nexen

AIR CHAMP® PRODUCTS

User Manual

Single Position Torque Limiter

RoHS compliant 2002/95/EC

FORM NO. L-21185-C-0914

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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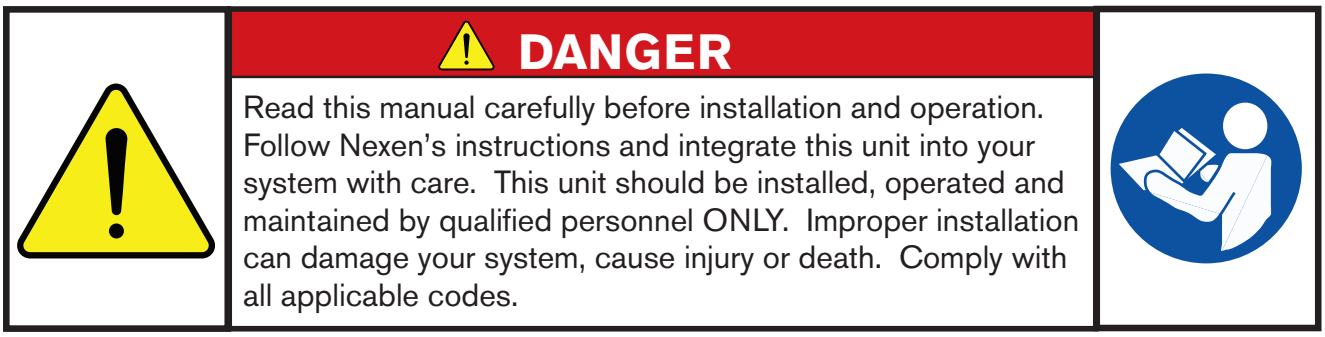

This document is the original, non-translated, version.

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 (27700 in-lbs)
Actuation Pressure	1 - 5.5 bar (14.5 - 80 psi)
Service Temperature	4.5° - 104° C (40° - 220° F)
Approximate Weight	Up to 31.8 kg (70 lbs)

GENERAL SAFETY PRECAUTIONS

⚠ CAUTION

Use appropriate guarding for moving components. Failure to guard could result in serious bodily injury.

⚠ CAUTION

Use lifting aids and proper lifting techniques when installing, removing or placing this product in service.

⚠ CAUTION

Watch for sharp features when interacting with this product. The parts have complex shapes and machined edges.

⚠ WARNING

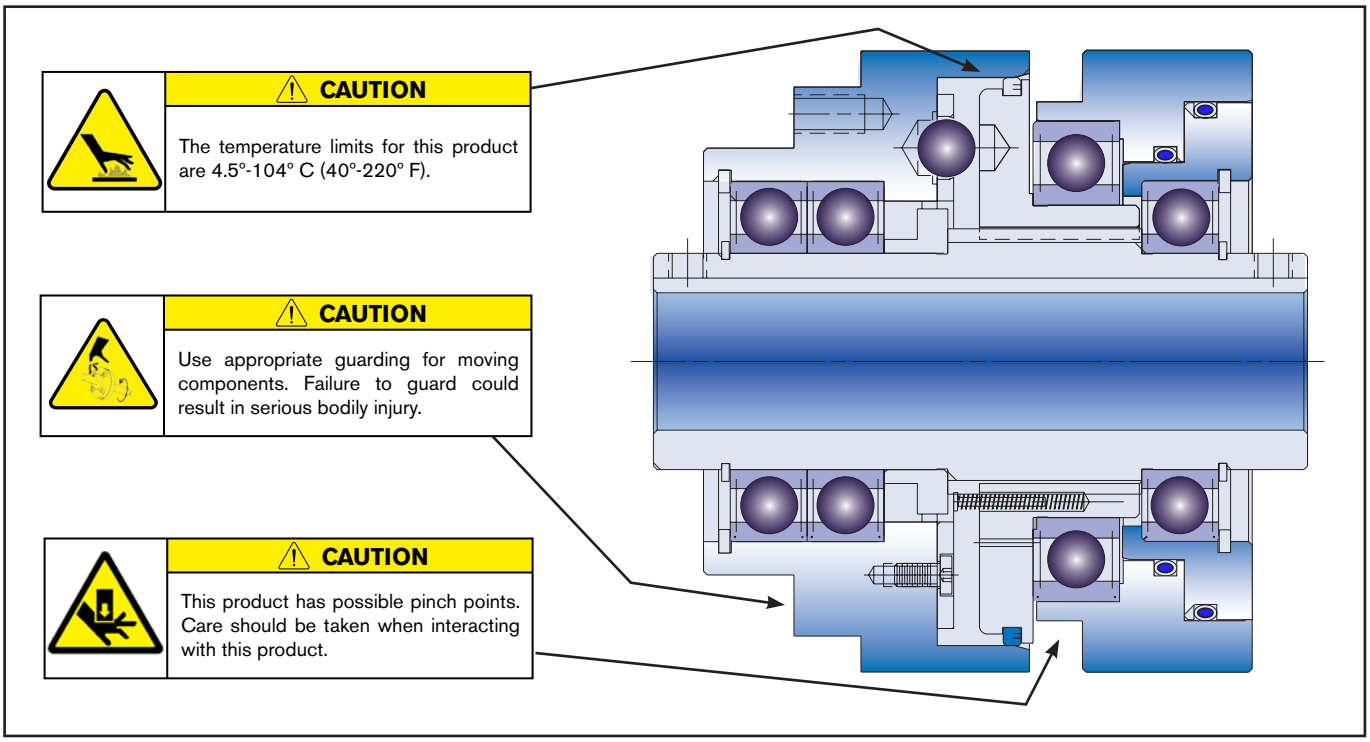
This product is capable of emitting a spark if misused, therefore is not recommended for use in any explosive environment.

