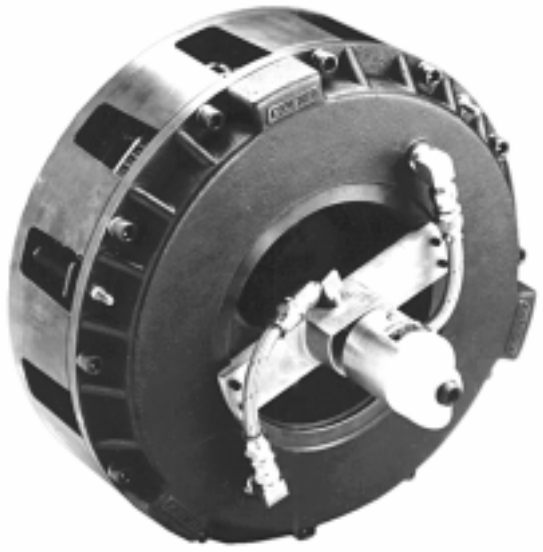
nexen®

AIR CHAMP® PRODUCTS

User Manual



DFE and QFE

Models 1150, 1650, 2200, and 2500

FORM NO. L-20021-D-0501

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.

Technical Support:
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www.nexengroup.com

WARNING

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.

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

ISO 9001 Certified

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INTRODUCTION

Read this manual carefully, making full use of its explanations and instructions. The “Know How” of safe, continuous, trouble-free operation depends on the degree of your understanding of the system and your willingness to keep all components in proper operating condition. Pay particular attention to all NOTES, CAUTIONS, and WARNINGS to avoid the risk of personal injury or property damage. It is important to understand that these NOTES, CAUTIONS, and WARNINGS are not exhaustive. Nexen cannot possibly know or evaluate all conceivable methods in which service may be performed, or the possible hazardous consequences of each method. Accordingly, anyone who uses a procedure that is not recommended by Nexen must first satisfy themselves that neither their safety or the safety of the product will be jeopardized by the service method selected.

Nexen’s pneumatically actuated Dual Faced Elements (DFE) and Quad Faced Elements (QFE) are used as a clutch or brake. These elements are intended for horizontal mounting only. The clutch is shaft mounted and the brake is either shaft end mounted or through shaft mounted.

The DEF or QFE, and Air Union Bracket are sold separately.

INSTALLATION- BRAKE

NOTE: The DFE and QFE Elements are partially assembled at the factory. Separate the Elements into sub-assemblies before installation.

DFE

1. Provide a piloting flange and 5/8-11 tapped holes to a non-rotating surface of the machine (See Figure 1).

   NOTE: Control perpendicularly between the machine shaft and the mounting surface of the Housing (Item 2) as the cap screws are tightened. Use a dial indicator for measurements and the machine surfaces of the housing posts as a reference surface. Perpendicularly should be less than 0.015'' [0.381 mm].

2. Using customer supplied cap screws, secure the Housing (Item 2) to the non-rotating part of the machine (See Figure 1).

3. Tighten the customer supplied cap screws to 233 Ft. Lbs. [315.90 N•m] torque.

4. Install a customer supplied key into the shaft; then, slide the Hub (Item 1) onto the shaft (See Figure 1).

   NOTE: The axial location of the Hub (Item 1) is critical to the proper operation of the DFE–BRAKE. Refer to Table 1 and Figure 2 for correct Hub location.

5. Using a customer supplied set screw, secure the Hub (Item 1) to the machine shaft (See Figure 1).

6. Coat the teeth of the Hub (Item 1) with Never-Seez®.

7. Slide the Disc Assembly (Item 4) onto the Hub (Item 1) (See Figure 1).

   NOTE: On DFE 1650 and DFE 2200 the Piston and Pressure Plate are one item.

8. Assemble the Cylinder (Item 5), Piston (Item 6), and Pressure Plate (Item 7) to the Housing (Item 2) (See Figure 1).

9. Using the Cap Screws (Item 14) and Lockwashers (Item 20), secure the Cylinder (Item 5) to the Housing (Item 2).

10. Alternately and evenly tighten the Cap Screws (Item 14) to 119 Ft. lbs. [161.34 N•m] torque..

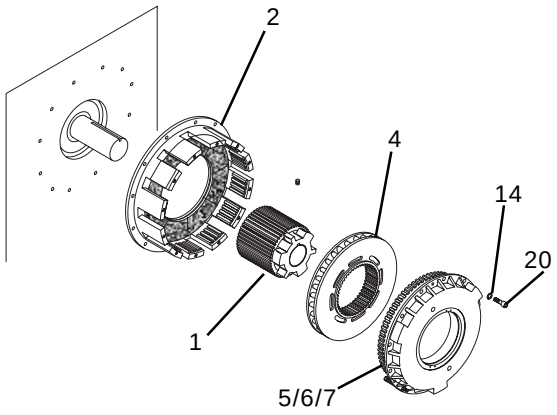

FIGURE 1

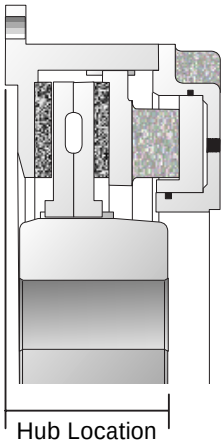

FIGURE 2

TABLE 1

DFE HUB LOCATION	
MODEL	HUB LOCATION
DFE-1150	4.375" [111.125 mm]
DFE-1650	5.0781" [128.907 mm]
DFE-2200	6.312" [160.324mm]
DFE-2600	6.250" [158.750 mm]

1. Provide a piloting flange and 5/8-11 tapped holes to a non-rotating surface of the machine (See Figure 3).

   NOTE: Control perpendicularly between the machine shaft and the mounting surface of the Housing (Item 2) as the cap screws are tightened. Use a dial indicator for measurements and the machine surfaces of the housing posts as a reference surface. Perpendicularly should be less than 0.015" [0.381 mm].

2. Using customer supplied cap screws, secure the Housing (Item 2) to the non-rotating part of the machine (See Figure 3).

3. Tighten the customer supplied cap screws to 233 Ft. Lbs. [315.90 N•m] torque.

4. Install a customer supplied key into the shaft; then, slide the Hub (Item 1) onto the shaft (See Figure 3).

   NOTE: The axial location of the Hub (Item 1) is critical to the proper operation of the QFE–BRAKE. Refer to Table 2 and Figure 4 for correct Hub location.

5. Using a customer supplied set screw, secure the Hub (Item 1) to the machine shaft (See Figure 3).

6. Coat the teeth of the Hub (Item 1) with Never-Seez®.

7. Slide the the first Disc Assembly (Item 4) onto the Hub (Item 1) (See Figure 3).

8. Slide the Facing Plate (Item 24) onto the Hub (Item 1) (See Figure 3).

9. Slide the second Disc Assembly (Item 4) onto the Hub (Item 1) (See Figure 3).

   NOTE: On QFE 1650 and QFE 2200 the Piston and Pressure Plate are one item.

10. Assemble the Cylinder (Item 5), Piston (Item 6), and Pressure Plate (Item 7) to the Housing (Item 2) (See Figure 3).

11. Using the Cap Screws (Item 14) and Lockwashers (Item 20), secure the Cylinder (Item 5) to the Housing (Item 2).

12. Alternately and evenly tighten the Cap Screws (Item 14) to the recommended torque (See Table 2).

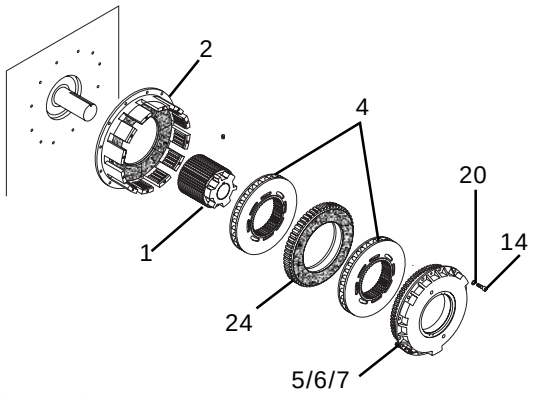

FIGURE 3

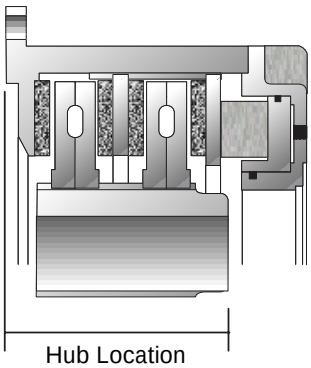

FIGURE 4

TABLE 2

QFE HUB LOCATION	
MODEL	HUB LOCATION
QFE-1150	6.781" [172.237 mm]
QFE-1650	6.250" [158.750 mm]
QFE-2200	8.937" [266.999 mm]
QFE-2600	8.968" [277.787 mm]

INSTALLATION- CLUTCH

NOTE: The DFE and QFE Elements are partially assembled at the factory. Separate the Elements into sub-assemblies before installation.

