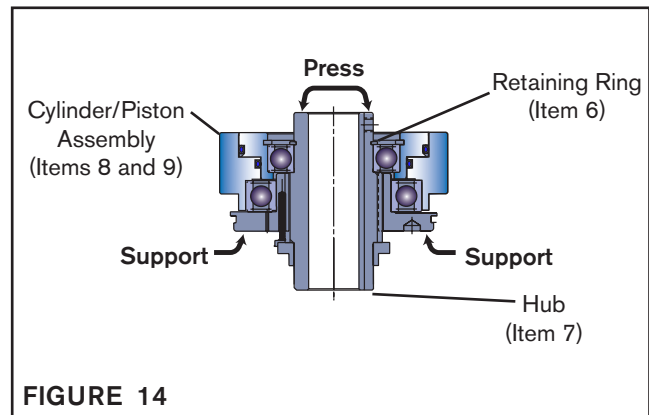
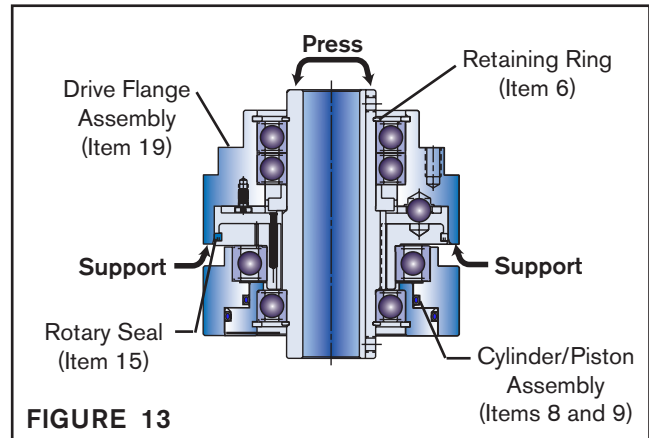
FIGURE 12

TORQUE LIMITER REMOVAL AND DISASSEMBLY

1. Shut off machine and air supply to the Torque Limiter.
2. Disconnect the Torque Limiter from the air supply by removing the Quick Exhaust Shuttle Valve and the 3-Way N.C. Solenoid Valve.
3. Remove the Torque Limiter from the machine.



4. Remove the Retaining Ring (Item 6) from the Hub (Item 7) on the Drive Flange Assembly (Item 19) end of the Torque Limiter (See Figure 13).
5. Supporting Drive Flange Assembly (Item 19), press Hub (Item 7) and Cylinder/Piston Assembly out of Drive Flange (See Figure 13).
6. Remove the Rotary Seal (Item 15) from the Cylinder/Piston Assembly (Items 8 and 9) (See Figure 13).



7. Remove Retaining Ring (Item 6) from Hub (Item 7) on Cylinder/Piston end of Torque Limiter (See Figure 14).
8. Supporting Cylinder/Piston Assembly, press Hub (Item 7) out of Cylinder/Piston Assembly (See Figure 14).

