

AIR CHAMP® PRODUCTS

User Manual



POWER CAPSULS®

PC-402-4, 405-4, 408-4, 410-4, AND 415-4

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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DANGER

Read this manual carefully before installation and operation.

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

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

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

Comply with all applicable codes.

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ISO 9001 Certified

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INTRODUCTION

Nexen Power Capsuls are wet, multiple disc, and pneumatically or hydraulically operated clutch-brakes that are totally enclosed in rugged housings.

Torque is transmitted through an alternating series of Inner Discs and Friction Discs. The Friction Discs are connected to the Input Shaft and Brake Housing. The Inner Discs are splined to the Output Shaft. When pressure is applied to the clutch cylinders the Actuator Rods shift the Pressure Plate/Bearing Ring assembly along the output shaft's spline and clamps the clutch disc pack between the Pressure Plate and the Input Shaft. Torque is transmitted through the Input Shaft to the discs and the Output Shaft. When pressure is exhausted from the clutch cylinders and applied to the brake cylinders the Actuator Rods shift the Pressure Plate/Bearing Ring assembly in the opposite direction and clamps the brake disc pack between the Pressure Plate and the inside wall of the Brake Housing. Torque from the Output Shaft is absorbed through the discs, pins, Brake Housing, and Cylinders. Internal springs retain the unit in a neutral position.

Internally generated heat is transferred through an oil bath to the housing and then dissipated by convection to the ambient air. Power Capsul Models 408, 410, and 415 are equipped with an internal, water cooled heat exchanger for additional cooling. The heat exchanger is a 3/8 inch [9.53 mm] copper tube, fabricated into a serpentine shape, with attached cooling fins that lie at the bottom of the oil bath.

INSTALLATION

Nexen's Power Capsul is foot mounted and equipped with input and output shafts. The Power Capsul must be horizontally mounted on a base capable of sustaining the braking torque generated by the unit and the shafts must be aligned with the other drive components.

A hose/fitting assembly, connecting both cylinders on each end of the unit, provides one pressure inlet for both the clutch and brake. The clutch inlet is on the Brake Housing and the brake inlet is on the Clutch Housing. Actuating pressures are 30 to 150 psi [2.1 to 10.3 BAR].

WARNING: Nexen Power Capsuls must operate with Dexron II or Type F transmission fluid. Any other transmission fluid with a lower hot coefficient of friction (such as Dexron III or Type F2) will result in increased slip and potential unit failure. Before operating the Power Capsul, remove one breather and fill unit to the oil level plug with Dexron II or Type F transmission fluid.

After 2000 hours of operation, drain the oil and refill the unit with fresh oil. If the unit is used on high cyclic applications, the oil should be changed after 1000 hours of operation.

Water lines may be connected to the heat exchanger tube ends on the clutch side, where it protrudes from the housing. A threaded, flareless type tube fitting is recommended. Clean, soft water should be used in the heat exchanger to prevent corrosion in the tube.

LUBRICATION

Outer Bearings (Item 19) are prelubricated, sealed, and require no lubrication. Inner Bearings (Item 17 and 18) are lubricated by the internal oil. Periodically inspect the oil level by removing the Oil Level Plug (Item 13). If oil flow is present, the oil level is adequate. If the unit is to be pneumatically actuated, install an air line lubricator on the line ahead of the other controls.



MAINTENANCE

Periodically inspect the Power Capsul for oil leaks, air leaks, and loose screws, particularly on the cylinders.

Loss of torque indicates the Friction Discs are worn and require replacement.

PARTS REPLACEMENT

SEAL KIT

1. Remove sixteen Cap Screws (Item 27).
2. Remove four Cylinders (Item 5).
3. Remove eight Cap Screws (Item 26).
4. Remove four Piston assemblies (Item 8).
5. Remove four old Cylinder Gaskets (Item 53).
6. Remove four old Piston Seals (Item 42).
7. Lubricate new Piston Seal with o-ring lubricant and with seal lip facing upward, place new Piston Seal onto Piston and slide new seal into groove.
8. Refer to **REASSEMBLY**, Steps **10** and **11**.

LINING KIT

1. Proceed with Steps 1-7 of **PARTS REPLACEMENT, SEAL KIT**.
2. Remove Breathers (Item 35).
3. Remove Pipe Plugs (Item 33) and drain out oil.
4. Place Power Capsul on a firm support with the Input Shaft (Item 7) pointing upwards.
5. Remove Cap Screws (Item 28).
6. Lift Clutch Housing (Item 1) off Brake Housing (Item 2).
7. Remove old O-ring (Item 32).
8. Remove clutch Friction Discs (Item 9) and Inner Discs (Item 10) and inspect for wear.
9. Remove the Actuator Rod Assemblies (Items 12, 14, 21, 24, and 29) from the Yoke (Item 4) sockets.
10. Slide Pressure Plate/Bearing Ring Assembly (Items 3, 17, 20, and 54) with the Yokes (Item 4) off the Output Shaft (Item 6).
11. Remove Brake Friction Discs (Item 9) and Inner Discs (Item 10). Inspect for wear and mark a reference pin as specified in the previous note.
12. Refer to **REASSEMBLY**.