DFE

NOTE: Control perpendicularly between the machine shaft and the mounting surface of the Housing (Item 2) as the cap screws are tightened. Use a dial indicator for measurements and the machine surfaces of the housing posts as a reference surface. Perpendicularly should be less than 0.015'' [0.381 mm].

1. Using customer supplied cap screws, secure the Housing (Item 2) to the bearing supported sheave or sprocket (See Figure 5).

2. Tighten the customer supplied cap screws to 233 Ft. Lbs. [315.90 N•m] torque.

3. Install a customer supplied key into the shaft; then, slide the Hub (Item 1) onto the shaft (See Figure 5).

   NOTE: The axial location of the Hub (Item 1) is critical to the proper operation of the DFE–CLUTCH. Refer to Table 3 and Figure 6 for correct Hub location.

4. Using a customer supplied set screw, secure the Hub (Item 1) to the machine shaft (See Figure 5).

5. Coat the teeth of the Hub (Item 1) with Never-Seez®.

6. Slide the Disc Assembly (Item 4) onto the Hub (Item 1) (See Figure 5).

   NOTE: On DFE 1650 and DFE 2200 the Piston and Pressure Plate are one item.

7. Assemble the Cylinder (Item 5), Piston (Item 6), and Pressure Plate (Item 7) to the Housing (Item 2) (See Figure 5).

8. Using the Cap Screws (Item 14) and Lockwashers (Item 20), secure the Cylinder (Item 5) to the Housing (Item 2).

9. Alternately and evenly tighten the Cap Screws (Item 14) to 119 Ft. lbs. [161.34 N•m] torque.

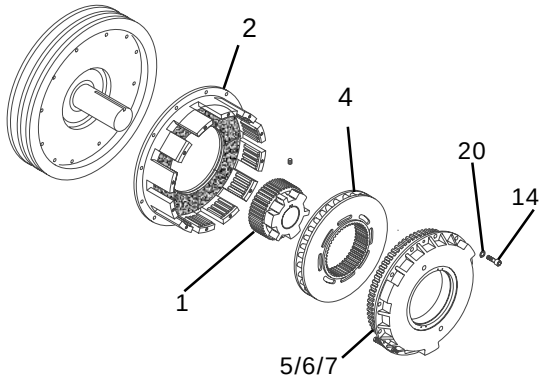

FIGURE 5

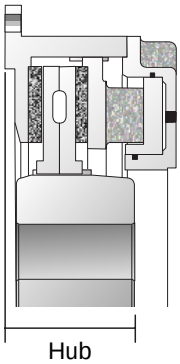

FIGURE 6

TABLE 3

DFE HUB LOCATION	
MODEL	HUB LOCATION
DFE-1150	4.375" [111.125 mm]
DFE-1650	5.0781" [128.907 mm]
DFE-2200	6.312" [160.324mm]
DFE-2600	6.250" [158.750 mm]

NOTE: Control perpendicularly between the machine shaft and the mounting surface of the Housing (Item 2) as the cap screws are tightened. Use a dial indicator for measurements and the machine surfaces of the housing posts as a reference surface. Perpendicularly should be less than 0.015" [0.381 mm].

1. Using customer supplied cap screws, secure the Housing (Item 2) to the bearing supported sheave or sprocket (See Figure 7).

2. Tighten the customer supplied cap screws to 233 Ft. Lbs. [315.90 N•m] torque.

3. Install a customer supplied key into the shaft; then, slide the Hub (Item 1) onto the shaft (See Figure 7).

   NOTE: The axial location of the Hub (Item 1) is critical to the proper operation of the QFE–CLUTCH. Refer to Table 4 and Figure 8 for correct Hub location.

4. Using a customer supplied set screw, secure the Hub (Item 1) to the machine shaft (See Figure 7).

5. Coat the teeth of the Hub (Item 1) with Never-Seez®.

6. Slide the the first Disc Assembly (Item 4) onto the Hub (Item 1) (See Figure 7).

7. Slide the Facing Plate (Item 24) onto the Hub (Item 1) (See Figure 7).

8. Slide the second Disc Assembly (Item 4) onto the Hub (Item 1) (See Figure 7).

   NOTE: On QFE 1650 and QFE 2200 the Piston and Pressure Plate are one item.

9. Assemble the Cylinder (Item 5), Piston (Item 6), and Pressure Plate (Item 7) to the Housing (Item 2) (See Figure 7).

10. Using the Cap Screws (Item 14) and Lockwashers (Item 20), secure the Cylinder (Item 5) to the Housing (Item 2).

11. Alternately and evenly tighten the Cap Screws (Item 14) to 119 Ft. lbs. [161.34 N•m] torque.

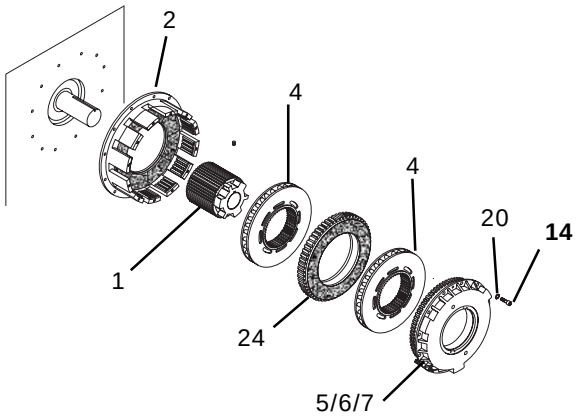

FIGURE 7

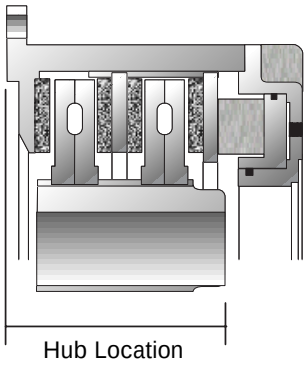

FIGURE 8

TABLE 4

QFE HUB LOCATION	
MODEL	HUB LOCATION
QFE-1150	6.781" [172.237 mm]
QFE-1650	6.250" [158.750 mm]
QFE-2200	8.937" [266.999 mm]
QFE-2600	8.968" [277.787 mm]

AIR LINE CONNECTIONS

BRAKE

1. Apply pipe sealant to the two Elbow Fittings (Item 26); then, install two Elbow Fittings into the air inlet holes located 180^0 at in the Cylinder (Item 5) (See Figure 9).

2. Install the two Hose Assemblies (Item 25) into a customer supplied Tee Fitting (See Figure 9).

3. Connect the two Hose Assemblies (Item 25) to the two Elbow Fittings (Item 26) installed in the Cylinder (Item 5) (See Figure 9).

4. Connect an air line from the air supply directly to the Tee Fitting (See Figure 9).

   NOTE: The Hose Assemblies must be routed as shown (See Figure 9). Do not use rigid pipe or tubing for air lines.

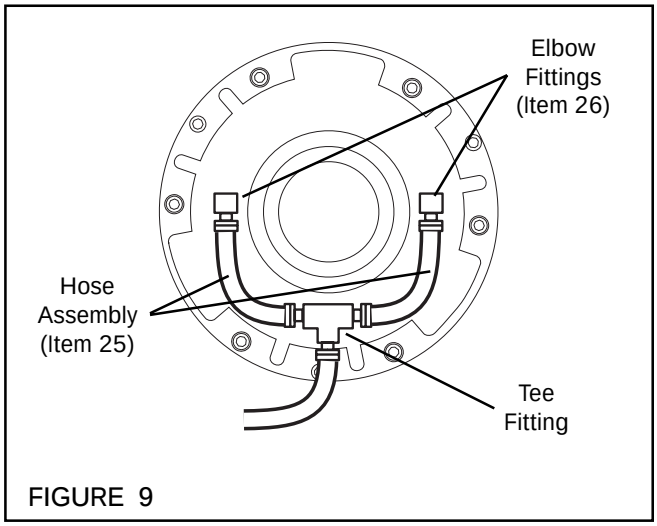

FIGURE 9

CLUTCH

1. If the Rotary Air Union (Item 23) and Rotary Air Union Bracket (Item 21) are not assembled, apply pipe sealant to the threads of the Rotary Air Union and screw the rotary Air Union into the Rotary air Union Bracket (See Figure 10).