⚠ CAUTION

This product has possible pinch points. Care should be taken when interacting with this product.

⚠ WARNING

Ensure proper guarding of the product is used. Nexen recommends the machine builder design guarding in compliance with OSHA 29 CFR 1910 “Occupational Safety and Health Hazards.”



INTRODUCTION

Nexen's air-engaged, single-position Torque Limiters provide overload protection for power transmission equipment, thus protecting machinery or 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.

HUB PREPARATION

NOTE

This section pertains only to Torque Limiters finished bored by the customer. If your Torque Limiter has been bored at the factory, 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

MODEL	US	METRIC	QTY
TL10-A	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

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]

HUB PREPARATION (continued)

TORQUE LIMITER ASSEMBLY

REFER TO FIGURES 1-5.

NOTE

When assembling the Torque Limiter, align the Hub keyway with balls as shown.

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

⚠ CAUTION

Working with spring loaded or tension loaded fasteners and devices can cause injury. Wear safety glasses and take the appropriate safety precautions.

2. Install the Retaining Ring (Item 6).

⚠ CAUTION

Do not over lubricate Drive Flange Assembly. Over lubricating creates a hydraulic effect within the Torque Limiter which will adversely affect the break-away torque.

3. Lubricate the Drive Flange Assembly (Item 19) (See LUBRICATION section).

4. Install the Compression Springs (Items 17) and Spring Stiffener Pins (Item 16) into the Drive Ring (Item 10).

NOTE

The back of the Rotary Seal must be installed facing the Drive Flange Assembly end of Torque Limiter.

5. Install the Rotary Seal (Item 15).

6. Lubricate the Hub spline with NEVER-SEEZ®.

NOTE

Care must be exercised when sliding the Cylinder/Piston Assembly onto Hub and into Drive Flange Assembly to avoid damage to the Rotary Seal.

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.

8. Install Retaining Ring (Item 6).

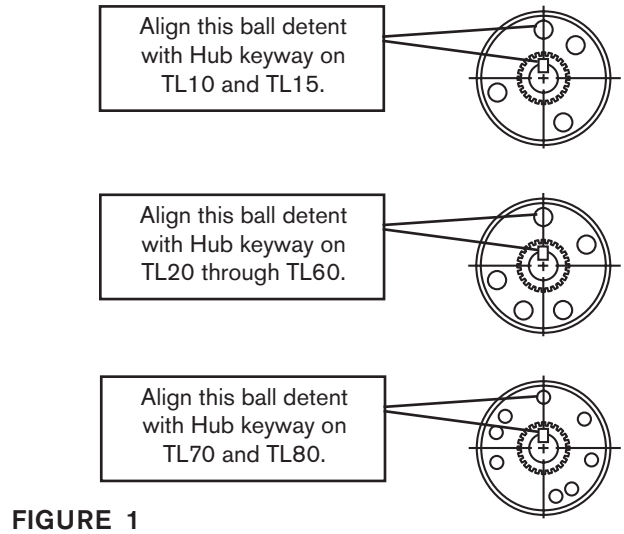


FIGURE 1

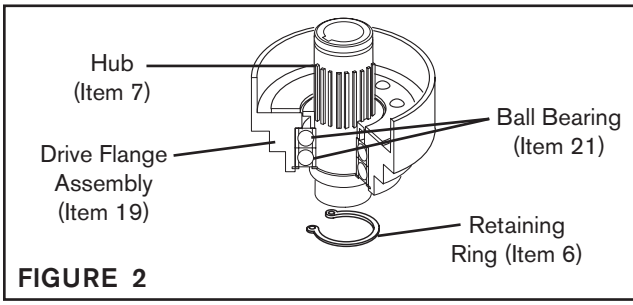


FIGURE 2

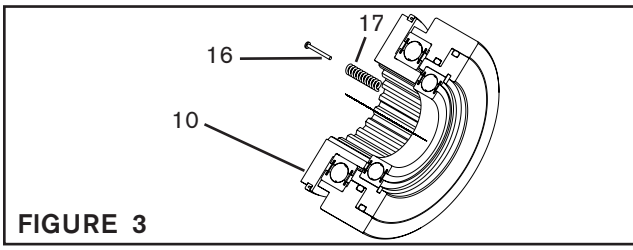


FIGURE 3

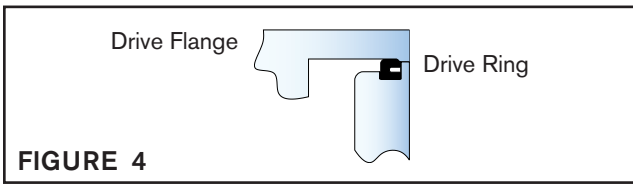


FIGURE 4

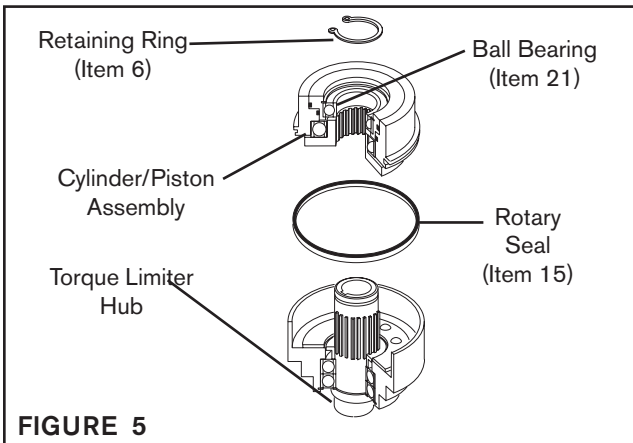


FIGURE 5

INSTALLATION

TORQUE LIMITER

REFER TO FIGURE 6.

