MOTORS

Repair Instructions

DT 700, 701 Series Orbital Motors

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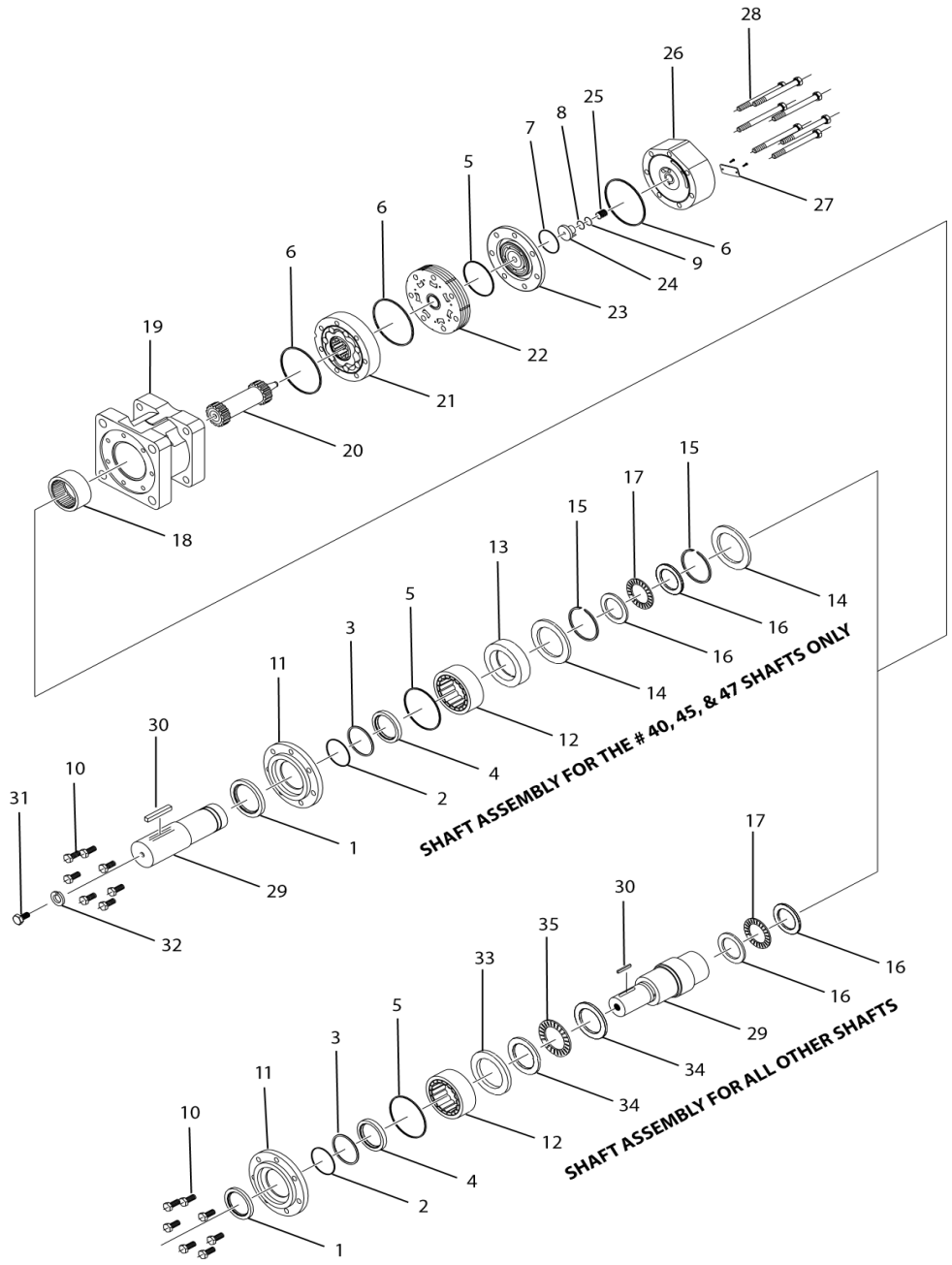