2. Apply a drop of Loctite® 242 to the threads of the four Socket Head Cap Screws (Item 22) provided with the Rotary Air Union (Item 23) and the Rotary Air Union Bracket (Item 21); then, secure the Rotary Air Union Bracket to the Cylinder (Item 5) (See Figure 10).

3. Tighten the four Socket head Cap Screws (Item 22) to 5.5 Ft. Lbs. [7.45 Nm] torque.

4. Apply pipe sealant to the threads of the Elbow Fittings (Item 26); then, install the Elbow Fittings into the Rotary Air Union (Item 23) and the Cylinder (Item 5) (See Figure 10).

5. Connect the two Hose Assemblies (Item 25) to the four Elbow Fittings (Item 26) (See Figure 10).

6. Connect the Hose Assemblies (Item 25) to the Rotary Air Union (See Figure 10).

   NOTE: The Hose Assemblies must be routed as shown (See Figure 10). Do not use rigid pipe or tubing for air lines.

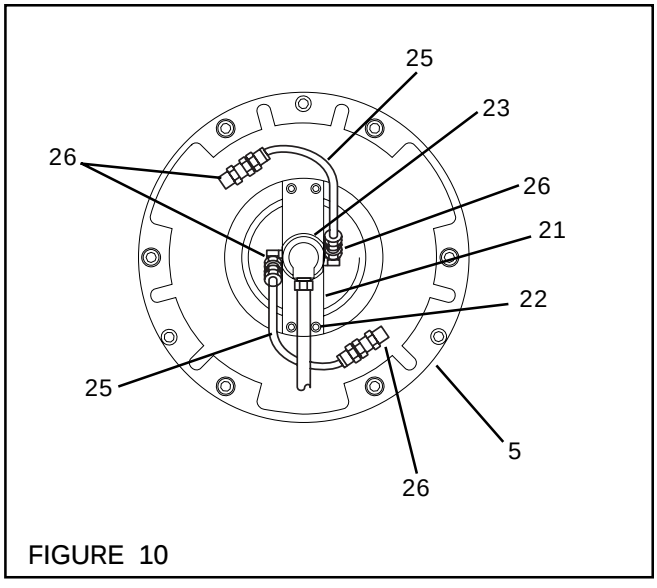

FIGURE 10

LUBRICATION

NOTE: Pneumatically actuated devices require clean, pressure regulated, and lubricated air for maximum performance and long life. The most effective and economical way to lubricate Nexen Clutches and Brakes is with an Air Line Lubricator, which injects oil into the pressurized air, forcing an oil mist into the air chamber.

Locate the lubricator above and within ten feet of the Clutch or Brake, and use a low viscosity oil such as SAE-10.

Synthetic lubricants are not recommended.

LUBRICATOR DRIP RATE SETTINGS

NOTE: These 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 counter-clockwise 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 counter-clockwise one-third turn.
8. Open the air line to the unit.

OPERATION

1. Before placing the DFE or QFE into operation verify that all Cap Screws are tightened to the recommended torque (See Table 5).
2. Never exceed the maximum recommended operation speeds for the DFE or QFE (See Table 6).
3. Periodically inspect all air line connections to make sure that they are securely tightened.
4. Inspect the Friction Facings for wear and replace them when they are approximately 0.312'' [7.924 mm] thick.

TABLE 5

RECOMMENDED TIGHTENING TORQUES	
Housing Cap Screw	233 ft. lbs. [315.90 Nm]
Cap Screw (Item 9)	13 ft. lbs. [17.62 Nm]
Cap Screw (Item 14)	119 ft. lbs. [161.34 Nm]
Cap Screw (Item 22)	5.5 ft. lbs. [7.45Nm]

TABLE 6

MAXIMUM RECOMMENDED OPERATING SPEEDS		
MODELS / DFE and QFE	DISC	HOUSING / CYLINDER
1150	2200 RPM	1600 RPM
1650	1500 RPM	1200 RPM
2200	1100 RPM	900 RPM
2600	1000 RPM	800 RPM

TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	SOLUTION
Failure to disengage.	Unexhausted air due to a control valve malfunction.	Replace the control valve.
	Rigid pipe or tubing used for air lines.	Use flexible tubing for air lines.
	Weak or broken Compression Springs.	Replace the Compression Springs.
Failure to engage.	Air not getting to the DFE or QFE due to a control valve malfunction.	Replace the control valve.
	Friction lock due to a lack of lubrication in the air chamber.	Check the air line lubricator.
Loss of torque.	Worn or contaminated Friction Facings.	Replace the Friction Facings.

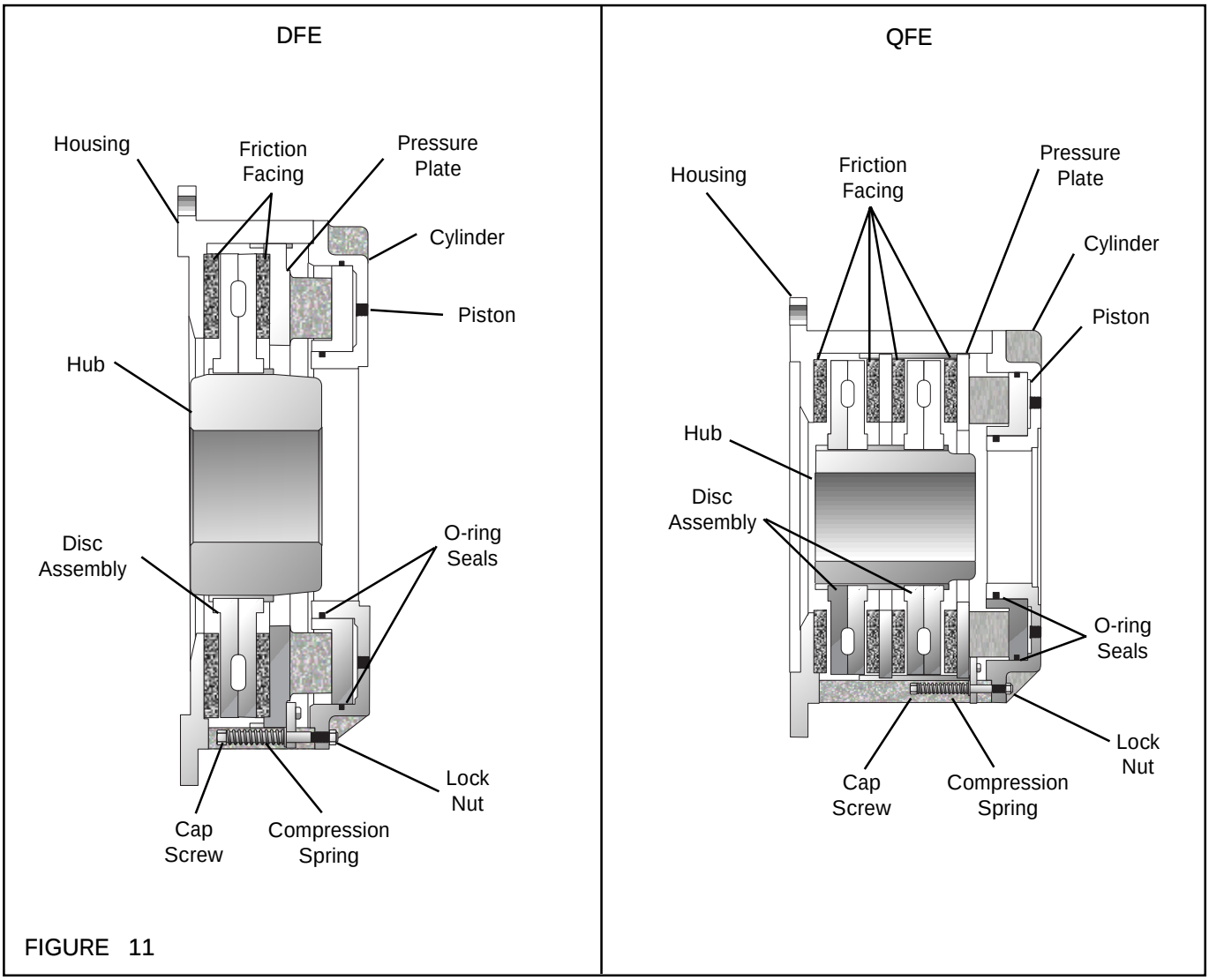

FIGURE 11

FRICTION FACING, COMPRESSION SPRING, AND O-RING SEAL REPLACEMENT- DFE

NOTE: The DFE does not have to be removed from the motor shaft to replace the Friction Facings and O-ring Seals.