BEARING KIT

1. Proceed with steps indicated in **PARTS REPLACEMENT, SEAL KIT and LINING KIT.**
2. Remove Input Shaft Retaining Ring (Item 22). (See **WARNING:** Special attention should be exercised when working with retaining rings.)
3. Press Input Shaft out of Clutch Housing.
4. Remove Outer Bearing (Item 19) and Shaft Seal (Item 23) from Clutch Housing.
5. Using a bearing separator, remove Pressure Plates (Item 3) from inner race of Bearing (Item 17).
6. Remove Retaining Ring (Item 20). (See **WARNING:** Special attention should be exercised when working with retaining rings.)
7. Press old Bearing (Item 17) out of Bearing Ring (Item 54).
8. Install new Bearing (Item 17) and Retaining Ring (Item 20).
9. Press Pressure Plate (Item 3) into the Bearing (Item 17).
10. Slide assembly over Output Shaft, making sure the Pressure Plate (Item 3) faces downward.
11. Place second Pressure Plate (Item 3) over the Output Shaft (Item 6) and press into Bearing.

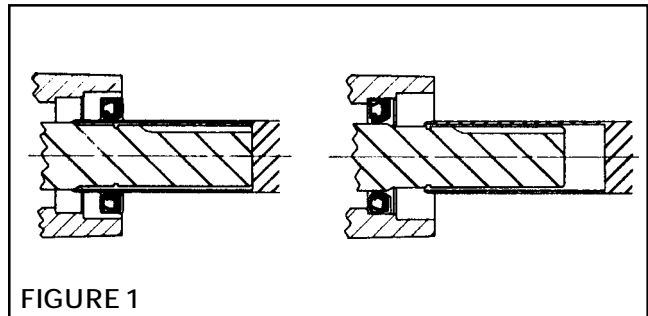
NOTE: Pressure Plate/Bearing Ring Assembly should now move freely on the spline of the Output Shaft. Any binding indicates improper internal spline alignment between the two Pressure Plates.

12. Remove Retaining Ring (Item 22) from Output Shaft (Item 6).
13. Press Output Shaft (Item 6) out of Brake Housing (Item 2).

14. Remove old Outer Bearing (Item 19) and Shaft Seal (Item 23) from Brake Housing (Item 2).
15. Using a bearing separator, remove old Inner Bearing (Item 18) from Input Shaft (Item 7).
16. Press old Inner Bearing off Output Shafts.
17. Press new Inner Bearing onto Input and Output Shaft.
18. Install Output Shaft and new Inner Bearing into Brake Housing.

NOTE: Do not reinstall Input Shaft until REASSEMBLY.

19. Carefully slide new Shaft Seal (Item 23) (in the opposite direction that the seal points) onto a pilot ring.
20. Slide pilot ring over Output Shaft (Item 6) shoulder so Shaft Seal lip points toward the Brake Housing (See Figure 1).
21. Press Shaft Seal (Item 23) into housing and remove pilot ring.
22. Press new Outer Bearing (Item 19) onto Output Shaft and install Retaining Ring (Item 22).



REASSEMBLY

1. With the Brake Housing (Item 2) in a vertical position and supported by the housing's outer face, replace the Inner Discs (Item 10) and Friction Discs (Item 9) starting with a Friction Disc against the Brake Housing. Alternate Inner Discs and Friction Discs until the proper number of discs are installed.

NOTE: Be certain a Friction Disc was the first and last disc to be installed. An even number of discs are installed in both the clutch and brake.

2. Slide the Pressure Plate/Bearing Ring Assembly (Items 3, 17, 20, and 54) with the Yokes (Item 4) onto the Output Shaft (Item 6). Insert the Actuator Rod Assemblies (Items 12, 14, 21, 24, and 29) in the Yoke (Item 4) sockets.

NOTE: The short end of the Actuator Rods are installed in the Brake Housing.