1. Using customer supplied cap screws, fasten a sheave or sprocket to the Torque Limiter.

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.

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.

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).

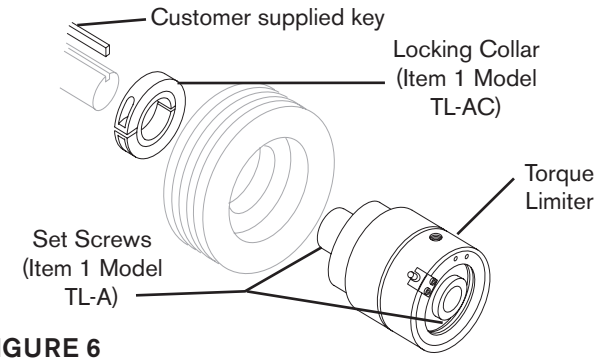


FIGURE 6

TABLE 3

Clamping Collar Screw Torque Specifications	
TL20-AC	15 ft-lbs [20.3 Nm]
TL30-AC	33 ft-lbs [44.7 Nm]
TL40-AC	33 ft-lbs [44.7 Nm]
TL50-AC	58 ft-lbs [78.4 Nm]
TL60-AC	58 ft-lbs [78.4 Nm]
TL70-AC	58 ft-lbs [78.4 Nm]
TL80-AC	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]

ANTI-ROTATION CLIP

NOTE

The Anti-Rotation Clip may be installed in either set of tapped holes located on the front of the Piston (Item 7) (See Figure 3).

REFER TO FIGURE 7.

1. Install Anti-Rotation Pin (Item 4).

2. Using the Cap Screws (Item 2), secure the Anti-Rotation Clip (Item 3) to the front of Piston (Item 8).

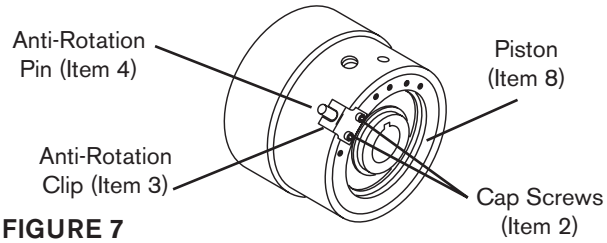


FIGURE 7

LIMIT SWITCH

REFER TO FIGURE 8.

1. Install the Dowel Pin (Item 52) into the Torque Limiter.

2. Using Cap Screws (Item 51), mount the Mounting Bracket (Item 56) onto the Torque Limiter.

3. Using Cap Screws (Item 53), secure the Limit Switch (Item 55) to the Limit Switch Mounting Plate (Item 57).

4. Using Cap Screws (Item 54), secure Limit Switch and Limit Switch Mounting Plate to the Mounting Bracket (Item 56).

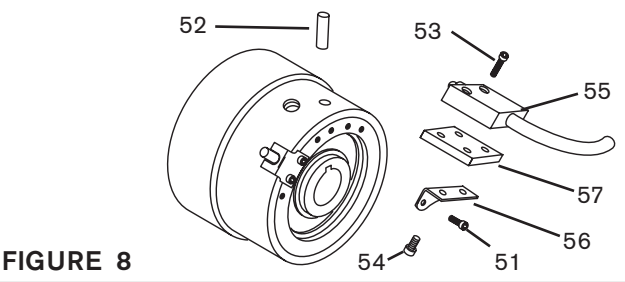


FIGURE 8

LUBRICATION

NOTE

Nexen pneumatically actuated devices require clean, pressure regulated air for maximum performance and life. All seals in Nexen pneumatically operated devices are lubricated for 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 product, and use low viscosity oil such as SAE-10.

Synthetic lubricants are not recommended.

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

LUBRICATOR DRIP RATE SETTINGS

⚠ CAUTION

These settings are for Nexen supplied lubricators. If you are not using a Nexen lubricator, calibration must follow the manufacturer's suggested 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.

DRIVE FLANGE ASSEMBLY

The Drive Flange Assembly has been prelubricated 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 5 for recommended lubricants).

TABLE 5

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

⚠ CAUTION

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

AIR CONNECTIONS

All Nexen pneumatically actuated devices require clean, lubricated air for maximum performance and long life. This air must meet or exceed ISO 8573.1:2001 Class 4.4.3 quality. Your Nexen Distributor carries filters and lubricators specifically designed to operate with Nexen products.

