

# MOTORS

**Repair Instruction**

*DR 600 Series*



*together in motion*

White is a leading global provider of motor and steering solutions that power the evolution of mobile and industrial applications around the world.



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# Chapter 1

## DR 600 Series Diagram

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### Topics:

- *DR 600 Exploded View*
- *Components list*

# DR 600 Exploded View

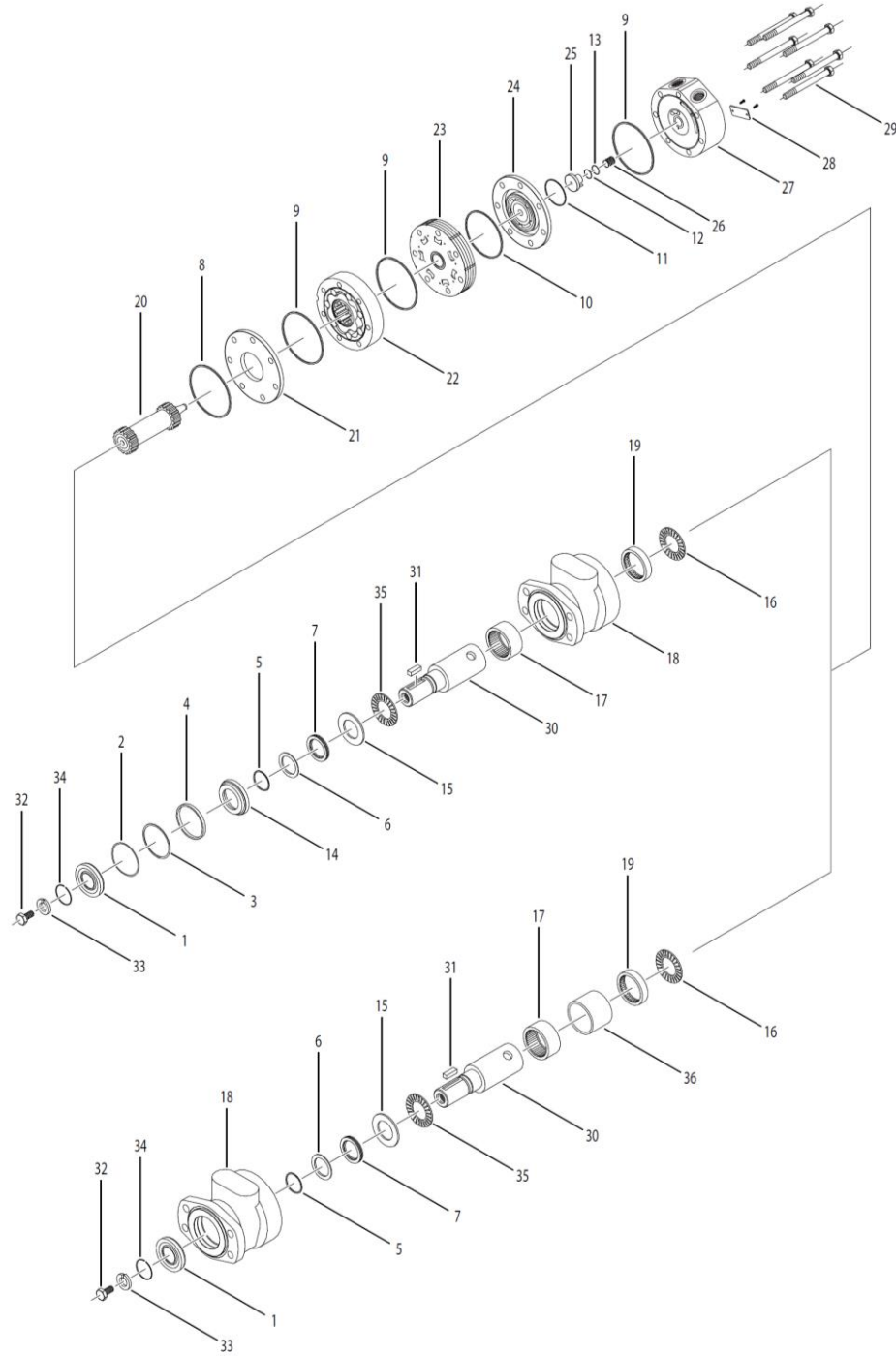


Figure 1 Exploded view

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## Components list

Description	Item Number	Description	Item Number
Dust seal	1	Rear housing bearing	19
Wire ring	2	Drive link	20
Metal backup shim	3	Wear plate	21
High pressure seal	4	Rotor assembly	22
Metal backup shim	5	Manifold	23
Backup seal	6	Commutator assembly	24
Shaft seal	7	Piston	25
Rear housing seal	8	Piston spring	26
Body seal	9	Endcover	27
Manifold seal	10	ID tag assembly	28
Commutator seal	11	Assembly bolt	29
O-ring seal	12	Shaft	30
Backup seal	13	Shaft key	31
Seal carrier	14	Shaft bolt	32
Thrust washer	15	Lock washer	33
Rear thrust bearing	16	Wire ring	34
Front housing bearing	17	Front thrust bearing	35
Housing	18	Bearing spacer	36

Table 1 Components list

### Note

The motor design that utilizes a seal carrier will use the larger O.D. backup seal and shaft seal.

## Chapter 2

# DR 600 Series Service Instructions

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### Topics:

- *DR 600 Motor Section Disassembly*
- *DR 600 Housing/Shaft with Seal Carrier Disassembly & Assembly*
- *DR 600 Housing/Shaft without Seal Carrier Disassembly & Assembly*
- *DR 600 Motor Section Assembly*

### Note

*In December 2006, the 600 series incorporated a design change. Refer to the exploded view drawing to determine which model is being serviced and follow the appropriate instructions.*

*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.*

*Dimensions mm[in]*

## DR 600 Motor Section Disassembly

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### Same Instructions for Both Designs

1. Remove all shaft related components from shaft (30) (i.e. keys, wire rings, nuts).
  - a) To aid in reassembly of the motor, make a "V" shaped set of lines from the endcover to the housing using either paint or a marker.