CYLINDER/PISTON BALL BEARING AND O-RING SEALS

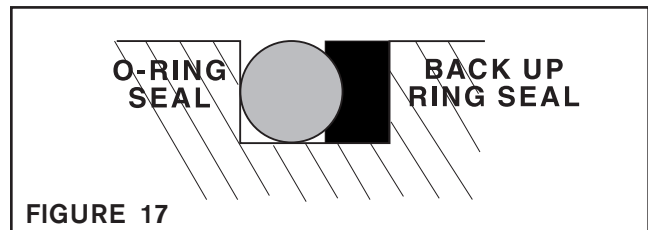
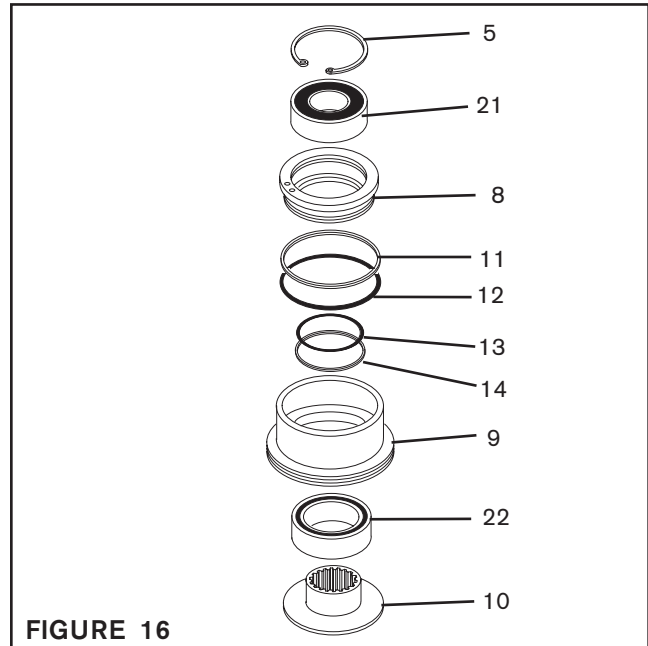
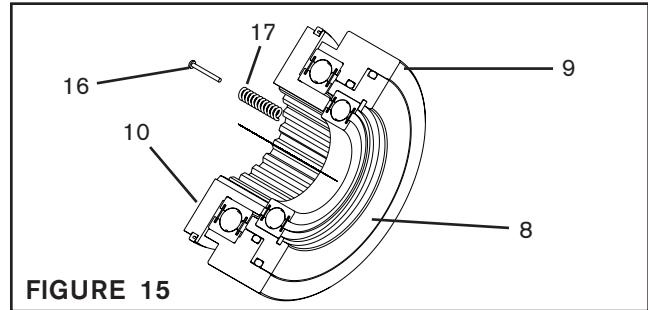
1. Remove the old Compression Springs (Item 17) and Spring Stiffener Pins (Item 16) from the Drive Ring (Item 10) (See Figure 15).
2. Separate the Piston (Item 8) from the Cylinder (Item 9) (See Figures 15 and 16).
3. Remove old O-ring Seals (Items 12,13) and Back-Up Ring Seals (Items 11 and 14) (See Figure 16).



4. Remove the Retaining Ring (Item 5) from the Piston (Item 8) (See Figure 16).
5. Press the old Ball Bearing (Item 21) out of the Piston (Item 8) (See Figure 16).

NOTE: Do not reuse the old Ball Bearings. Applying force to the inner race to remove a ball bearing held by the outer race causes damage to ball bearing.

6. Clean bearing bore of Piston (Item 8) with fresh solvent, making sure all Loctite® residue is removed.
7. Apply an adequate amount of Loctite® 680 to evenly coat the outer race of the new Ball Bearing (Item 21) and press the new Ball Bearing into the Piston (Item 8) (See Figure 16).
8. Reinstall Retaining Ring (Item 5) (See Figure 16).
9. Press the old Ball Bearing (Item 22) and Drive Ring (Item 10) out of Cylinder (Item 9) (See Figure 16).
10. Using a bearing puller, remove the old Ball Bearing (Item 22) from the Drive Ring (Item 10) (See Figure 16).
11. Clean the bearing bore of the Cylinder (Item 9) with fresh solvent, making sure all old Loctite® residue is removed.
12. Apply an adequate amount of Loctite® 680 to evenly coat the outer race of the new Ball Bearing (Item 22) and press the new Ball Bearing into the Cylinder (Item 9) (See Figure 16).
13. Supporting the inner race of the Ball Bearing (Item 22), press the Drive Ring (Item 10) into the Cylinder (Item 9) and new Ball Bearing (Item 22) (See Figure 16).



14. Lubricate the new O-ring Seals (Items 12 and 13), Back-Up Ring Seals (Items 11 and 14), and seal contact surfaces of the Piston (Item 8) and Cylinder (Item 9) with a thin film of fresh o-ring lubricant (See Figure 16).

NOTE: When installing new O-ring Seals (Items 12 and 13) and Back-Up Ring Seals (Items 11 and 14), make sure the curved surface of the Back-Up Ring Seal matches the curved surface of the O-ring Seal. Back-Up Ring Seals must be installed on the non-pressurized side of the O-ring (See Figure 17).