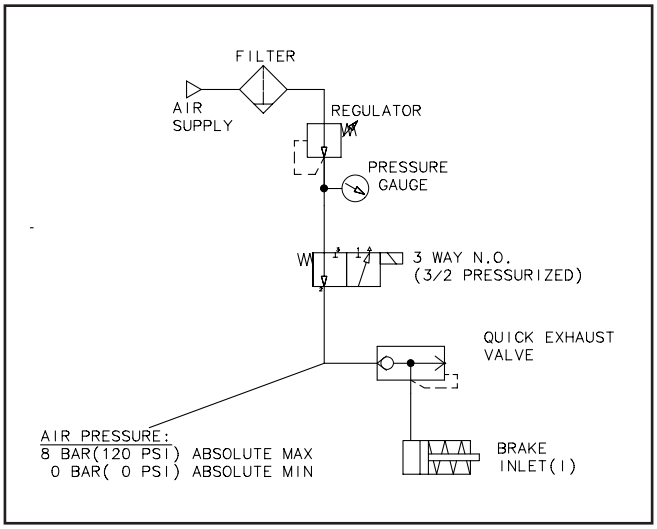
NOTE

Nexen recommends the Air Regulator used with Torque Limiters is a Constant Bleed Type used together with a 3-Way Solenoid Valve to ensure a total "crisp" release upon an overload condition.

⚠ CAUTION

Do not use rigid pipe or 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 centerline. Align air inlet port to the six o'clock down position to allow condensation in the air chamber to drain out of the exhaust port.

The following are common air supply schemes used with this product. These are examples and not an all-inclusive list. All air circuits to be used with this product must be designed following ISO 4414 guidelines.



SINGLE AIR PRESSURE CONTROL SYSTEM

Nexen's Single Air Pressure Control System consists of: Constant Bleed Type Regulator, Gauge, Quick Exhaust Shuttle Valve, Tee Fitting, 3-Way N.C. (Normally Closed) Solenoid Valve, and Air Line.

DUAL AIR PRESSURE CONTROL SYSTEM

Nexen's Dual Air Pressure Control System consists of: Air Filter, Air Regulator, Constant Bleed Type Regulator, two Tee Fittings, two 3-Way N.C. (Normally Closed) Solenoid Valves, Timer Delay Control, two Quick Exhaust Shuttle Valves, Gauge, and Air Line.

ELECTRICAL CONNECTIONS

LIMIT SWITCH
Single and Dual Air Pressure Systems

REFER TO FIGURE 9.

1. Connect the **GREEN** lead of the Limit Switch to ground.

2. Connect the **BLACK** lead of the Limit Switch to a 110V power supply or customer supplied Reset Switch.

NOTE

A customer supplied, manually operated, Reset Switch may be installed between the Limit Switch and 3-Way N.C. Solenoid Valve. This allows the operator to apply running air pressure to the Torque Limiter to aid in resetting the Torque Limiter. Flexible electrical conduit must be used when making electrical connections between the Limit Switch, 3-Way Air Inlet N.C. Solenoid Valve, and Power Supply. Do not use rigid electrical conduit for these connections.

3. Connect one lead of the 3-Way N.C. Solenoid Valve to the **RED** lead of the Limit Switch.

4. Connect the second wire of the 3-Way N.C. Solenoid Valve to ground or neutral.

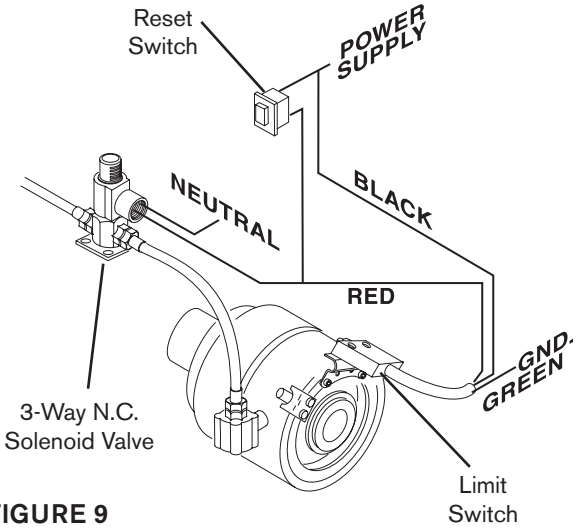


FIGURE 9

⚠ CAUTION

The WHITE wire on the Limit Switch is used only when connected to a Normally Open (N.O.) Solenoid Valve. Tape off the end of the WHITE wire when using Normally Closed (N.C.) Solenoid Valves. Voltage is present at the WHITE wire when the Limit Switch is actuated to the open condition.

TIMER DELAY CONTROL
Dual Air Pressure Control System

REFER TO FIGURE 10.

1. Connect Terminal **A1** of the Timer Delay Control to a power supply.

2. Connect one lead wire of the 3-Way N.C. Solenoid Valve to Terminal **A1** of the Timer Delay Control.

3. Connect the other lead wire of the 3-Way N.C. Solenoid Valve to Terminal **16** of the Timer Delay Control.

4. Connect the Jumper wire between Terminals **15** and **A2** of the Timer Delay Control to ground.

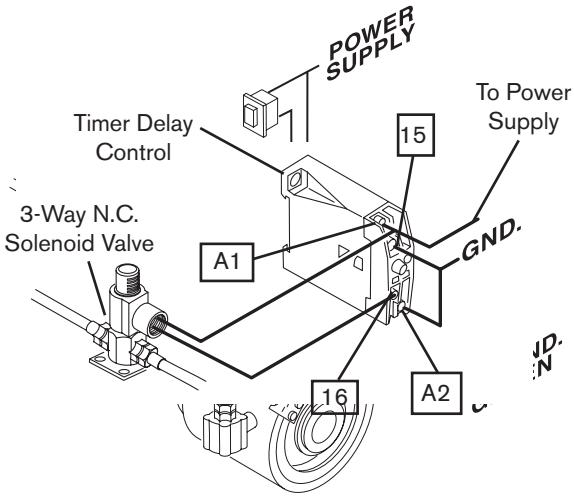


FIGURE 10

ADJUSTMENTS

LIMIT SWITCH

REFER TO FIGURE 11.