  - b) With shaft facing down, secure motor in vise by clamping on to housing (18).
2. Loosen and remove seven bolts (29) holding motor assembly together.
  - a) Remove endcover (27) carefully as piston (25) and spring (26) may fall out.
  - b) If piston does not come out, carefully pry piston (25) out of endcover (27) and lay aside.
  - c) Remove O-Ring seal (12) and backup seal (13) from endcover and discard seals.
  - d) Remove spring (26) and lay aside.
3. Lift commutator container and commutator (24) from motor and lay aside.
  - a) Place commutator on a flat, clean surface with the seal (11) facing up.
  - b) Place the tip of a small screwdriver on the seal (11) and gently tap until opposite side of seal lifts from groove.
  - c) Remove seal (11) and discard.
4. Remove manifold (23), rotor set (22) and divider plate (21) from motor.
  - a) Remove all seals (8, 9, & 10) from components and discard.



**Caution:** Do not allow rolls to drop from rotor assembly (22) when removing rotor assembly from motor.

- b) Remove drive link (20) and thrust bearing (16) from motor and lay aside.
- c) Gently tap shaft (30) upward from housing (18) and remove through rear of housing and lay aside.

## DR 600 Housing/Shaft with Seal Carrier Disassembly & Assembly

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### Design that utilizes a seal carrier (14)

1. Remove housing (18) from vise and turn over.
  - a) Press dust seal (1) from housing.
  - b) Push the seal carrier (14), thrust washer (15) and thrust bearing (35) down until they make contact with the roller bearing (17) located in the housing bore.
2. Remove snap ring (2), steel backup shim (3) and high pressure seal (4) from inner bore groove with a small screwdriver.
  - a) Lift out seal carrier (14), thrust washer (15) and thrust bearing (35) from the housing bore.
  - b) Using a small screwdriver, carefully pry shaft seal (7), backup seal (6) and metal backup shim (5) from seal carrier (14) and discard.
  - c) Lay seal carrier, thrust washer and thrust bearing 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.*



3. Place shaft (30) on a clean flat surface with output end facing up.

a) Place thrust bearing.