3. Starting with a Friction Disc, repeat the same stack up of discs as for the brake.
4. Place the Input Shaft (Item 7) with the Inner Bearing (Item 18) installed onto the clutch disc pack, sliding the drive pins through the holes of the Friction Disc.
5. Lubricate and install new O-ring (Item 32) in the Brake Housing.
6. Lower Clutch Housing (Item 1) onto the Brake Housing and align with the Dowel Pins (Item 16).
7. Install Cap Screws (Item 28) and tighten to the recommended torque (See Table 1).
8. Install Outer Bearing (Item 19) and Shaft Seal (Item 23) in the Clutch Housing.

- a. Carefully slide the new Shaft Seal (Item 3) (in the opposite direction that the seal lip points) onto a pilot ring.
- b. Slide the pilot ring over the Input Shaft shoulder so the seal lip points toward the Clutch Housing. Press the Shaft Seal into the Clutch Housing and remove the pilot ring (See Figure 2).
- c. Push the new Outer Bearing (Item 9) into place on the Input Shaft and into the Clutch Housing.
- d. With a sleeve that fits over the Input Shaft and against the bearing's inner race and protrudes beyond the end of the Input Shaft, draw the Input Shaft into the Bearing using the tapped hole in the end of the Input Shaft (See Figure 3).

9. Reinsert Retaining Ring (Item 22). (See WARNING: Special attention should be exercised when working with retaining rings.)
10. Reinsert Cylinder Gaskets (Item 53).
11. Install Pistons (Item 8).
12. Install Cylinders (Item 5).
13. Reinsert Pipe Plugs (Item 33) and Breathers (Item 35).
14. Fill unit with proper amount of oil.

CAUTION: Fill unit with proper amount of Dexron II or Type F transmission fluid. Any other transmission fluid with a lower hot coefficient of friction will result in increased slip and potential unit failure.

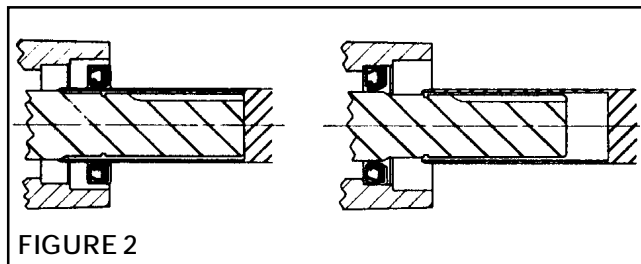


FIGURE 2

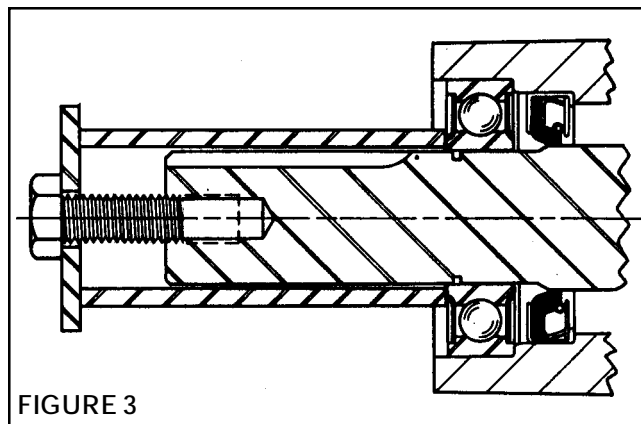


FIGURE 3



TABLE 1
 RECOMMENDED TIGHTENING TORQUES

MODEL	SOCKET HEAD CAP SCREW (ITEM 28)
402	15.0 Ft. Lbs [20.3 Nm]
405	8.3 Ft. Lbs [11.3 Nm]
408	21.1 Ft. Lbs [36.7 Nm]
410	21.1 Ft. Lbs [36.7 Nm]
415	48.3 Ft. Lbs [65.5 Nm]



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

Replacement parts are available in three repair kits and consist of:

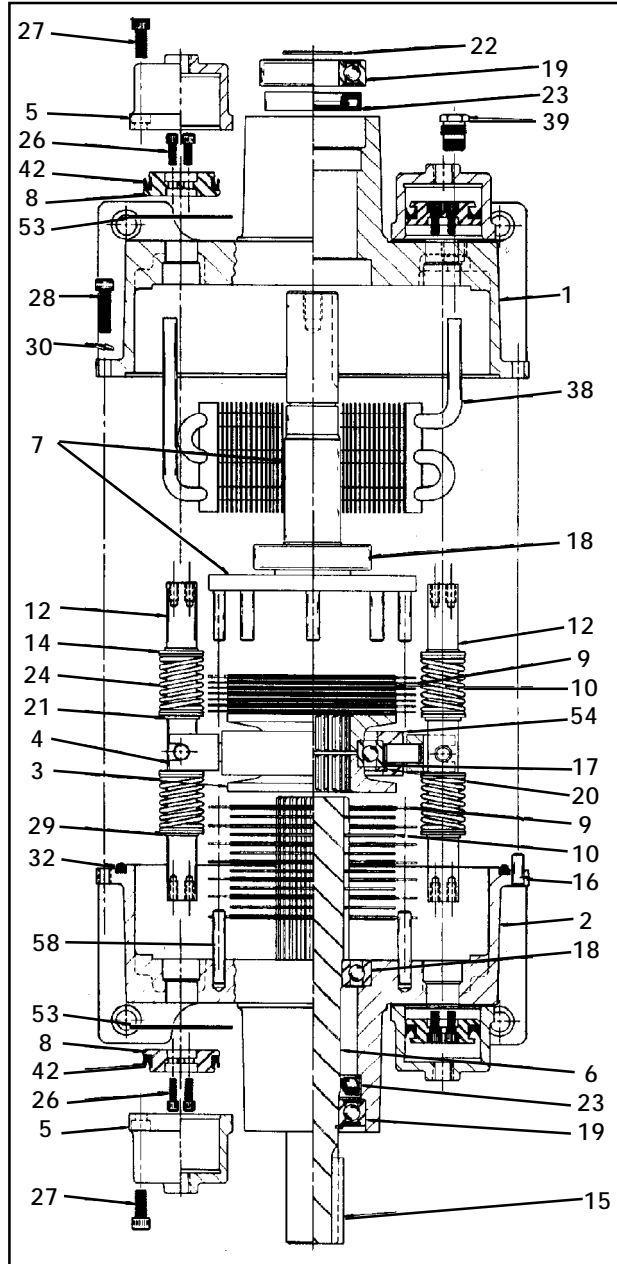
- Seal Kit** 4 Piston Seals and 4 Gaskets.
- Lining Kit** Seal Kit items plus Friction Discs and Housing O-ring.
- Repair Kit** Seal and Lining Kit items plus 3 Inner Bearings and Shaft Seal.

TABLE 2
REPAIR KIT SELECTION

MODEL	BEARING KIT	LINING KIT	SEAL KIT
PC-402	961700	951771	951772
PC-405	951800	951871	951872
PC-408	951900	951971	951972
PC-410	952000	952071	952072
PC-415	952100	952171	952172

To order a repair kit, specify the model and serial number of your unit and the repair kit product number from the following table.

PARTS LIST



ITEM	DESCRIPTION	MODEL				
		402	405	408	410	415
1	Clutch Housing	1	1	1	1	1
2	Brake Housing	1	1	1	1	1
3	Pressure Plate	2	2	2	2	2
4	Yoke	2	2	2	2	2
5	Cylinder	4	4	4	4	4
6	Output Shaft	1	1	1	1	1
7	Input Shaft	1	1	1	1	1
8	Piston	4	4	4	4	4
9 ¹	Friction Disc	10	12	14	14	14
10 ¹	Inner Disc	8	10	12	12	12
12	Actuator Rod	2	2	2	2	2
13	Oil Level Plug (Not Shown)	2	2	2	2	2
14	Washer	8	8	8	8	8
15	Key	2	2	2	2	2
16	Dowel Pin	—	2	2	2	2
17 ¹	Bearing	1	1	1	1	1
18 ¹	Inner Bearing	2	2	2	2	2
19 ¹	Outer Bearing	2	2	2	2	2
20	Retaining Ring	1	1	1	1	1
21	Retaining Ring	6	4	4	4	4
22	Retaining Ring	2	2	2	2	2
23 ¹	Shaft Seal	2	2	2	2	2
24	Spring (Self Centering)	4	4	4	4	4
26	Cap Screw	8	8	8	8	8
27	Cap Screw	16	16	16	16	16
28	Cap Screw	6	12	12	12	12
29	Retaining Ring	—	2	2	2	2
30	Lock Washer	—	12	12	12	12
32 ¹	O-ring Seal	1	1	1	1	1
33	Pipe Plug (Not Shown)	1	2	2	2	2
34	Vinyl Plug (Not Shown)	4	4	4	4	4
35	Breather (Not Shown)	1	1	1	1	1
38	Heat Exchanger	—	—	1	1	1
39	Tube Fitting	—	—	2	2	2
42 ¹	Buna "A" Piston Seal	4	4	4	4	4
53	Gasket	4	4	4	4	4
54	Bearing Ring	1	1	1	1	1
55	Hose Assembly (Not Shown)	2	2	2	2	2
56	Elbow Fitting (Not Shown)	2	2	2	2	2
57	Tee Fitting (Not Shown)	2	2	2	2	2
58	Dowel Pin	6	6	8	8	12

¹ Denotes repair kit items.



WARRANTY

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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