1. Apply air pressure to the Torque Limiter.
2. Rotate the Drive Flange Assembly until the positioning balls are seated into the detents.
3. Hold the Reset Switch in the **ON** position to maintain Torque Limiter in engaged position.
4. Insert a $^{11}/_{64}$" [4.35 mm] Spacer between the Limit Switch Plunger and the Torque Limiter Dowel Pin.
5. Slide the Limit Switch (Item 55) on the Bracket (Item 57) until the Limit Switch Plunger is fully depressed against the Spacer and Dowel Pin (Item 52).
6. Tighten the screws and nut securing the Limit Switch to the Mounting Bracket.
7. Release air pressure to the Torque Limiter and remove the Spacer.
8. Run the machine to verify proper operation of the Torque Limiter.
9. If nuisance tripping occurs, slide the Limit Switch away from Dowel Pin until nuisance tripping stops.

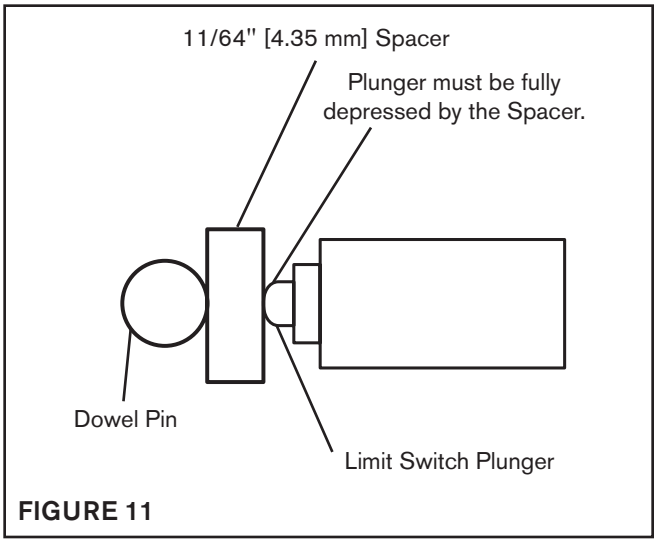


FIGURE 11

TIMER DELAY CONTROL

REFER TO FIGURE 12.

1. Set DIP switches on the side of the Timer Delay Control to the desired time delay.
2. Rotate the Timer Delay Control adjustment knob to fine tune the Timer Delay Control.

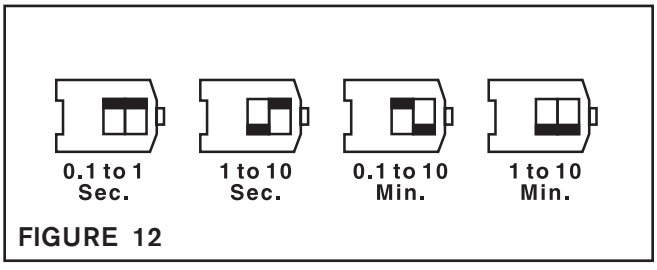


FIGURE 12

INTERFACE DESIGN

The Torque Limiter interface consists of 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.

⚠ CAUTION

The temperature limits for this product line are 4.5° - 104° C (40°-220° F).

⚠ WARNING

Never exceed maximum operating speeds listed for your product (See Table 4).

TABLE 4 Maximum Allowable Speed

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

TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	SOLUTION
Failure to engage	Insufficient air pressure to the Torque Limiter	Check the air line for leaks and replace damaged air lines.
	Damaged or leaking 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	Limit Switch not properly adjusted	Adjust the Limit Switch (See ADJUSTMENTS section.)