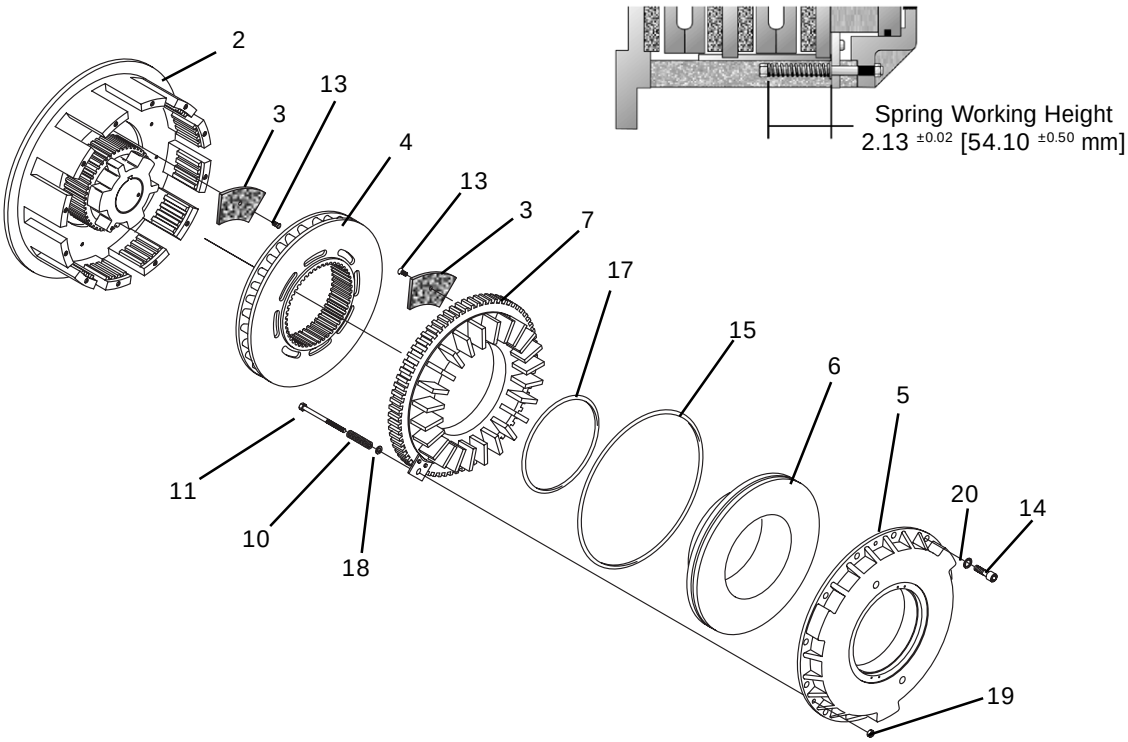

FIGURE 12
DFE 1150 AND DFE 2500

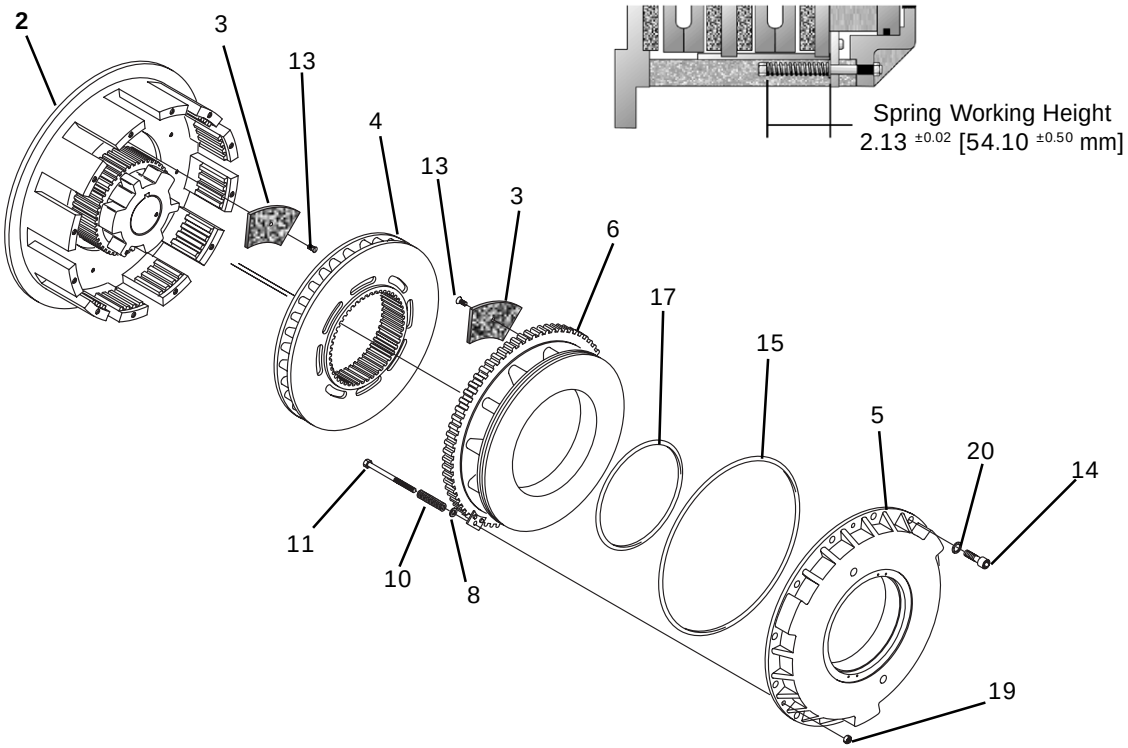

FIGURE 13
DFE 1650 AND DFE 2200

1. Disconnect the air supply from the DFE.

2. Remove the Lock Nuts (Item 19): then, remove the Cap Screws (Item 11), Compression Springs (Item 10), and Washers (Item 18) (See Figure 12 or 13).

3. Remove the Socket Head Cap Screws (Item 14) and Lockwashers (Item 20) (See Figure 12 or 13).

4. Remove the Cylinder (Item 5) (See Figure 12 or 13).

   NOTE: Applying low air pressure aids in the separation of the Cylinder (Item 5) from the Piston (Item 6) and Pressure Plate (Item 7) (See Figure 12 or 13).

   NOTE: On DFE Models 1650 and 2200 the Pressure Plate and Piston are one unit (Item 6) (See Figure 13).

5. Slide the Piston (Item 6) and Pressure Plate (Item 7) out of the Housing (Item 5) (See Figure 12 or 13).

6. Slide the Disc Assembly (Item 4) out of the Housing (Item 5) (See Figure 12 or 13).

7. Remove the old Machine Screws (Item 13) and the old Friction Facings (Item 3) from the Housing (Item 2), Disc Assembly (Item 4), and Pressure Plate (Item 7 on DFE 1150 and DFE 2500, or Item 6 on DFE 1650 and 2200) (See Figure 12 or 13).

8. Using new Machine Screws (Item 13), install the new Friction Facings (Item 3) onto the Housing (Item 2), Disc Assembly (Item 4), and Pressure Plate (Item 7 on DFE 1150 and DFE 2500, or Item 6 on DFE 1650 and DFE 2200) (See Figure 12 or 13).

9. Tighten the new Machine Screws (Item 3) to 16 Ft. Lbs. [21.59 N•m] torque.

10. Slide the Disc Assembly (Item 4) back into the Housing (Item 2) (See Figure 12 or 13).

11. Remove the old O-ring Seals (Items 15 and 17) from the Piston (Item 6 on DFE 1150 and 2500) and Pressure Plate (Item 7 on DFE 1150 and 2500) or the Piston/Pressure Plate (Item 6) on DFE 1650 and 2200) (See Figure 12 or 13).

13. Coat the new O-ring Seals (Items 15 and 17) with fresh o-ring lubricant; then, install the new O-ring Seals into the Piston (Item 6) and Pressure Plate (Item 7) or Piston/Pressure Plate (Item 6) (See Figure 12 or 13).

14. Slide the Piston (Item 6) and Pressure Plate (Item 7) or Piston/Pressure Plate (Item 6) back into the Cylinder (Item 5) (See Figure 12 or 13).

15. Slide new Compression Springs (Item 10) and Washers (Item 18) onto the Cap Screws (Item 11); then install the Cap Screws, Compression Springs, and Washers into the Cylinder, Piston, and Pressure Plate (See Figure 12 or 13).