**Note**

*If the thrust bearing has an integral washer, make sure washer surface faces down.*

b) Then place thrust washer (15) on the shaft.

c) Lightly coat seal area of shaft with clean oil and place plastic installation sleeve with shaft seal (7) down onto shaft covering all splines, keyways and wire ring grooves.

d) Slide shaft seal (7) down onto shaft (30) making sure that lip on seal faces down (See Figure 2 for correct seal orientation) until it contacts thrust washer (15).

e) Remove plastic installation sleeve.

f) Carefully install the backup seal (6) onto the shaft (30) with the flat side up and the seal lip facing the shaft seal (7).

g) Place the metal backup shim (5) onto the shaft and against the backup seal (6).

h) Place the seal carrier (14) onto the shaft (large end down) and carefully press the seal carrier (14) down onto the seal assembly using an arbor press and sleeve to compress the seals into the carrier.

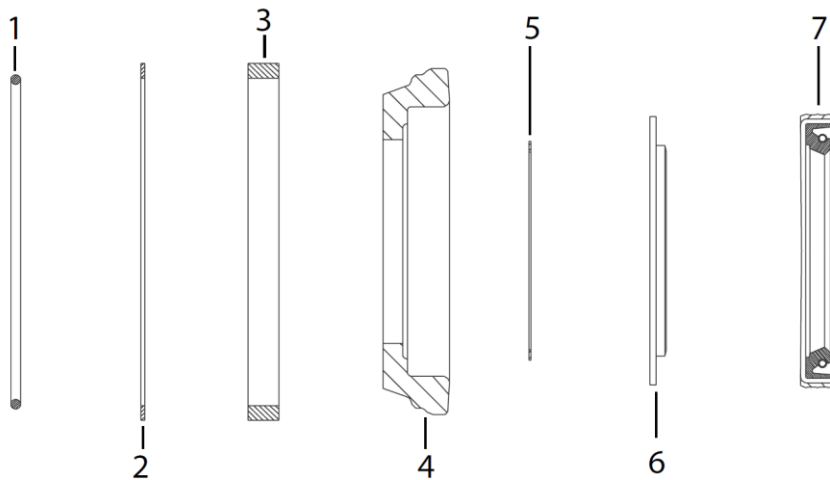


Figure 2 Seal elements with Seal Carrier

1 Wire ring

2 Metal backup shim

3 High pressure seal

4 Seal carrier

5 Metal backup shim

6 Backup seal

7 Shaft seal

4. With pilot side facing up, place housing (18) on spacers to raise housing approximately 6mm [.25 in] above work surface.

**Note**

*Spacers should allow shaft to contact work surface.*

a. Place shaft/seal carrier assembly into housing (18).

b. Install high pressure seal (4) into groove in housing.

c. Install metal backup shim (3) against high pressure seal (4) in groove in housing bore by squeezing the shim(3) between thumb and forefinger to bow shim.

d. While maintaining bow in shim, start the shim into the groove and use a small screwdriver to push the shim into groove.

e. Install wire ring (2) into the groove making sure that the ends are butted.

5. While holding shaft into housing, place housing/shaft assembly in vise with shaft end down.
  - a) Install drive link (20) into shaft and tap lightly to seat the seal carrier assembly against the wire ring (2).
  - b) Place thrust bearing (16) over drive link (20).
  - c) If shaft is properly seated against wire ring, thrust bearing (16) will be flush with rear of housing.