15. Install new O-ring Seals (Items 11 & 14) and new Back-Up Ring Seals (Items 11 & 14) (See Figure 16).
16. Press the Piston (Item 8) back into the Cylinder (Item 9) (See Figure 16).

DRIVE FLANGE BALL BEARINGS



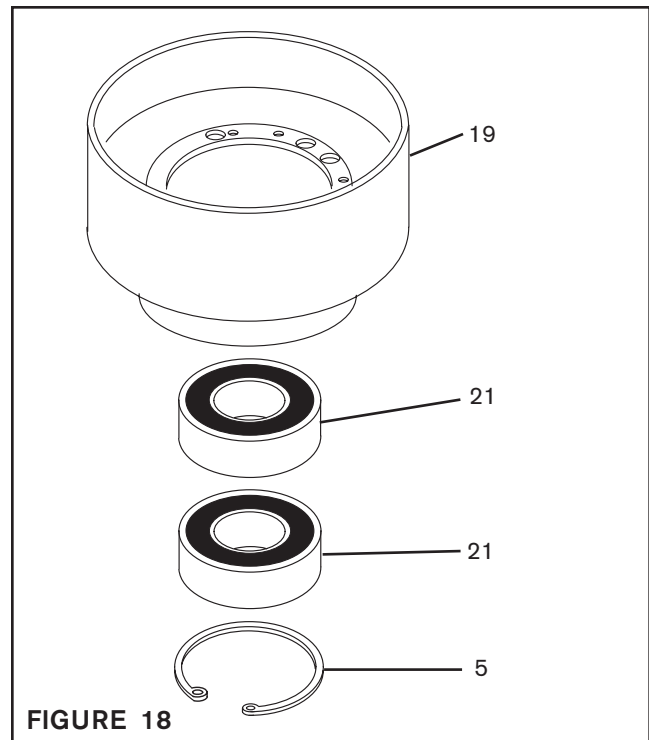
1. Remove the Retaining Ring (Item 5) from the Drive Flange (Item 19) (See Figure 18).

NOTE: The Drive Flange Assembly consists of: machine screws, ball seat, balls, and Drive Flange. If any of these items show signs of wear or damage, the entire Drive Flange Assembly (Item 19) must be replaced.

2. Fully support the Drive Flange Assembly (Item 19) and press the Ball Bearings (Item 21) out of Drive Flange Assembly (See Figure 18).

NOTE: Do not reuse old Ball Bearings. Applying force to the inner race to remove ball bearings held by the outer race causes damage to ball bearings.

3. Clean the bearing bore of the Drive Flange Assembly (Item 19) with fresh solvent, making sure all old Loctite® residue is removed.
4. Apply an adequate amount of Loctite® 680 to evenly coat the outer race of the new Ball Bearings (Item 21) and press the new Ball Bearings into the Drive Flange Assembly (Item 19) (See Figure 18).
5. Reinstall Retaining Ring (Item 5) (See Figure 18).

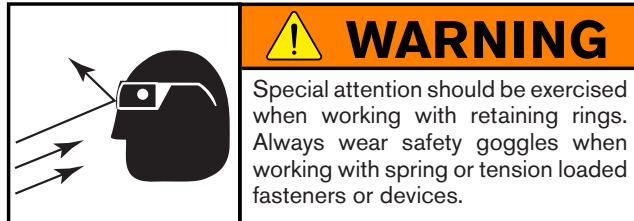


TORQUE LIMITER REASSEMBLY

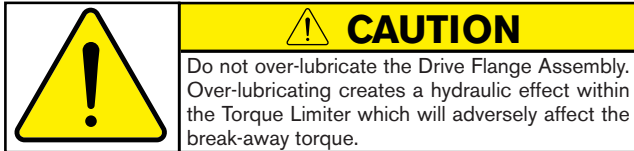
NOTE: To ensure proper operation after assembling the Torque Limiter, align the chalk alignment marks.

When assembling Torque Limiter, align the Hub keyway with balls as shown (See Figure 19).