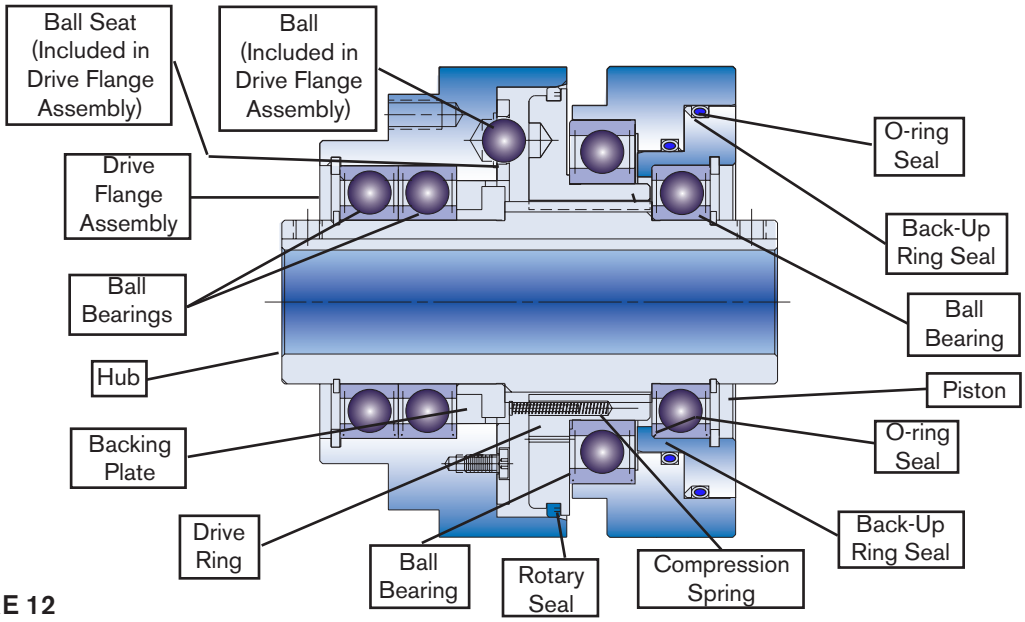


FIGURE 12

TORQUE LIMITER REMOVAL & DISASSEMBLY

REFER TO FIGURES 13 & 14.

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.

⚠ CAUTION

Correct alignment of Torque Limiter internal components is critical for proper operation of the Torque Limiter. Before disassembly, mark Hub, Cylinder, and Drive Flange with chalk alignment marks to ensure correct alignment of internal components when reassembling Torque Limiter.

⚠ CAUTION

Working with spring loaded or tension loaded fasteners and devices can cause injury. Wear safety glasses and take the appropriate safety precautions.

4. Remove the Retaining Ring (Item 6) from the Hub (Item 7) on the Drive Flange Assembly (Item 19) end of the Torque Limiter.

5. Supporting Drive Flange Assembly (Item 19), press Hub (Item 7) and Cylinder/Piston Assembly out of Drive Flange.

6. Remove the Rotary Seal (Item 15) from the Cylinder/Piston Assembly (Items 8 and 9).

7. Remove Retaining Ring (Item 6) from Hub (Item 7) on Cylinder/Piston end of Torque Limiter.

8. Supporting Cylinder/Piston Assembly, press Hub (Item 7) out of Cylinder/Piston Assembly.

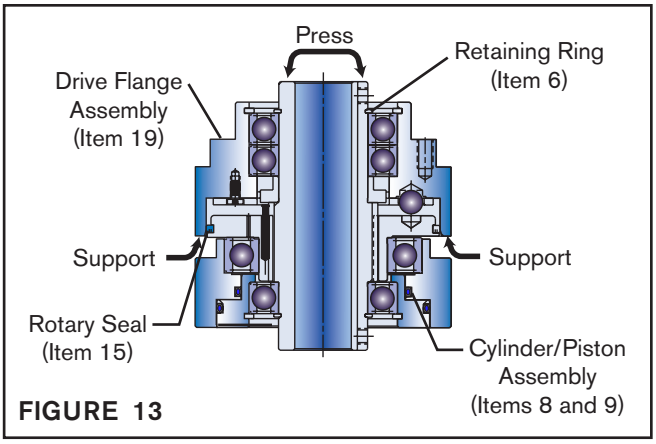


FIGURE 13

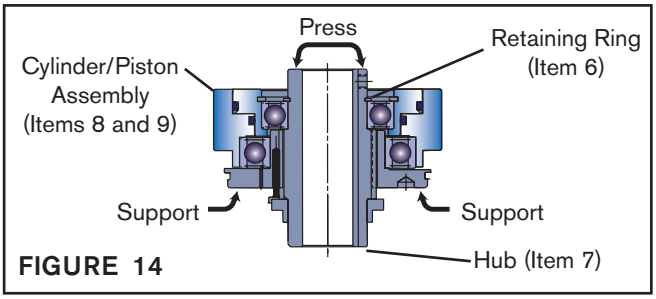


FIGURE 14

CYLINDER/PISTON BALL BEARING AND O-RING SEALS

⚠ CAUTION

Working with spring loaded or tension loaded fasteners and devices can cause injury. Wear safety glasses and take the appropriate safety precautions.

REFER TO FIGURES 15-17.

1. Remove the old Compression Springs (Item 17) and Spring Stiffener Pins (Item 16) from the Drive Ring (Item 10).

2. Separate the Piston (Item 8) from Cylinder (Item 9).

3. Remove old O-ring Seals (Items 12,13) and Back-Up Ring Seals (Items 11 and 14).

4. Remove the Retaining Ring (Item 5) from the Piston (Item 8).

5. Press the old Ball Bearing (Item 21) out of the Piston (Item 8).

NOTE

Do not reuse 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 new Ball Bearing into the Piston (Item 8).

8. Reinstall Retaining Ring (Item 5).

9. Press the old Ball Bearing (Item 22) and Drive Ring (Item 10) out of Cylinder (Item 9).

10 Using a bearing puller, remove the old Ball Bearing (Item 22) from the Drive Ring (Item 10).

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 new Ball Bearing into Cylinder (Item 9).

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).

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.