Figure 1: DT 700 Exploded View

Description	Item Number	Description	Item Number
Dust seal	1	Drive link	20
Metal backup shim	2	Rotor assembly	21
Backup seal	3	Manifold	22

Shaft seal	4	Commutator assembly	23
High pressure seals	5	Endcover piston	24
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Snap ring	15	Front thrust washer	34
Thrust washer	16	Front thrust bearing	35
Thrust bearing	17	Housing seal (OPT)	36
Rear housing bearing	18	Wear plate (OPT)[1]	37
Housing	19		

Table 1: Components list

[1] These components may or may not be used in the motor configuration.

Chapter 2
DT 700 Series Service Instructions

Topics:
- DT 700 Housing/Shaft Disassembly & Assembly
- DT 700 Motor Section Disassembly/Assembly

For use with seal kits: PT666251, PT666251P & PT666251PY dimensions: mm [in]

Note:

In January 1994, a change was made to the 700 Series motors with 2.5" bearing to change to a high pressure shaft seal. This change included the use of a backup seal (3), metal backup shim (2) and a revision to the pilot ring to allow use of the new seals. To allow conversion of low pressure shaft seal motors to high pressure shaft seal motors, three kits are available:

1. PT018064- New revision pilot ring (can be used with this kit for conversion)
2. PT666251P- Includes new revision pilot ring and complete seal kit.
3. PT666251PY- Includes new revision 125mm pilot ring and complete seal kit.

Housing and body seals on products manufactured after July 1, 2016 are o-ring seals. Prior to this date these seals were square cut seals. It is recommended that if the product being serviced has square seals to replace with the square seals in this kit, likewise if the product has o-ring seals, replace with the o-ring seals in this kit.

DT 700 Housing/Shaft Disassembly & Assembly

1. Remove all shaft related components (i.e. keys, wire rings, nuts) from shaft (29).
    a. To aid in reassembly of the motor, make a "V" shaped set of lines from the endcover (26) to the housing (19) using either paint or a marker.
    b. With shaft facing up, secure motor in vise by clamping on to housing (19).

2. Remove seven pilot ring bolts (10) and lay aside.
    a. If motor uses either a 2-1/4" straight shaft (#40 shaft) or 60mm tapered shaft (#45 shaft), the pilot ring must be removed from the rear of the shaft.
    Skip to *Step 3* for this disassembly procedure.
    b. If the motor has any other shaft, remove pilot ring (11) by pushing down on shaft (29) to hold in housing and use an upward, twisting motion to pull pilot ring (11) off of shaft (29).

    It is not necessary to remove the shaft assembly from the motor unless component inspection is desired.
    c. To remove seals from pilot ring, go to *Step 4*.

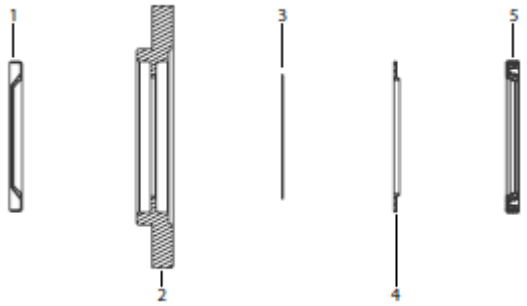
3. Using a rag to grasp output end of shaft (29), lift shaft/bearing assembly form motor.
    a. Remove retaining washer (14) from motor end of shaft (29).
    Note: Retaining washer (14) may remain in housing (19).
    b. Using snap ring pliers, remove snap ring (15) from shaft (29).
    c. Remove two thrust washers (16) and thrust bearing (17) from shaft (29).

d. Push the second retaining washer (14) towards output end of shaft (29) until second snap ring (15) is visible.
e. Using snap ring pliers, remove the second snap ring (15) from shaft (29).
f. If bearing spacer (13) is used, remove it and lay aside.
g. Remove roller bearing (12) from shaft (29).
h. Using a twisting motion, remove pilot ring (11) from rear of shaft (29).