## DR 600 Housing/Shaft without Seal Carrier Disassembly & Assembly

### Design that does NOT utilize a seal carrier (14)

1. Position the housing (18) in vise and use a slide and hammer type bearing puller to remove the rear housing bearing (19), the bearing spacer (36), and the front housing bearing (17).
  - a) Remove the thrust washer (15) and thrust bearing (35) and set aside.
  - b) Using a small screwdriver carefully pry the shaft seal (7), backup seal (6) and metal shim (5) from housing bore and discard.
2. Remove the housing from vise and turn over and pry the dust seal (1) from housing and discard.

#### Note

*At this point, all parts should be cleaned in an oil-base 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.*

3. Place housing (18) in vise with the seven bolt assembly holes facing up.
  - a) Place metal shim (5) or excluder seal (not shown) in the smallest diameter recess in the housing (18). Install the backup seal (6) into the housing (18) with the flat side down and the seal lip facing up.
  - b) Insert shaft seal (7) down into housing (18) making sure that lip on seal faces up (See Figure 3 for correct seal orientation).
  - c) Install thrust washer (12) into housing and using an arbor press, seat the shaft seal (7) into housing (18), then place the thrust bearing (35) into housing.

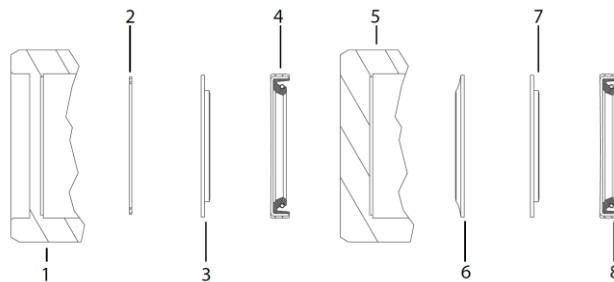


Figure 3 Seal elements without Seal Carrier

- |                 |               |
|-----------------|---------------|
| 1 Housing       | 7 Backup seal |
| 2 Backup shim   | 8 Shaft seal  |
| 3 Backup seal   |               |
| 4 Shaft seal    |               |
| 5 Housing       |               |
| 6 Excluder seal |               |

4. Place front housing bearing (17) onto housing and press bearing into housing to a depth of 60.1mm [2.37in] from the rear surface of the housing (18) to the top of the bearing.
  - a) Insert the bearing spacer (36) into the housing.

- b) Place the rear housing bearing (19) onto the rear housing bore and press to a depth of 3.6mm [.14in] from the rear surface of the housing (18) to the top of the bearing (19).
- c) Place the shaft (30) down into housing (18) and place thrust bearing (16) on top of shaft (30).
- d) If shaft seals are properly seated against the housing (18), thrust bearing (16) will be flush with rear surface of housing.

## DR 600 Motor Section Assembly

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### Same instructions for both designs

1. Install housing seal (8) into groove in housing (18).
  - a) Place divider plate (21) onto housing (18) aligning bolt holes.
  - b) Place body seals (9) in grooves in both sides of rotor (22).
  - c) Place rotor (22) onto divider plate (21) with side of rotor with chamfer in splines facing divider plate (21).
  - d) Place manifold (23) over rotor (22) with seal groove side up. Install manifold seal (10).
2. Install the commutator seal (11) into the commutator (24) 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 (23) and then place the commutator onto the protruding end of the drive link (20) making sure that the seal side faces up.
  - c) Install the remaining body seal (9) in the groove in the face of the endcover (27).
  - d) Install piston spring (26) into endcover (27), then the white backup seal (13) followed by the O-Ring seal (12).
  - e) Lining up the alignment pin with the hole in the endcover, press piston (25) into the endcover (27).
  - f) While holding the piston (25) in the endcover, lower the endcover assembly on to the motor.
  - g) Check to make sure that the endcover ports are in their original position.
3. Install the seven assembly bolts (29).