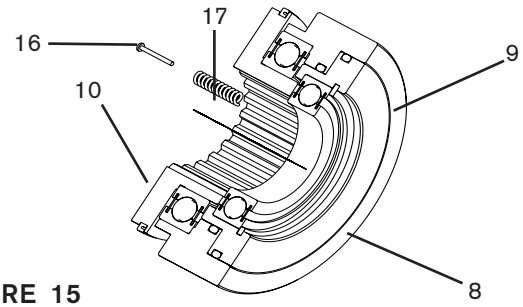


FIGURE 15

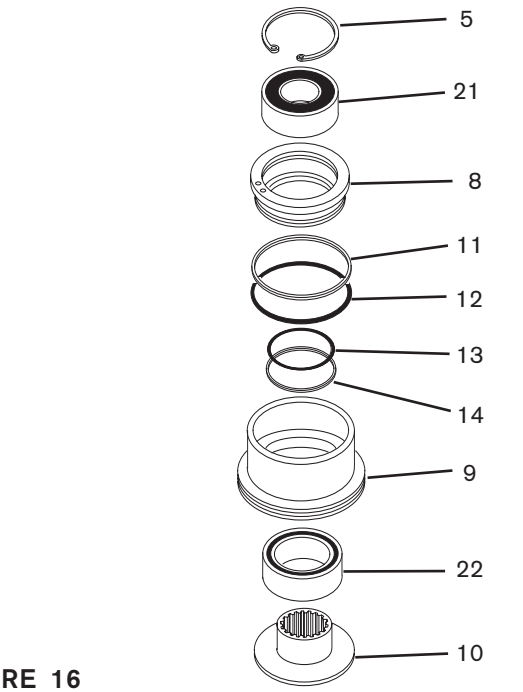


FIGURE 16

FIGURE 17

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.

15. Install new O-ring Seals (Items 11 and 14) and new Back-Up Ring Seals (Items 11 and 14).

16. Press the Piston (Item 8) back into Cylinder (Item 9).

DRIVE FLANGE BALL BEARINGS

⚠ CAUTION

Working with spring loaded or tension loaded fasteners and devices can cause injury. Wear safety glasses and take the appropriate safety precautions.

REFER TO FIGURE 18.

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

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.

   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).

5. Reinstall Retaining Ring (Item 5).

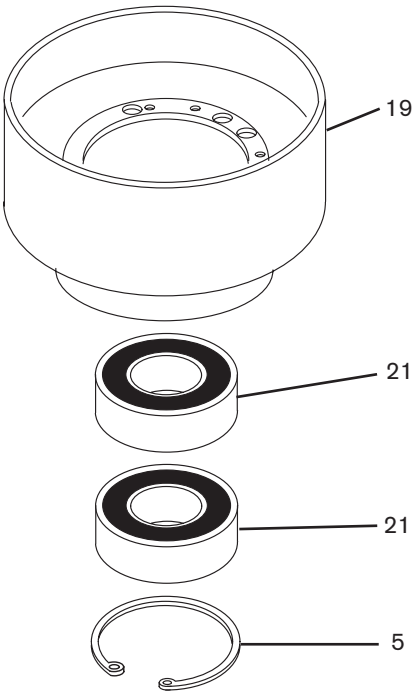


FIGURE 18

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 in Figure 19.

REFER TO FIGURES 19-23.

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).

⚠ CAUTION

Working with spring loaded or tension loaded fasteners and devices can cause injury. Wear safety glasses and take the appropriate safety precautions.

2. Reinstall Retaining Ring (Item 6).

⚠ CAUTION

Do not over lubricate Drive Flange Assembly. Over lubricating creates a hydraulic effect within the Torque Limiter which will adversely affect the break-away torque.

3. Lubricate the Drive Flange Assembly (Item 19) (See LUBRICATION section for details).

4. Install new Compression Springs (Items 17) and Spring Stiffener Pins (Item 16) into the Drive Ring (Item 10).

NOTE

The back of the Rotary Seal must be installed facing the Drive Flange Assembly end of Torque Limiter.

5. Install the new Rotary Seal (Item 15).

6. Lubricate the Hub spline with NEVER-SEEZ®.

NOTE

Care must be exercised when pressing Cylinder/Piston Assembly onto Hub and into Drive Flange Assembly to avoid damage to the Rotary Seal.

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.