16. Install the Lock Nuts (Item 19); then tighten the Lock Nuts until a spring working height of 2.13'' [54.10 mm] is achieved (See Figure 12 or 13).

17. Slide the Cylinder, Piston, and Pressure Plate back into the Housing (See Figure 12 or 13).

18. Apply a drop of Loctite 242 to the threads of the Cap Screws (Item 14); then, using the CapScrews and Lockwashers (Item 20, secure the Cylinder, Piston, and Pressure Plate to the Housing (See Figure 12 or 13).

19. Alternately and evenly tighten the Cap Screws (Item 14) to 110 Ft. Lbs. [148.43 N•m] torque (See Figure 12 or 13).

FRICTION FACING, COMPRESSION SPRING, AND O-RING SEAL REPLACEMENT- QFE

NOTE: The QFE does not have to be removed from the motor shaft to replace the Friction Facings and O-ring Seals.

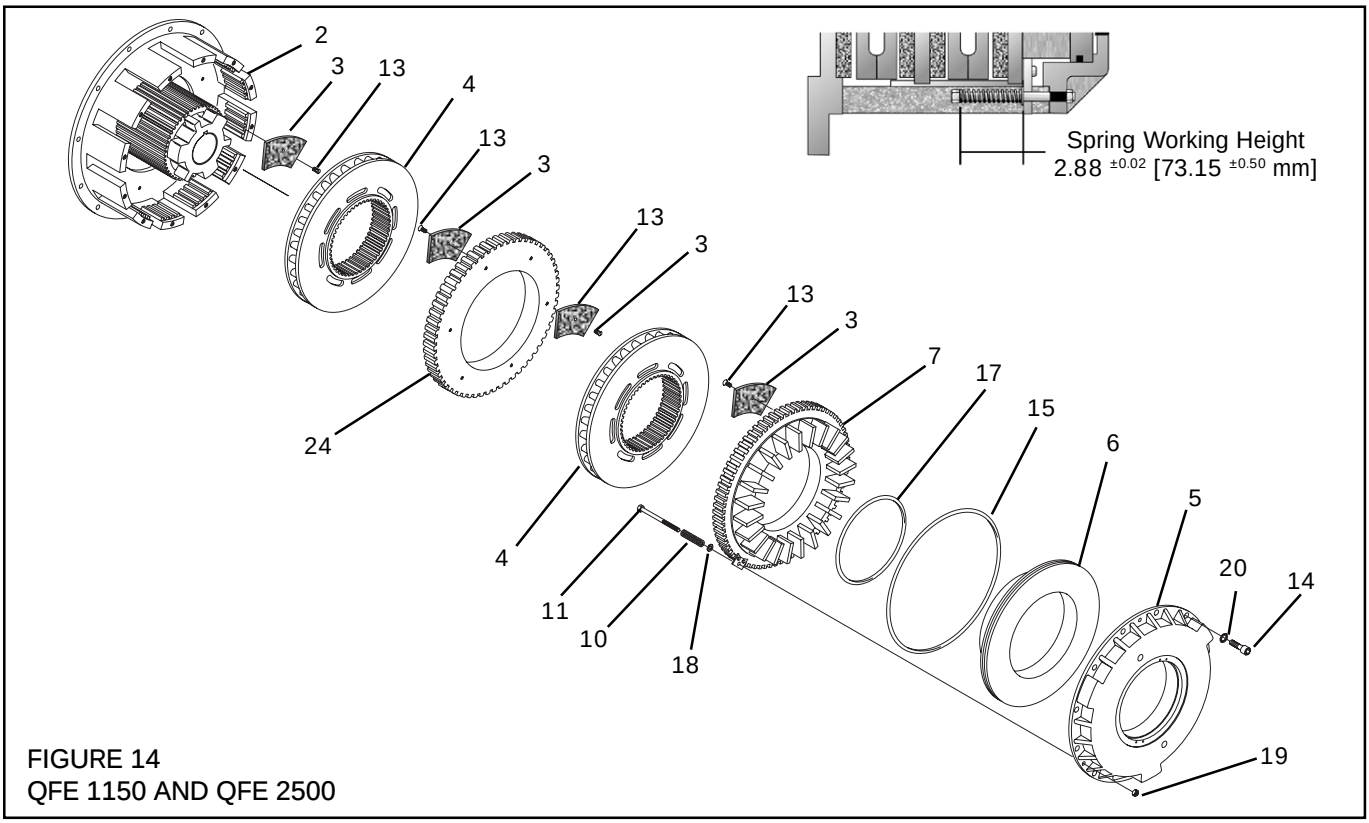

FIGURE 14
QFE 1150 AND QFE 2500

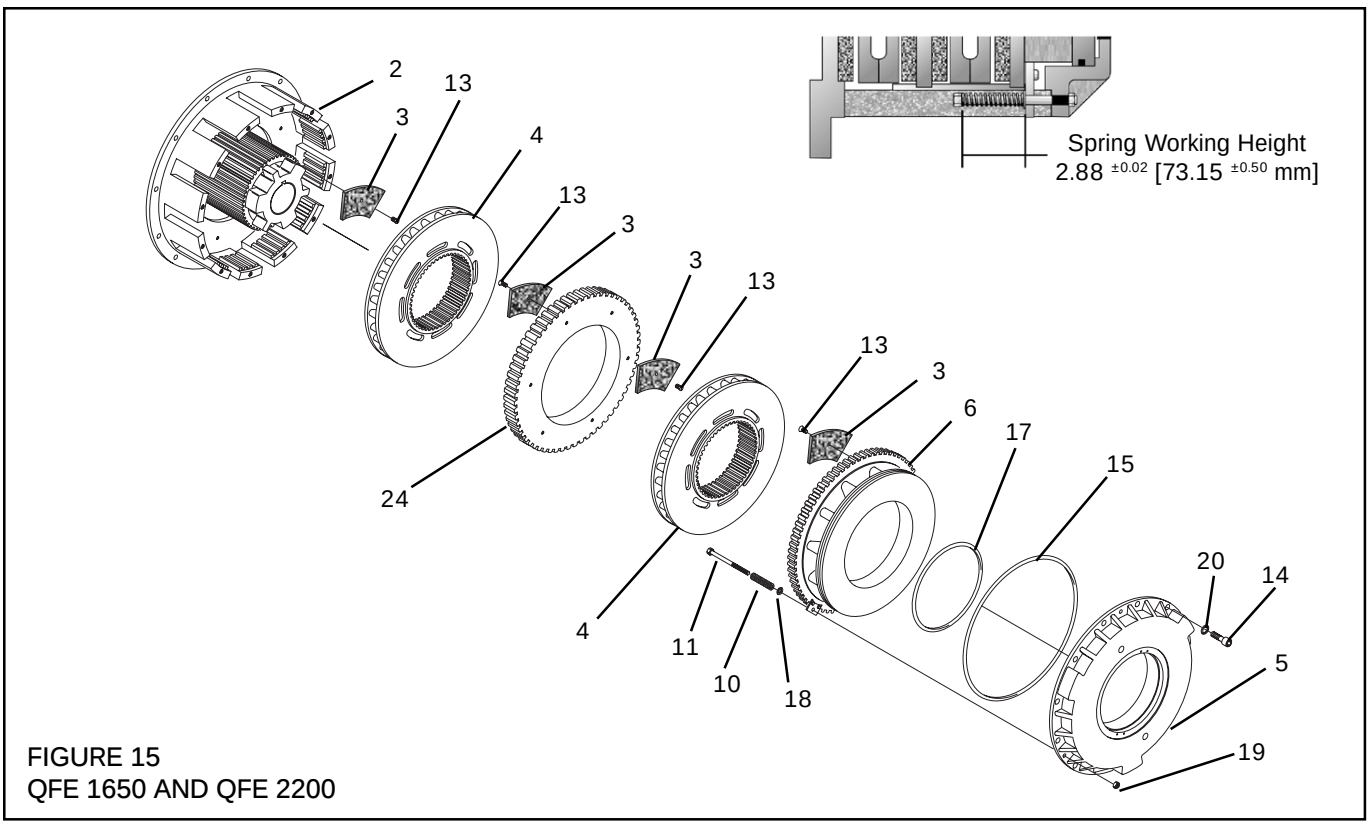

FIGURE 15
QFE 1650 AND QFE 2200

1. Disconnect the air supply from the QFE.
2. Remove the Lock Nuts (Item 19): then, remove the Cap Screws (Item 11), Compression Springs (Item 10), and Washers (Item 18) (See Figure 14 or 15).
3. Remove the Socket Head Cap Screws (Item 14) and Lockwashers (Item 20) (See Figure 14 or 15).
4. Remove the Cylinder (Item 5) (See Figure 14 or 15).