4. Using a small, thin screwdriver, carefully pry dust seal (1) and shaft seal (4) from pilot ring (11). Remove high pressure seal (5) from groove in front of housing (19) and discard.
Note: Some motors have a backup seal (3) and metal backup shim (2). If so, remove and discard at this time.

Caution: It is not possible to use the backup seal (3) and metal backup shim (2) with the old revision pilot ring (11). The new revision pilot ring is thicker and has a small groove to accept the metal backup shim (2). Use of the old revision pilot ring with the backup seal (3) and metal backup shim (2) could cause motor components to bind when assembled.
Note: At this point, all parts should be cleaned in an oil-based solvent and dried using compressed air (For safety, observe all OSHA safety guidelines). All new seals should be lightly coated with clean oil prior to installation.

5. Place the pilot ring on a clean, flat surface with large O.D. side facing down.
    a) Using *Figure 1* as a reference, use a seal driver to install dust seal (1) into pilot ring making sure lip on seal faces up.
    b) Turn pilot ring (11) over.
    c) If repairing a motor with high pressure shaft seal or converting to high pressure shaft seal, the correct metal backup shim must be installed.
    d) If the motor has a 2-1/4" straight shaft (#40 & #47 shaft) or a 60mm tapered shaft (#45 shaft), the split metal backup shim included in the kit must be used.
    e) If the motor uses any other shaft, the unsplit metal shim must be used.
    f) After determining which metal backup shim (2) to use, install in the groove in the pilot ring (11).
    g) Place backup seal (3) into pilot ring (11) making sure lip on seal faces up.
    h) Using a seal driver, install shaft seal (4) into pilot ring (11).
    i) Place a high pressure seal (5) into the groove in the front of the housing (19).



1. Dust seal
2. Pilot ring
3. Metal backup shim
4. Backup seal
5. Shaft seal

Figure 2: DT 700 Seals

6. If shaft assembly requires disassembly to remove pilot ring (11), go to *Step 8* to reassemble shaft components.
    a) If shaft assembly did not have to be disassembled to remove pilot ring (11), replace pilot ring (11) down over shaft (29) using a slight twisting motion until it contact housing (29).
    b) Align bolt holes and install seven pilot ring bolts (10).
    c) Using bolt torque sequence shown in *Figure 3*, torque bolts to 69,8 ± 7,5 Nm [51.5 ±5.5 ft. lb.]. Go to *DT 700 Motor Section Disassembly/Assembly*.

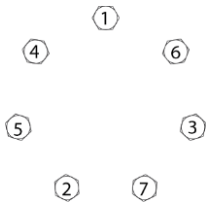


Figure 3: Bolt torque sequence

7. To reassemble shaft assembly, place pilot ring (11) over rear of shaft (29) with large O.D. side facing rear of shaft (29). Using a slight twisting motion, push pilot ring (11) down over grooves in shaft (29) until it reaches step in shaft.
   Note: It may be helpful to place tape over grooves in shaft and thoroughly coat shaft with oil to aid in installing pilot ring onto shaft.

8. Reassemble shaft components in reverse order that components were removed from shaft (29).
    a) If shaft (29) used bearing spacer (13), it is necessary for spacer (13) to be replaced in correct position.
    b) After shaft components are assembled onto shaft (29), place retaining washer (14) in housing (19).
    c) Place high pressure seal (5) in groove in front of housing (19).
    d) Grasping output end of shaft (29), lower shaft assembly into housing (19).
    e) Rotate pilot ring (11) to align bolt holes and install seven pilot ring bolts (10). Pre-torque bolts to 13.6 Nm [10 ft. lb.].
    f) Using the bolt torque sequence shown in *Figure 3*, final torque all bolts to 69.8 ± 7.5 Nm [51.5 ± 5.5 ft. lb.].