1. While fully supporting the inner races of the two Ball Bearings (Item 21), press the Hub (Item 7) into the Drive Flange Assembly (Item 19) (See Figure 20).



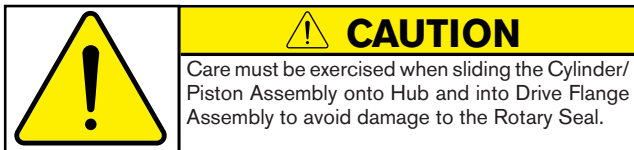
2. Reinstall Retaining Ring (Item 6) (See Figure 20).



3. Lubricate the Drive Flange Assembly (Item 19) (See LUBRICATION).
4. Install new Compression Springs (Items 17) and Spring Stiffener Pins (Item 16) into the Drive Ring (Item 10) (See Figure 21).

NOTE: The back of the Rotary Seal must be installed facing the Drive Flange Assembly end of Torque Limiter (See Figure 22).

5. Install the new Rotary Seal (Item 15) (See Figures 22 and 23).
6. Lubricate the Hub spline with NEVER-SEEZ®.



7. While fully supporting the inner race of the Ball Bearing (Item 21), press the Cylinder/Piston Assembly onto the Hub and onto the Drive Flange Assembly of the Torque Limiter (See Figure 23).
8. Reinstall Retaining Ring (Item 6) (See Figure 23).