   NOTE: Applying low air pressure aids in the separation of the Cylinder (Item 5) from the Piston (Item 6) and Pressure Plate (Item 7) (See Figure 14 or 15).

   NOTE: On QFE Models 1650 and 2200 the Pressure Plate and Piston are one unit (Item 6) (See Figure 15).
5. Slide the Piston (Item 6) and Pressure Plate (Item 7) out of the Housing (Item 5) (See Figure 14 or 15).
6. Slide the first Disc Assembly (Item 4) out of the Housing (Item 5) (See Figure 14 or 15).
7. Slide the Facing Plate (Item 24) out of the Housing (Item 2) (See Figure 14 or 15).
8. Slide the second Disc Assembly (Item 4) out of the Housing (Item 5) (See Figure 14 or 15).
9. Remove the old Machine Screws (Item 13) and the old Friction Facings (Item 3) from the Housing (Item 2), Facing Plate (Item 24), and Pressure Plate (Item 7 on QFE 1150 and QFE 2500, or Item 6 on QFE 1650 and QFE 2200) (See Figure 14 or 15).
10. Using new Machine Screws (Item 13), install the new Friction Facings (Item 3) onto the Housing (Item 2), Facing Plate (Item 24), and Pressure Plate (Item 7 on QFE 1150 and QFE 2500, or Item 6 on QFE 1650 and QFE 2200) (See Figure 14 or 15).
11. Tighten the new Machine Screws (Item 3) to 16 Ft. Lbs. [21.59 N•m] torque.
12. Slide the the second Disc Assembly (Item 4) removed back into the Housing (Item 2) (See Figure 14 or 15).
13. Slide the Facing Plate (Item 24) back into the Housing (Item 2) (See Figure 14 or 15).
14. Slide the the first Disc Assembly (Item 4) removed back into the Housing (Item 2) (See Figure 14 or 15).
15. Remove the old O-ring Seals (Items 15 and 17) from the Piston (Item 6 on QFE 1150 and 2500) and Pressure Plate (Item 7 on QFE 1150 and 2500) or the Piston/Pressure Plate (Item 6) on QFE 1650 and 2200) (See Figure 14 or 15).
16. Coat the new O-ring Seals (Items 15 and 17) with fresh o-ring lubricant; then, install the new O-ring Seals into the Piston (Item 6) and Pressure Plate (Item 7) or Piston/Pressure Plate (Item 6) (See Figure 14 or 15).
17. Slide the Piston (Item 6) and Pressure Plate (Item 7) or Piston/Pressure Plate (Item 6) back into the Cylinder (Item 5) (See Figure 14 or 15).
18. Slide new Compression Springs (Item 10) and Washers (Item 18) onto the Cap Screws (Item 11); then install the Cap Screws, Compression Springs, and Washers into the Cylinder, Piston, and Pressure Plate (See Figure 14 or 15).
19. Install the Lock Nuts (Item 19); then tighten the Lock Nuts until a springs working height of 2.13'' [54.10 mm] is achieved (See Figure 14 or 15).
20. Install the Lock Nuts (Item 19); then tighten the Lock Nuts until a springs working height of 2.13'' [54.10 mm] is achieved (See Figure 14 or 15).
21. Slide the Cylinder, Piston, and Pressure Plate back into the Housing (See Figure 14 or 15).
22. Apply a drop of Loctite 242®to the threads of the Cap Screws (Item 14); then, using the Cap Screws and Lockwashers (item 20, secure the Cylinder, Piston, and Pressure Plate to the Housing (See Figure 14 or 15).
23. Alternately and evenly tighten the Cap Screws (Item 14) to 110 Ft. Lbs. [148.43 N•m] torque (See Figure 14 or 15).

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.

PARTS LIST

DFE 1150 AND DFE 2500

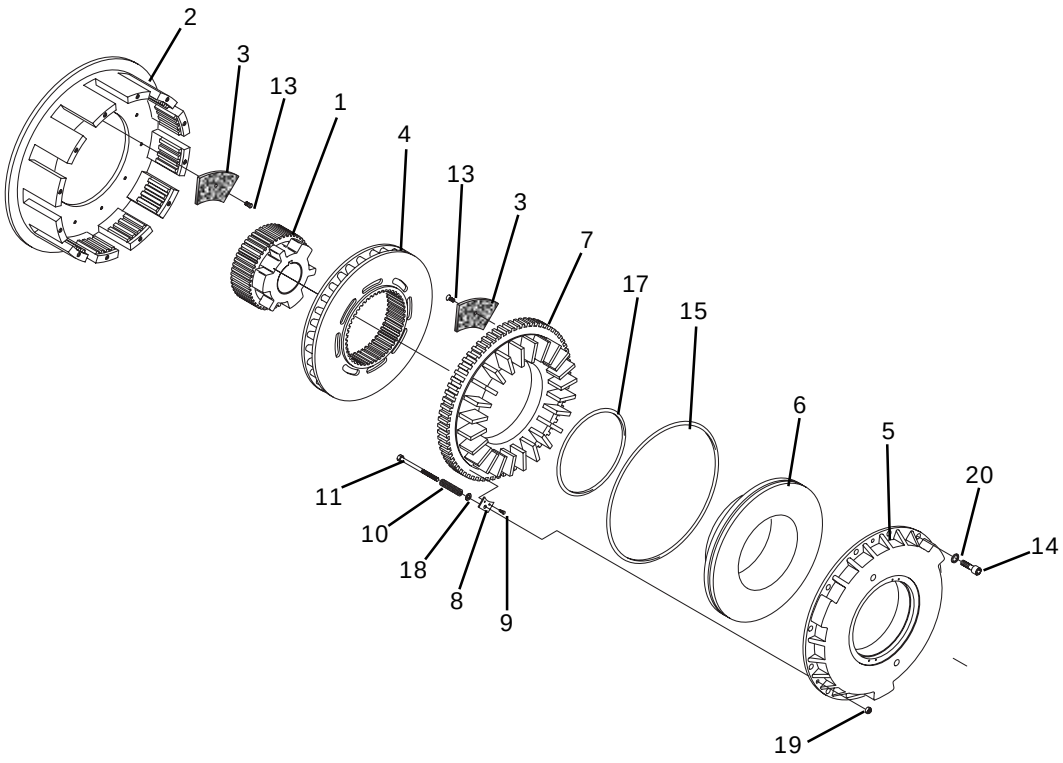

FIGURE 16

DFE 1150

ITEM	DESCRIPTION	QTY
1[3]	Hub	1
2[3]	Housing	1
3[2]	Friction Facing	12
4	Disc Assembly	1
5	Cylinder	1
6	Piston	1
7	Pressure Plate	1
8	Bracket	3
9	Cap Screw	6
10[1,3]	Compression Spring	3
11[3]	Cap Screw	3
13[2]	Machine Screw	24
14	Cap Screw	6
15[1]	O-ring Seal	1
16	Pin (Not Shown)	1
17[1]	O-ring Seal	1
18	Washer	3
19	Lock Nut	3
20	Lockwasher	6

[1] Denotes Repair Kit item
Repair Kit Product No. 964016
[2] Denotes Facing Kit item.
Facing Kit Product No. 964028
[3] Specify DFE or QFE when ordering these items.

DFE 2500

ITEM	DESCRIPTION	QTY
1[3]	Hub	1
2[3]	Housing	1
3[2]	Friction Facing	12
4	Disc Assembly	1
5	Cylinder	1
6	Piston	1
7	Pressure Plate	1
8	Bracket	6
9	Cap Screw	12
10[1,3]	Compression Spring	6
11[3]	Cap Screw	6
13[2]	Machine Screw	24
14	Cap Screw	12
15[1]	O-ring Seal	1
16	Pin (Not Shown)	1
17[1]	O-ring Seal	1
18	Washer	6
19	Lock Nut	6
20	Lockwasher	12

[1] Denotes Repair Kit item
Repair Kit Product No. 964025
[2] Denotes Facing Kit item.
Facing Kit Product No. 964037
[3] Specify DFE or QFE when ordering these items.