DT 700 Motor Section Disassembly & Assembly

1. To aid in reassembly of the motor, make a "V" shaped set of lines from the endcover (26) to the housing (19) using either paint or a marker. With shaft facing down, secure motor in vise by clamping on to housing (19).

2. Loosen and remove seven bolts (28) holding motor assembly together.
    a) Remove endcover (26) carefully as piston (24) and spring (25) may fall out.
    b) If piston does not come out, carefully pry piston (24) out of endcover (26) and lay aside.
    c) Remove O-Ring seal (9) and backup seal (8) from endcover and discard seals.
    d) Remove spring (25) and lay aside.

3. Lift commutator container and commutator (23) from motor and lay aside.
    a) Place commutator on a flat, clean surface with the seal (7) facing up.

b) Place the tip of a small screwdriver on the seal (7) and gently tap until the opposite side of seal lifts from groove.
c) Remove seal (7) and discard.

4. Remove manifold (22) and rotor set (21).
   a. Remove all seals (5,6) from components and discard.

   Caution: Do not allow rolls to drop from rotor assembly (21) when removing rotor assembly from motor.

   b. If the motor utilizes a wear plate, remove wear plate (37) and housing seal (36) and discard housing seal. c) Remove drive link (20) from motor and lay aside.

Note: At this point, all parts should be cleaned in an oil-based solvent and dried using compressed air (For safety, observe all OSHA safety guidelines). All new seals should be lightly coated in clean oil prior to installation.

5. Install drive link (20) into end of shaft with tapered end facing up.
   a. If the motor utilizes a wear plate, place housing seal (36) in groove in housing (19) and place wear plate.
   (37) over drive link (20) and onto housing.
   b. Place body seals (6) in grooves on both sides of rotor (21).
   c. Place rotor (21) onto housing (19) with side of rotor with chamfer in splines facing housing (19).
   d. Place manifold (22) over rotor (21) with seal groove side up.
   e. Install manifold seal (5).

6. Install the commutator seal (7) into the commutator (23) with the metal side facing up.
   a. Use finger pressure to press the seal down flush with the surface of the commutator.
   b. Place the commutator container onto the manifold (22) and then place the commutator onto the protruding end of the drive link (20) making sure that the seal side faces up.

7. Install the remaining body seal (6) in the groove in the face of the endcover (26).
   a. Install piston spring (25) into endcover (26), then the white backup seal (9) followed by the O-Ring seal (8).
   b. Lining up the alignment pin with the hole in the endcover, press piston (24) into the endcover (26).
   c. While holding the piston (24) in the endcover, lower the endcover assembly onto the motor.
   d. Check to make sure that the endcover ports are in their original position.
8. Install the seven assembly bolts (28) into endcover (26) and pre-torque to 13.6 Nm [10 ft. lb.]. Using the bolt torque sequence shown in *Figure 3*, final torque all bolts to 69.8 ± 7.5 Nm [51.5 ± 5.5 ft. lb.].

Chapter 3
DT 700 Series Parts Listing

Available Kits

Note: Refer to the *Exploded View* for item numbers

Description	Exploded View Item Number	Qty. In Kit	Order Number
Dust seal	1	1	PT666251 (Includes item numbers 1-9)
Metal backup shim	2	1	
Backup seal	3	1	
Shaft seal	4	1	
Pilot ring seal	5	1	
Body seal	6	3	
Commutator seal	7	1	
Backup seal	8	1	
O-ring seal	9	1	
For #C2 & C8 housing motors			PT666251P
For #E2 & E8 housing motors			PT666251PY

Table 2: Housing/Shaft and Related Component Kit(s)

Note: Motors assembled before Jan. 5, 1994 have low pressure shaft seals. These motors will lack items 2 and 3 as shown in the exploded view drawing. To upgrade these motors to the new high pressure shaft seal configuration, order the kits below. The kit includes a standard PT666251 seal kit and a new revision pilot ring that must be used with the new seals.