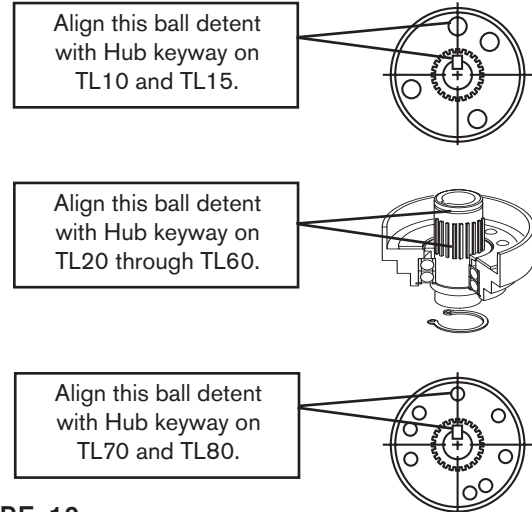


FIGURE 19

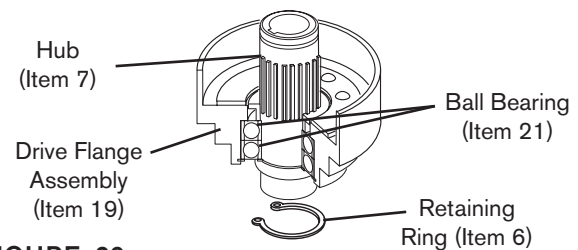


FIGURE 20

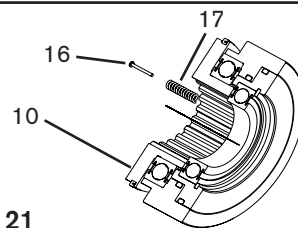


FIGURE 21

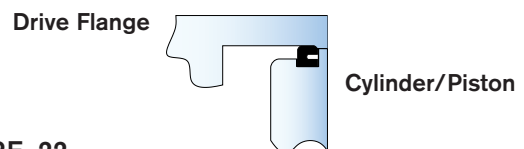


FIGURE 22

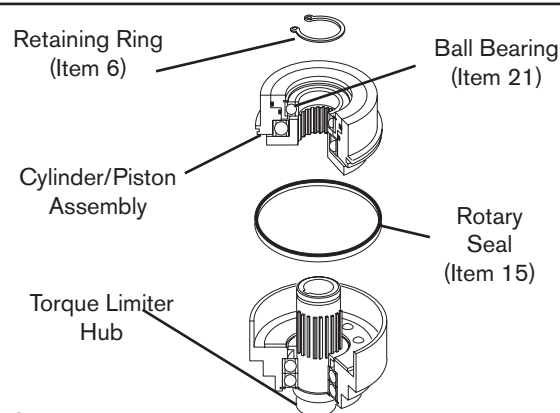


FIGURE 23

PARTS LIST

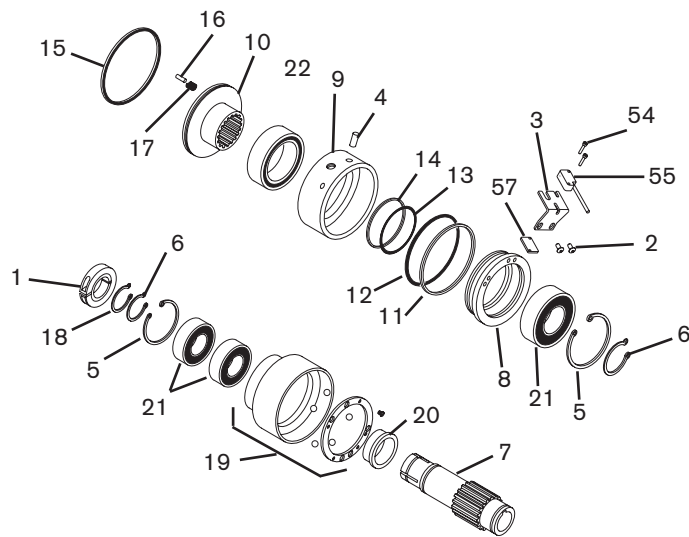


FIGURE 24

ITEM	DESCRIPTION	QUANTITY								
		TL10	TL15	TL20	TL30	TL40	TL50	TL60	TL70	TL80
1	Clamping Collar (TL-AC Only)	--	--	1	1	1	1	1	1	1
	Set Screw (TL-A Only) (Not Shown)	2	2	4	4	4	4	4	4	4
2	Button Head Cap Screw	2	2	2	2	2	2	2	2	2
3	Mounting Bracket (Proximity Sensor)	1	1	1	1	1	1	1	1	1
4	Anti-Rotation Pin	1	1	1	1	1	1	1	1	1
5	Retaining Ring	2	2	2	2	2	2	2	2	2
6	Retaining Ring	2	2	2	2	2	2	2	2	2
7 ¹	Hub	1	1	1	1	1	1	1	1	1
8	Piston	1	1	1	1	1	1	1	1	1
9	Cylinder	1	1	1	1	1	1	1	1	1
10	Drive Ring	1	1	1	1	1	1	1	1	1
11 ²	Back-Up Ring Seal (Large)	1	1	1	1	1	1	1	1	1
12 ²	O-Ring Seal (Large)	1	1	1	1	1	1	1	1	1
13 ²	O-Ring Seal (Small)	1	1	1	1	1	1	1	1	1
14 ²	Back-Up Ring Seal (Small)	1	1	1	1	1	1	1	1	1
15	Rotary Seal	1	1	1	1	1	1	1	1	1
16 ²	Pin (Spring Stiffener)	3	3	6	10	13	15	18	20	21
17 ²	Compression Spring	3	3	6	10	13	15	18	20	21
18	Retaining Ring (TL-AC Only)	--	--	1	1	1	1	1	1	1
19 ³	Drive Flange Assembly	1	1	1	1	1	1	1	1	1
20	Backing Plate	1	1	1	1	1	1	1	1	1
21 ²	Ball Bearing	3	3	3	3	3	3	3	3	3
22 ²	Ball Bearing	1	1	1	1	1	1	1	1	1
24	Air Line (Not Shown)	1	1	1	1	1	1	1	1	1
54	Cap Screw (M03-.5x16)	2	2	2	2	2	2	2	2	2
55	Proximity Sensor	1	1	1	1	1	1	1	1	1
57	Mounting Plate (Proximity Sensor)	1	1	1	1	1	1	1	1	1

¹ Specify Model TL-AC or TL-A when ordering Hub (Item 7).

² Denotes Repair Kit item.

³ Drive Flange Assembly (Item 19) includes: Drive Flange, Machine Screws, Ball Seat, and Balls.

REPLACEMENT PARTS

The item or balloon number for all Nexen products is used for part identification on all product parts lists, product price lists, unit assembly drawings, bills of materials, and instruction manuals.