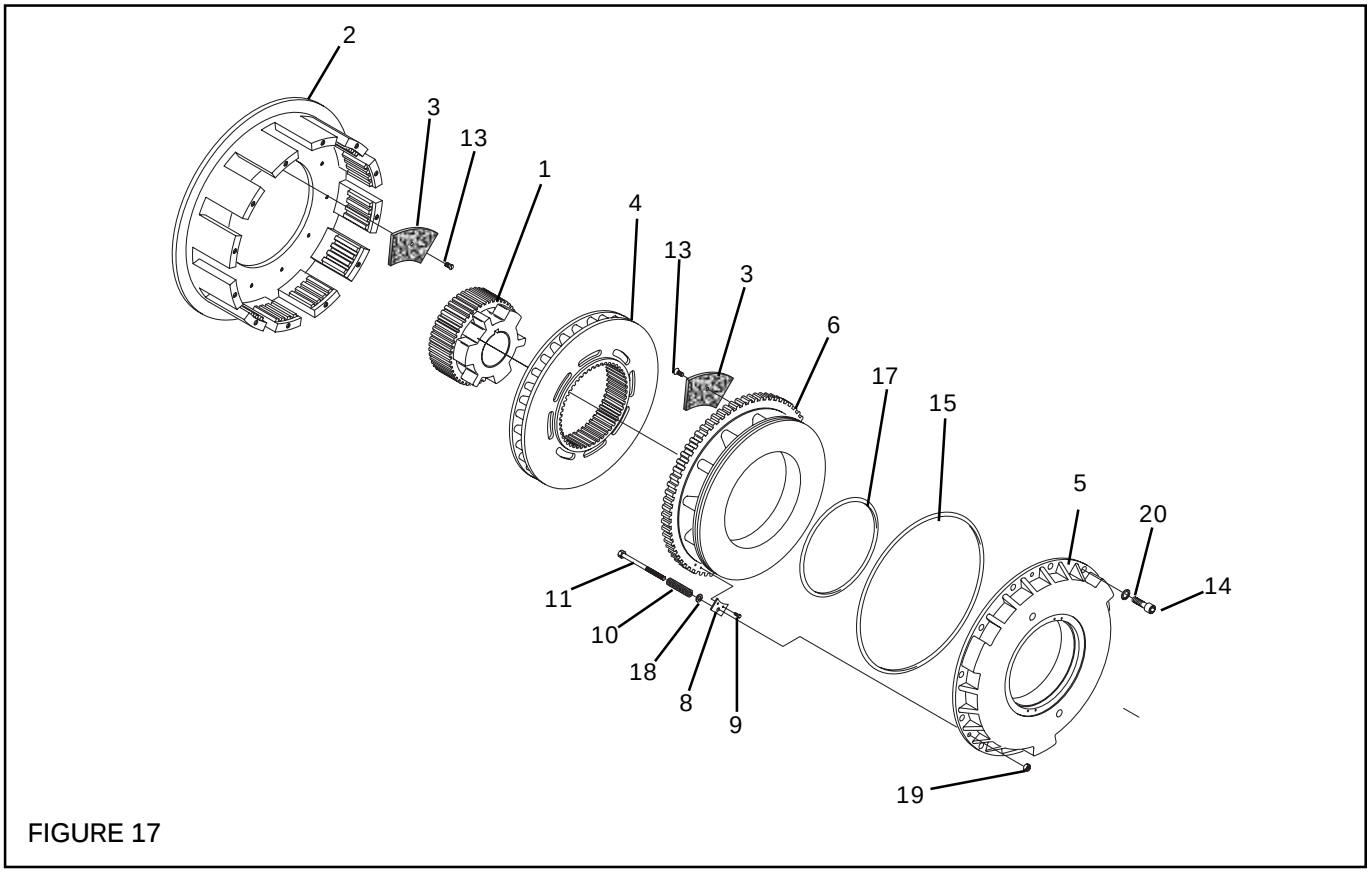

FIGURE 17

DFE 1650

ITEM	DESCRIPTION	QTY
1[3]	Hub	1
2[3]	Housing	1
3[2]	Friction Facing	12
4	Disc Assembly	1
5	Cylinder	1
6	Piston/Pressure Plate	1
8	Bracket	3
9	Cap Screw	6
10[1,3]	Compression Spring	3
11[3]	Cap Screw	3
13[2]	Machine Screw	24
14	Cap Screw	6
15[1]	O-ring Seal	1
16	Pin (Not Shown)	1
17[1]	O-ring Seal	1
18	Washer	3
19	Lock Nut	3
20	Lockwasher	6

[1] Denotes Repair Kit item.
Repair Kit Product No. 964019
[2] Denotes Facing Kit item.
Facing Kit Product No. 964031
[3] Specify DFE or QFE when ordering these items.

DFE 2200

ITEM	DESCRIPTION	QTY
1[3]	Hub	1
2[3]	Housing	1
3[2]	Friction Facing	12
4	Disc Assembly	1
5	Cylinder	1
6	Piston/Pressure Plate	1
8	Bracket	6
9	Cap Screw	12
10[1,3]	Compression Spring	6
11[3]	Cap Screw	6
13[2]	Machine Screw	24
14	Cap Screw	12
15[1]	O-ring Seal	1
16	Pin (Not Shown)	1
17[1]	O-ring Seal	1
18	Washer	6
19	Lock Nut	6
20	Lockwasher	12

[1] Denotes Repair Kit item.
Repair Kit Product No. 964022
[2] Denotes Facing Kit item.
Facing Kit Product No. 964034
[3] Specify DFE or QFE when ordering these items.