Description	Exploded View Item Number	Order Number
Dust seal	1	700018070
Pilot ring bolts (7)	10	700018071
Pilot ring (5.00" DIA.)	11	700018064
Pilot ring (125mm DIA.)	11	700018097
Front housing bearing	12	700018056
Bearing spacer	13	700018101
Retaining washer	14	700018061
Snap ring	15	700018062

Thrust washer	16	700018059
Thrust bearing	17	700018057
Rear housing bearing	18	700018060
Manifold	22	700668002
Commutator assembly	23	700668003
Endcover piston	24	700668004
Piston spring	25	700018046
Spacer	33	700018115
Front thrust washer	34	700018113
Front thrust bearing	35	700018114
1000 psi relief valve	Not shown	500018228
2000 psi relief valve	Not shown	500018231
3000 psi relief valve	Not shown	500018221
1.125-18 UNEF slotted nut	Not shown	700018038
1.125-18 UNEF solid nut	Not shown	700018054
M42 X 3 castle nut	Not shown	700669303

Table 3: Miscellaneous kits

Rotors, drive links, and bolts

When changing motor displacements, a matching rotor, drive link, and bolt set kit must be ordered.

Exploded View Item Number	**21**	**21**	**20**	**28**
Displacement	**Standard Rotor Kit**	**Freeturn Rotor Kit**	**Drive Link Kit**	**Bolt Set Kit**
300	700662019	700662019F	700140019	700664019
375	700662025	700662025F	700140025	700664025
470	700662028	700662028F	700140028	700664028
540	700662033	700662033F	700140033	700664033
750	700662046	700662046F	700140046	700664046
930	700662056	-	700140056	700664056

1K1	700662066	700662066F	700140066	700664066
1K5	700662091	-	700140091	700664091
2K1	700662099	-	700140099	700664099

Table 4: Rotors, drive links, and bolts

Housing kit and pilot ring

Housing kits include exploded view item #13 & #18.
Exploded view item #11 is ordered as an individual part.

Exploded view item #19		**Exploded view item #11**
Description	**Order Number**	**Pilot Order Number**
#C2 & C8 - SAE C MOUNT (use 5" pilot)	700130006	700018064
#E2 & E8 - SAE C MOUNT (use 125mm pilot)	700130006	700018097

Table 5: Housing kit and pilot ring

Shafts and related components list

Shaft kits come with related shaft components (i.e. keys, nuts, etc.). To order individual shaft components (i.e. keys, nuts, washers or wire rings) use the kit number for each individual part.

Exploded View Item Numbers	**29**	**30**	**Not Shown**	**31**	**32**
Description	**Shaft Kit**	**Key Kit**	**Nut Kit**	**Bolt Kit**	**Washer Kit**
#31- 1-1/2" Tapered	700110020	500449105	See *Table 3: Miscellaneous kits*	-	-
#41- 50mm Straight	700110021	700669102		-	-
#32- 1-1/2" Straight (EURO)	700110022	700669106		-	-
#45- 60mm Tapered	700110023	700669103		-	700669304
#36- 40mm Straight	700110024	700669104		-	-
#54- 40mm Straight (S)	700110054	700669104		-	-
#40- 2-1/4" Straight	700110025	700669105		700669305	700669306
#47- 2-1/4" Straight (S)	700110035	700669105		700669305	700669306
#42- 16 Tooth spline	700110026	-		-	-

#48- 16 Tooth spline (S)	700110056	-		-	-
#34- 17 Tooth spline (EURO)	700110028	-		-	-
#49- 17 Tooth spline (S)	700110058	-		-	-
#30- 1-1/2" Straight (USA)	700110032	700669101		-	-
#23- 14 Tooth spline	700110036	-		-	-
#09- 14 Tooth spline (S)	700110031	-		-	-
#33- 17 Tooth spline (USA)	700110038	-		-	-

Table 6: Housing kit and pilot ring

Endcover kits

Exploded view item #26

Endcover kits come assembled with exploded view item numbers 8, 9, 24, &25. To order a relief valve for the valve cavity endcovers, see *Table 3: Miscellaneous kits* listing for relief valve kit numbers.