When ordering replacement parts, specify model designation, item number, part description, and quantity. Purchase replacement parts through your local Nexen Distributor.

REPAIR KITS

Repair Kits include the following:

ITEM	DESCRIPTION
11	Back-up Ring Seal (Large)
12	O-ring Seal (Large)
13	O-ring Seal (Small)
14	Back-up Ring Seal (Small)
16	Spring Stiffener Pin
17	Compression Spring
21	Ball Bearing
22	Ball Bearing

MODEL	REPAIR KIT. NUMBER
TL10	801808
TL15	801808
TL20	801508
TL30	801518
TL40	801528
TL50	801538
TL60	801548
TL70	801558
TL80	801568

WARRANTY

Warranties

Nexen warrants that the Products will (a) be free from any defects in material or workmanship for a period of 12 months from the date of shipment, and (b) will meet and perform in accordance with the specifications in any engineering drawing specifically for the Product that is in Nexen's current product catalogue, or that is accessible at the Nexen website, or that is attached to this Quotation and that specifically refers to this Quotation by its number, subject in all cases to any limitations and exclusions set out in the drawing. 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.

Exclusive Remedy

The exclusive remedy for the Buyer for any breach of any warranties provided in connection with this agreement will be, at the election of Nexen: (a) repair or replacement with new, serviceably used, or reconditioned parts or products; or (b) issuance of credit in the amount of the purchase price paid to Nexen by the Buyer for the Products.

Agent's Authority

Buyer agrees that no agent, employee or representative of Nexen has authority to bind Nexen to any affirmation, representation, or warranty concerning the Products other than those warranties expressly set forth herein.

Limitation on Nexen's Liability

TO THE EXTENT PERMITTED BY LAW NEXEN SHALL HAVE NO LIABILITY TO BUYER OR ANY OTHER PERSON FOR INCIDENTAL DAMAGES, SPECIAL DAMAGES, CONSEQUENTIAL DAMAGES OR OTHER DAMAGES OF ANY KIND OR NATURE WHATSOEVER, WHETHER ARISING OUT OF BREACH OF WARRANTY OR OTHER BREACH OF CONTRACT, NEGLIGENCE OR OTHER TORT, OR OTHERWISE, EVEN IF NEXEN SHALL HAVE BEEN ADVISED OF THE POSSIBILITY OR LIKELIHOOD OF SUCH POTENTIAL LOSS OR DAMAGE. For all of the purposes hereof, the term "consequential damages" shall include lost profits, penalties, delay damages, liquidated damages or other damages and liabilities which Buyer shall be obligated to pay or which Buyer may incur based upon, related to or arising out of its contracts with its customers or other third parties. In no event shall Nexen be liable for any amount of damages in excess of amounts paid by Buyer for Products or services as to which a breach of contract has been determined to exist. The parties expressly agree that the price for the Products and the services was determined in consideration of the limitation on damages set forth herein and such limitation has been specifically bargained for and constitutes an agreed allocation of risk which shall survive the determination of any court of competent jurisdiction that any remedy herein fails of its essential purpose.

Inspection

Buyer shall inspect all shipments of Products upon arrival and shall notify Nexen in writing, of any shortages or other failures to conform to these terms and conditions which are reasonably discoverable upon arrival without opening any carton or box in which the Products are contained. Such notice shall be sent within 14 days following arrival. All notifications shall be accompanied by packing slips, inspection reports and other documents necessary to support Buyer's claims. In addition to the foregoing obligations, in the event that Buyer receives Products that Buyer did not order, Buyer shall return the erroneously shipped Products to Nexen within thirty (30) days of the date of the invoice for such Products; Nexen will pay reasonable freight charges for the timely return of the erroneously shipped Products, and issue a credit to Buyer for the returned Products at the price Buyer paid for them, including any shipping expenses that Nexen charged Buyer. All shortages, overages and nonconformities not reported to Nexen as required by this section will be deemed waived.

Limitation on Actions

No action, regardless of form, arising out of any transaction to which these terms and conditions are applicable may be brought by the Buyer more than one year after the cause of action has accrued.

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