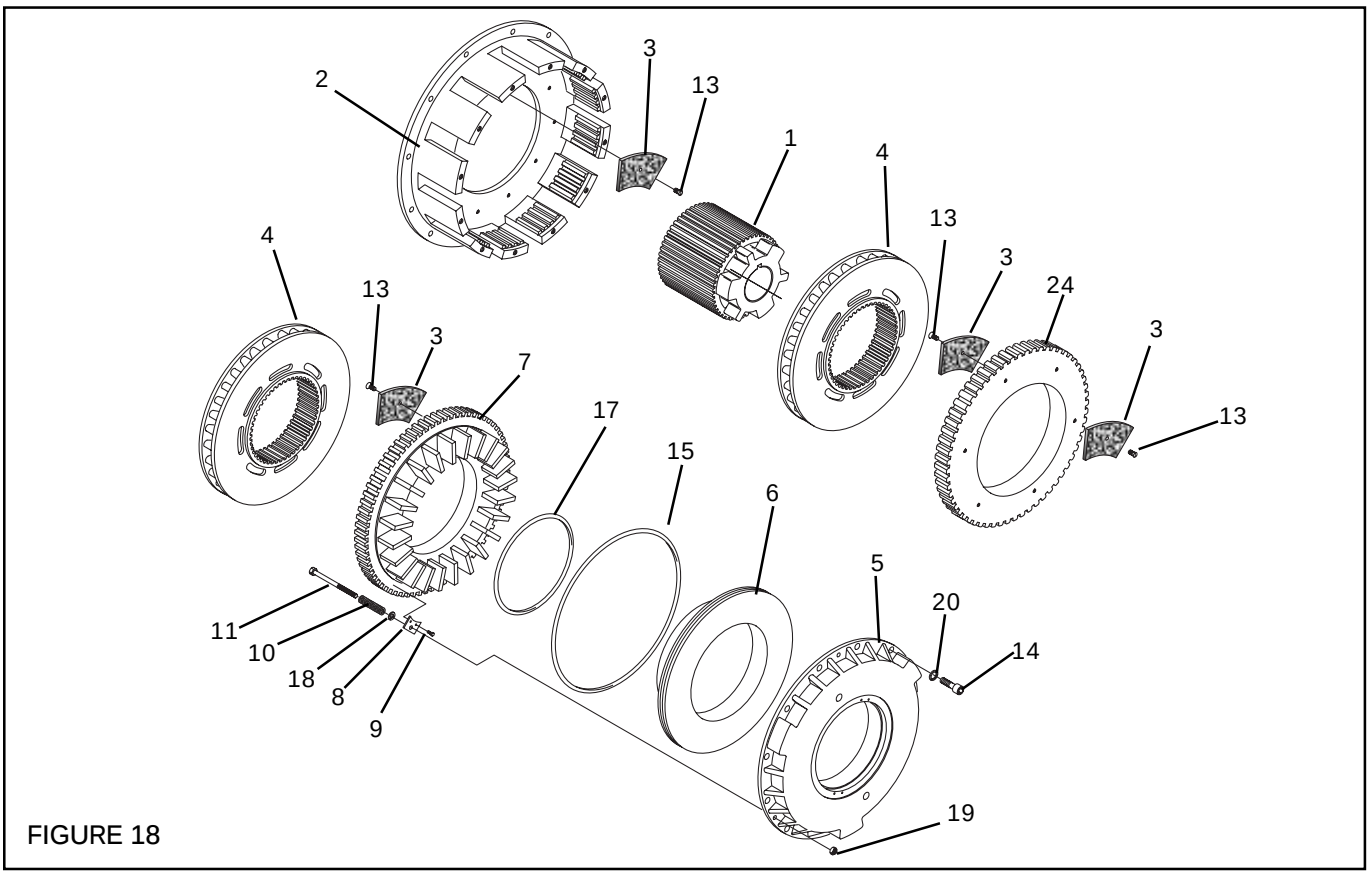

FIGURE 18

QFE 1150

ITEM	DESCRIPTION	QTY
1[3]	Hub	1
2[3]	Housing	1
3[2]	Friction Facing	24
4	Disc Assembly	2
5	Cylinder	1
6	Piston	1
7	Pressure Plate	1
8	Bracket	3
9	Cap Screw	6
10[1,3]	Compression Spring	3
11[3]	Cap Screw	3
13[2]	Machine Screw	48
14	Cap Screw	6
15[1]	O-ring Seal	1
16	Pin (Not Shown)	1
17[1]	O-ring Seal	1
18	Washer	3
19	Lock Nut	3
20	Lockwasher	6
24	Facing Plate	1

[1] Denotes Repair Kit item.
Repair Kit Product No. 964088
[2] Denotes Facing Kit item.
Facing Kit Product No. 964028 (2 Required).
[3] Specify DFE or QFE when ordering these items.

QFE 2500

ITEM	DESCRIPTION	QTY
1[3]	Hub	1
2[3]	Housing	1
3[2]	Friction Facing	24
4	Disc Assembly	1
5	Cylinder	1
6	Piston	1
7	Pressure Plate	1
8	Bracket	6
9	Cap Screw	12
10[1,3]	Compression Spring	6
11[3]	Cap Screw	6
13[2]	Machine Screw	48
14	Cap Screw	12
15[1]	O-ring Seal	1
16	Pin (Not Shown)	1
17[1]	O-ring Seal	1
18	Washer	6
19	Lock Nut	6
20	Lockwasher	12
24	Facing Plate	1

[1] Denotes Repair Kit item.
Repair Kit Product No. 964025
[2] Denotes Facing Kit item.
Facing Kit Product No. 964037 (2 required).
[3] Specify DFE or QFE when ordering these items.

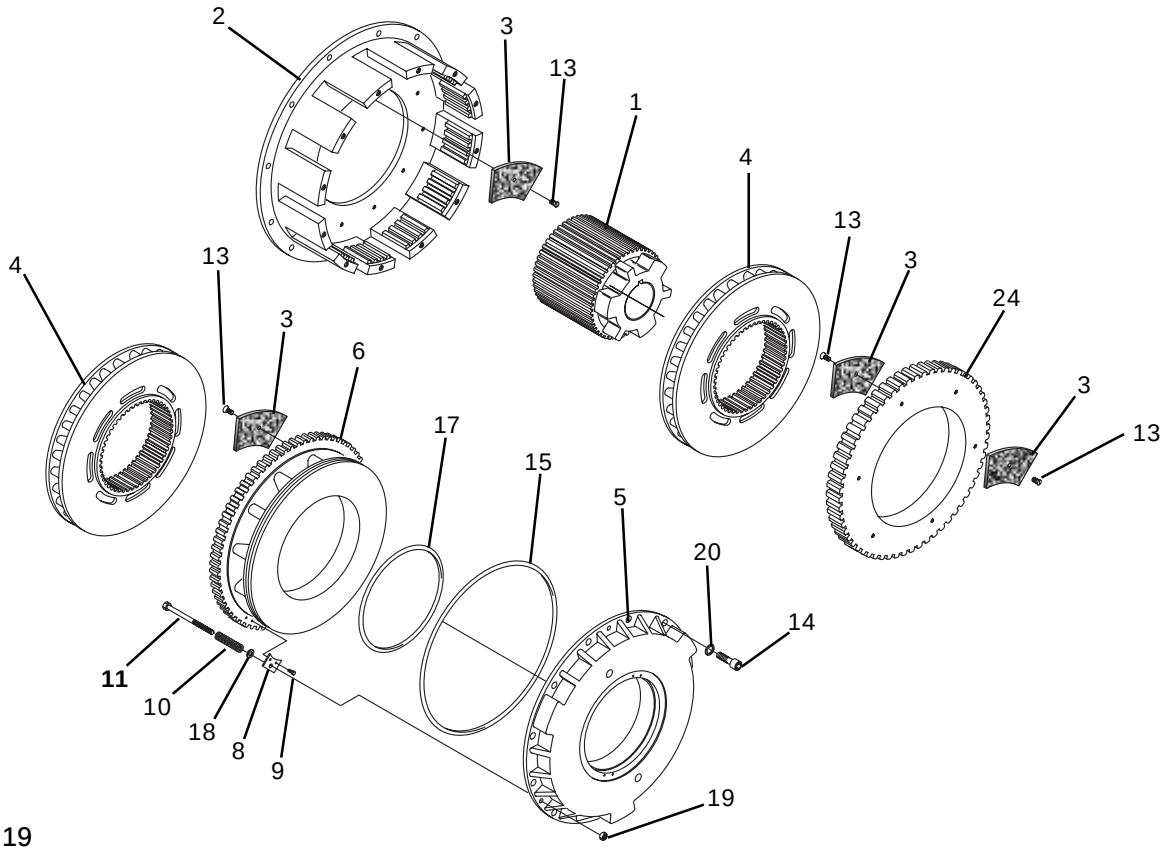

FIGURE 19

QFE 1650

ITEM	DESCRIPTION	QTY
1[3]	Hub	1
2[3]	Housing	1
3[2]	Friction Facing	24
4	Disc Assembly	2
5	Cylinder	1
6	Piston/Pressure Plate	1
8	Bracket	3
9	Cap Screw	3
10[1,3]	Compression Spring	3
11[3]	Cap Screw	3
13[2]	Machine Screw	48
14	Cap Screw	12
15[1]	O-ring Seal	1
17[1]	O-ring Seal	1
18	Washer	3
19	Lock Nut	3
20	Lockwasher	12

[1] Denotes Repair Kit item.
Repair Kit Product No. 964091.
[2] Denotes Facing Kit item.
Facing Kit Product No. 964031 (2 Required).
[3] Specify DFE or QFE when ordering these items.

QFE 2200

ITEM	DESCRIPTION	QTY
1[3]	Hub	1
2[3]	Housing	1
3[2]	Friction Facing	24
4	Disc Assembly	2
5	Cylinder	1
6	Piston/Pressure Plate	1
8	Bracket	6
9	Cap Screw	12
10[1,3]	Compression Spring	6
11[3]	Cap Screw	6
13[2]	Machine Screw	48
14	Cap Screw	12
15[1]	O-ring Seal	1
17[1]	O-ring Seal	1
18	Washer	6
19	Lock Nut	6
20	Lockwasher	12

[1] Denotes Repair Kit item.
Repair Kit Product No. 964094.
[2] Denotes Facing Kit item.
Facing Kit Product No. 964034 (2 Required).
[3] Specify DFE or QFE when ordering these items.

ROTARY AIR UNION

ITEM	DESCRIPTION	QTY
21	Rotary Air Union Bracket	1
22	Cap Screw	4
23	Rotary Air Union	1
25	Hose Assembly (Not Shown)	2
26	Elbow Fitting (Not Shown)	4

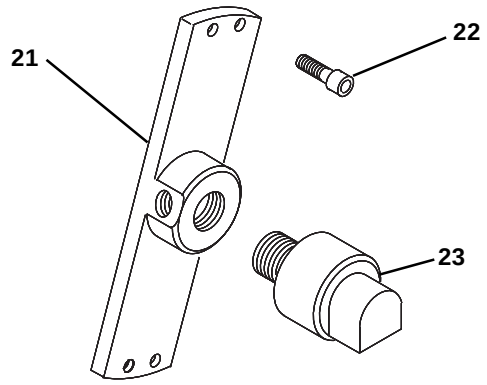

FIGURE 20

Warranties

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.

Exclusive Remedy

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.

Limitation of 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 images, 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.

Limitation of Damages

In no event shall Nexen be liable for any consequential, indirect, incidental, or special damages of any nature whatsoever, including without limitation, lost profits arising from the sale or use of the Products.

Warranty Claim Procedures

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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