8. Reinstall Retaining Ring (Item 6).

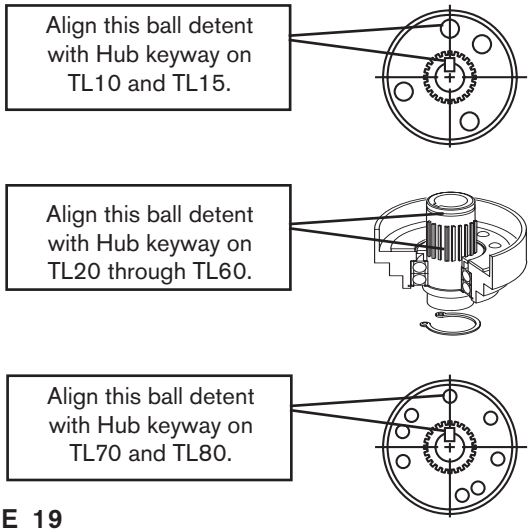


FIGURE 19

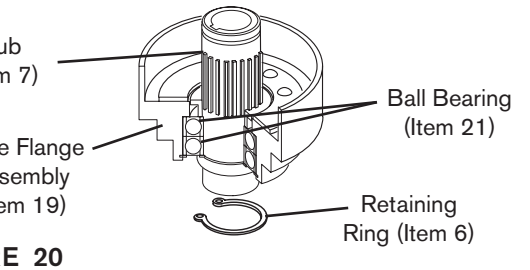


FIGURE 20

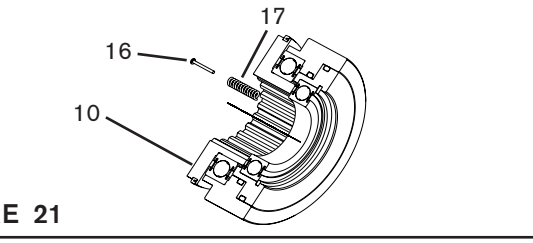


FIGURE 21

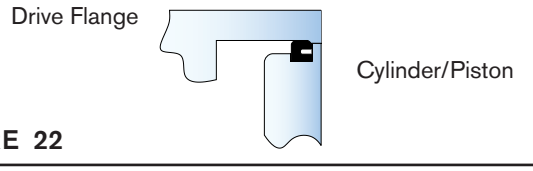


FIGURE 22

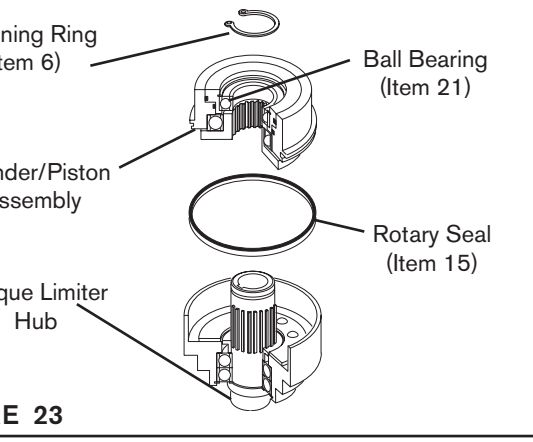


FIGURE 23

REPAIR KITS

The following items are included in each repair kit:

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

ACCESSORIES

SINGLE AIR PRESSURE CONTROL SYSTEM

Product Number 801578

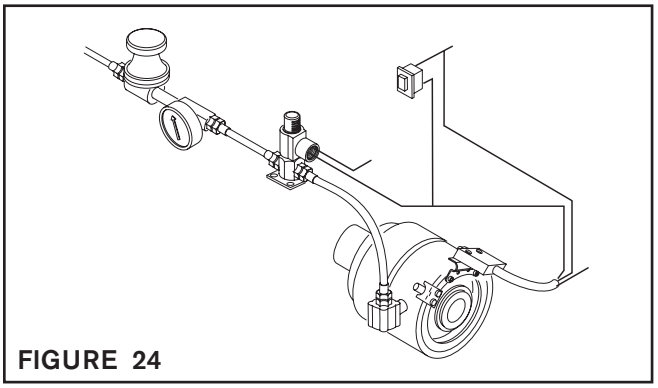


FIGURE 24

DUAL AIR PRESSURE CONTROL SYSTEM

Product Number 801579

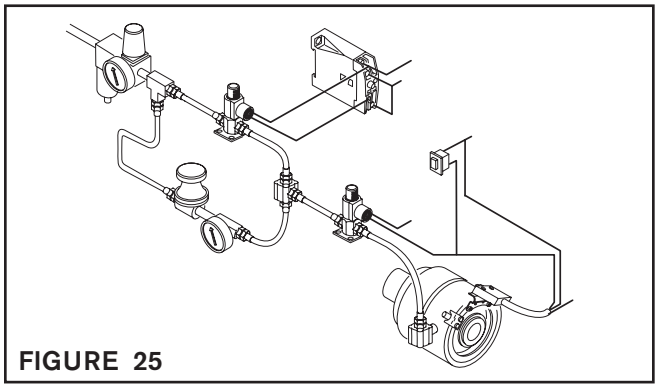


FIGURE 25

REPLACEMENT PARTS LIST

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.

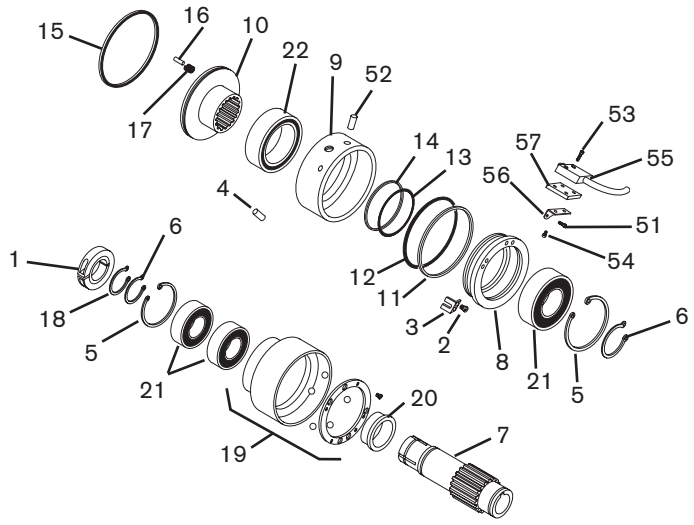


FIGURE 26

REPLACEMENT PARTS LIST (continued)

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	Cap Screw	2	2	2	2	2	2	2	2	2
3	Anti-Rotation Clip	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 Disc	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
51	Cap Screw (10-24 x 3/8)	4	4	4	4	4	4	4	4	4
52	Dowel Pin (Limit Switch)	1	1	1	1	1	1	1	1	1
53	Cap Screw (832 x 5/8)	2	2	2	2	2	2	2	2	2
54	Cap Screw (823 x 1/4)	2	2	2	2	2	2	2	2	2
55	Limit Switch	1	1	1	1	1	1	1	1	1
56	Mounting Bracket (Limit Switch)	1	1	1	1	1	1	1	1	1
57	Mounting Bracket (Limit Switch)	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.

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.

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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.

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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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