Description	**Standard Endcover Kit**	**Valve Cavity Endcover Kit**	**Internal Drain Endcover Kit**	**Valve Cavity & Internal Drain Endcover Kit**
#1-7/8"O-ring rear ports	700160000	700160000R	700160000D	700160000DR
#3-Manifold ports, D-shaped	-	-	700160003D	-
#5- 1-1/16" O-ring radial ports	700160005	700160005R	700160005D	700160005DR
#2- 3/4" BSP.F Radial ports	700160007	700160007R	700160007D	700160007DR
#6- 1-1/16" O-ring parallel ports	700160008	700160008R	-	-
#7- 3/4" BSP.F Parallel ports	700160009	-	-	-

Table 7: Endcover kits

Chapter 4
DT 701 Repair Instructions

DT 701 Exploded view

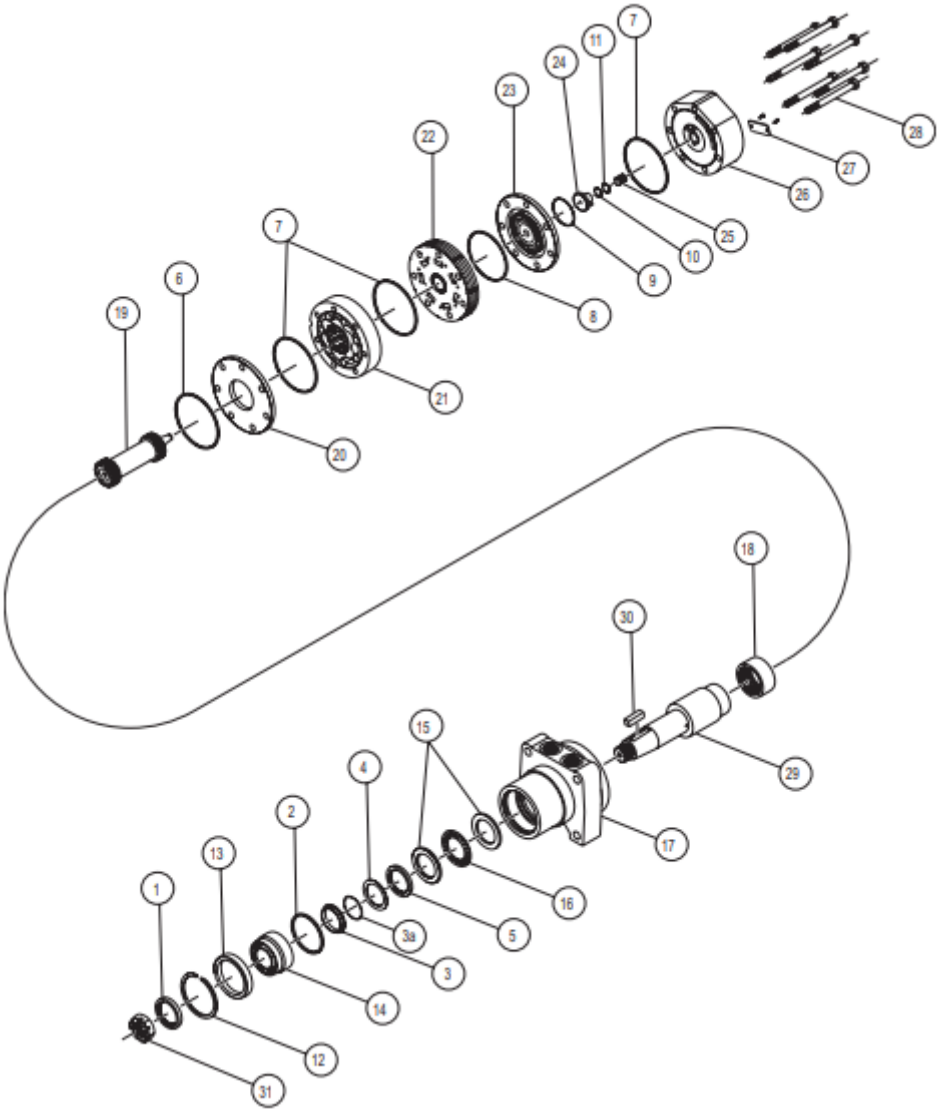


Figure 5: DT 701 Exploded view

Component Number	Description
1.	Dust Seal *
2.	High Pressure Seal*
3.	Metal Backup Ring*
3a.	Metal Backup Shim*
4.	Backup Seal*
5.	Shaft Seal*
6.	Housing Seal*
7.	Body Seals (3)*
8.	Manifold Seal*

9.	Commutator Seal*
10.	O-Ring Seal*
11.	Backup Seal
12.	Retaining Snap Ring
13.	Bearing Spacer
14.	1.5" Bearing
15.	Thrust Washers (2)
16.	Thrust Bearing
17.	Housing
18.	Rear Housing Bearing
19.	Drive Link
20.	Divider Plate
21.	Rotor Assembly
22.	Manifold
23.	Commutator Assembly
24.	Endcover Piston
25.	Piston Spring
26.	Endcover
27.	I.D. Tag Assembly
28.	Assembly Bolts (7)
29.	Shaft
30.	Shaft Key
31.	Shaft Nut

Table 8: DT 701 Components list

* Contained in Seal Kit PT666250

DT 701 Service Instructions

For Use With Seal Kits: PT666250, dimensions: mm [in]

NOTE: Housing and body seals on products manufactured after July 1, 2016 are o-ring seals. Prior to this date these seals were square cut seals. It is recommended that if the product being serviced has square seals to replace with the square seals in this kit, likewise if the product has o-ring seals, replace with the o-ring seals in this kit.

HOUSING/SHAFT DISASSEMBLY AND ASSEMBLY