Pre-torque to 13.6 Nm [10 ft. lbs.] Final torque all bolts to 67.8 Nm [50 ft. lbs.].
4. Install dust seal (1) flush with the pilot face of the housing (18) making sure that the lip side of the seal faces out.

# Chapter 3

## DR 600 Series Parts Listing

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### Topics

- *DR 600 Replacement kits*

## DR 600 replacement kits

### Note

Refer to Exploded view (figure 1) for item numbers

### Seal kits

Description	Exploded View Item Number	Qty. In Kit	Order Number
Dust seal	1	1	600555000 (Includes item numbers 1-13)
Split wire ring	2	1	
Metal backup shim	3	1	
High pressure seal	4	1	
Metal backup shim	5	1	
Polyamide seal	6	2	
Shaft seal	7	2	
Rear housing seal	8	1	
Body seal	9	3	
Manifold seal	10	1	
Commutator seal	11	1	
O-ring seal	12	1	
Backup seal	13	1	
Seal carrier	14	1	500444003 (Includes item numbers 14-15)
Thrust washer	15	1	

Table 2 Seal kits

### Miscellaneous kits

Description	Exploded View Item Number	Order Number
Rear thrust bearing	16	500018059
Front housing bearing (1" wide)	17	500018003
Rear housing bearing (.5" wide)	19	500018002
Divider plate	21	500012004
Manifold	23	700668002
Commutator assembly	24	700668003
Endcover piston	25	700668004
Piston spring	26	700018046
Front thrust bearing	35	500018252
1000 psi relief valve	Not shown	500018228
2000 psi relief valve	Not shown	500018231
3000 psi relief valve	Not shown	500018221
7/8" O-ring port plug	Not shown	700018021
1.00-20 UNEF slotted nut	Not shown	500449304
1.00-20 UNEF solid nut	Not shown	500449303
1.00-20 UNEF locked nut	Not shown	300339303P
Bearing spacer	36	500018305

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	22	22	20	29
Displacement	Standard Rotor Kit	Freeturn Rotor Kit	Drive Link Kit	Bolt Set Kit
200	500167004	500167011	600140012	700664012
260	500227000	500227004	600140016	700664019
300	500247005	500247011	600140019	700664025
350	500207000	500207004	600140027	700665028
375	500307005	500307011	600140025	700664028
470	500357003	500357005	600140027	700665028
540	500407005	500407011	600140033	700665033
750	500607005	500607011	600140046	700665046

Table 4 Rotors, drive links, and bolts

## Housing kits

Exploded view item #18

Standard housing kits include the front bearing (17) and the rear bearing (19) installed in the housing.

Description	Order Number
#W2 & W8- wheel mount flange	500130723
#A2 & A8- 4-hole SAE "A" style	500130823
#K2 & K8- wheel mount with brake mount	500131123
#A0 & A7- 2-hole SAE "A" style	500131623
#A4 & A9- 6-hole SAE "A" style	500131823

Table 5 Housing kits

## Shafts and related component kits

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

Exploded View Item Number	30	31	Not Shown	32	33	34
Description	Shaft Kit	Key Kit	Nut Kit	Bolt Kit	Washer Kit	Wire Ring Kit
#02- 6-B Spline	500011600	-	See table 3 miscellaneous kits	-	-	-
#22- 1-1/4" Tapered	500011300	500449101		-	-	-
#20- 1-1/4" Straight	500011200	500449102		500449301	500449302	500449201
#23- 14 Tooth spline	500011101	-		-	-	500449201
#06- 1" Straight	500011201	500449100		-	-	-
#12- 25mm Straight	500011109	500449104		-	-	-
#24- 19 Tooth spline	500011102	-		-	-	500449201
#21- 32mm Straight	500011203	500449103		-	-	500449201

Table 6 Shafts and related components kits

## Endcover kits

Exploded view item #27

Endcover kits come assembled with exploded view item numbers 12, 13, 25, & 26. To order a relief valve for the valve cavity endcovers, See Table 3: Miscellaneous kits on 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

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