A) Remove all shaft related components from shaft (29) (i.e. keys, wire rings, nuts, etc.). Secure motor in vise by clamping on to housing. Remove retaining ring (12) from groove in pilot of housing (17). Remove spacer (13) from housing (17). Remove shaft (29) from housing (17) then remove bearing (14), thrust bearing (16) and two thrust washers (15) from shaft (29).

B) Being careful not to drop any rolls from bearing (14), pry out shaft seal (5), backup seal (4) backup shim (3a), and dust seal (1) from bearing assembly (14). (NOTE: Metal backup ring (3) may or may not come out of bearing (14). It is not necessary to remove the metal backup ring

(3) from the bearing (14) to service the motor.) Remove high pressure seal (2) from groove in pilot of housing (17) discard shaft seal (5), backup seal (4) backup shim (3a) and high pressure seal (2).
At this point, all parts should be cleaned in an oil-based solvent and dried using compressed air (For safety, observe all OSHA safety guidelines). All new seals should be lightly coated with clean oil prior to installation.

C) Install high pressure seal (2) in to groove in pilot of housing (17). Place shaft on a clean, flat surface with output end facing up. Place thrust washer (15), thrust bearing (16) and second thrust washer (15) over shaft (29). Carefully place shaft seal (5) over shaft (29) making sure that lip on seal faces down (See Figure 1). Repeat process for backup seal (4) making sure that lip faces down. Install backup shim (3a). If metal backup ring (3) came out of bearing (14), place over shaft (29) making sure that large O.D. side faces down. Lightly grease bearing (14) if needed. Place bearing (14) over shaft making sure that the large O.D. side faces down. Using an arbor press, careful press bearing (14) down to press seal assembly (3-5) into bearing (14).

D) Place shaft (29) assembly into housing (17). Install dust seal (1) over shaft (29) with lip facing up (See Figure 5) and carefully press the seal down to seat it in the bearing (14). Place bearing spacer (13) over shaft (29). Install retaining ring (12) into groove in housing pilot (17). (NOTE: It may be necessary to lightly tap the snap ring (12) and bearing spacer (13) to allow the retaining ring (12) to seat properly.) Replace all shaft related components (i.e. keys, wire rings, nuts).

MOTOR SECTION DISASSEMBLY AND ASSEMBLY

E) To aid in reassembly of the motor, make a "V" shaped set of lines from the endcover (26) to the housing (17) using either paint or a marker. With shaft facing down, secure motor in vise by clamping on to housing (17).

F) Loosen and remove seven bolts (28) holding motor assembly together. Remove endcover (26) carefully as piston (24) and spring (25) may fall out. If piston does not come out, carefully pry piston (24) out of endcover (26) and lay aside. Remove O-Ring seal
(10) and white backup seal (11) from endcover and discard seals. Remove spring (25) and lay aside.

G) Lift commutator container and commutator (23) from motor and lay aside. Place commutator on a flat, clean surface with the seal (9) facing up. Place the tip of a small screwdriver on the seal (9) and gently tap until the opposite side of seal lifts from groove. Remove seal (9) and discard.

H) Remove manifold (22), rotor set (21) and divider plate (20). Remove all seals (6-8) from components and discard. *(Caution - Do not allow rolls to drop from rotor assembly (21) when removing rotor assembly from motor.)* Remove drive link (19) from motor and lay aside.

At this point, all parts should be cleaned in an oil-based solvent and dried using compressed air (For safety, observe all OSHA safety guidelines). All new seals should be lightly coated in clean oil prior to installation.

I) Install drive link (19) into end of shaft with tapered end facing up. Place rear housing seal (6) in groove in housing (17). Place body seals (7) in grooves in both sides of rotor (21). Place

rotor (21) onto housing (17) with side of rotor with chamfer in splines facing housing (17). Place manifold (22) over rotor (21) with seal groove side up. Install manifold seal (8).

J) Install the commutator seal (9) into the commutator (23) with the metal side facing up. Use finger pressure to press the seal down flush with the surface of the commutator. Place the commutator container onto the manifold (22) and then place the commutator onto the protruding end of the drive link (19), making sure that the seal side faces up.

K) Install the remaining body seal (7) in the groove in the face of the endcover (26). Install piston spring (25) into endcover (26), then the white backup seal (11) followed by the O-Ring seal (10). Lining up the alignment pin with the hole in the endcover, press piston (24) into the endcover (26). While holding the piston (24) in the endcover, lower the endcover assembly onto the motor. Check to make sure that the endcover ports are in their original position.

L) Install the seven assembly bolts (28) and pre-torque to 13,6 Nm [10 ft. lbs.] Using the bolt torque sequence shown in Figure 4, final torque all bolts to 67,8 Nm [50 ft. lbs.].

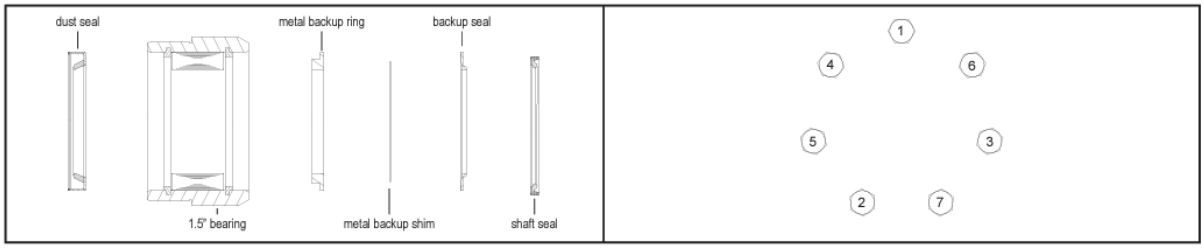


Figure 4: Bolt torque sequence

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