

# **Repair Instructions**

## **WS 350/351 Series**



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# Chapter

# 1

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## WS 350/351 Series Diagram

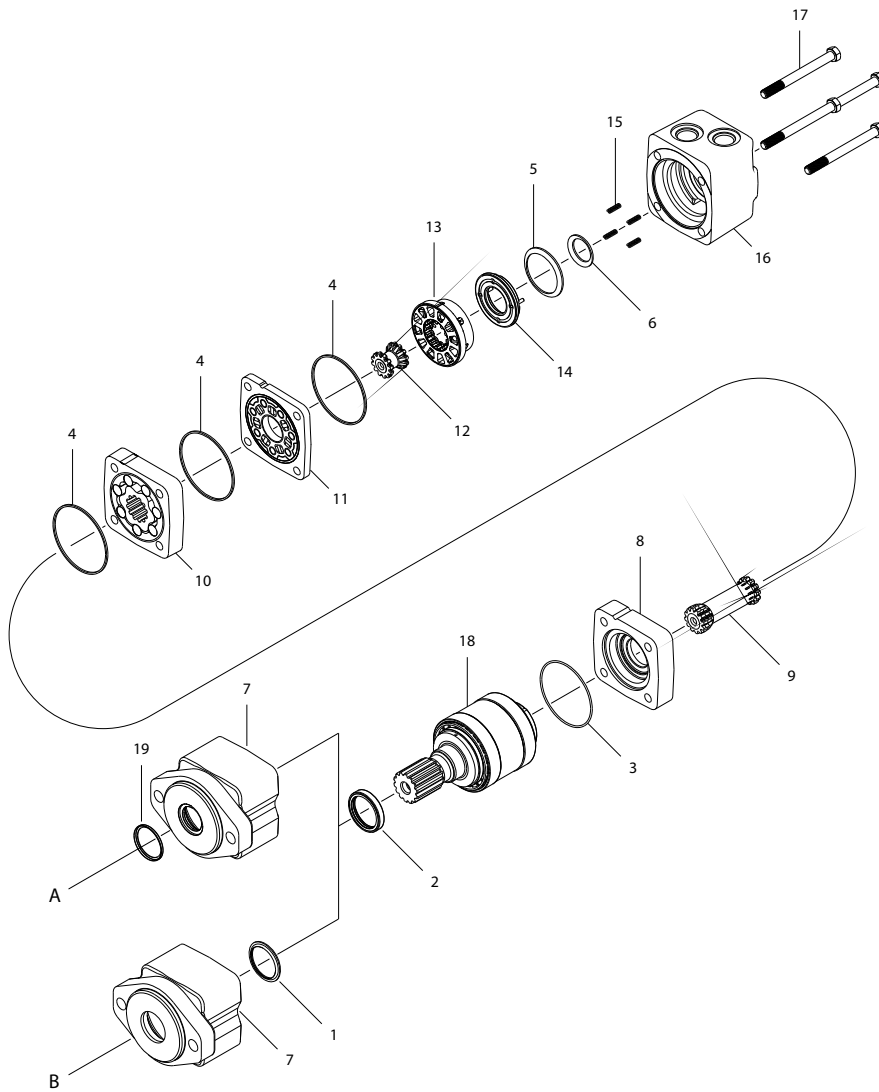
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### Topics:

- [\*WS 350/351 Exploded View\*](#)

## WS 350/351 Exploded View

### Exploded View



**Table 1: Seal Options**

Description	Item Letter
Dust seal	A
Excluder seal	B

### Component List

Description	Item Number
Excluder seal	1
Shaft seal	2
Housing seal	3

<b>Description</b>	<b>Item Number</b>
Body seal	4
Large piston seal	5
Small piston seal	6
Housing	7
Wear plate	8
Drive link	9
Rotor assembly	10
Manifold	11
Driver	12
Commutator	13
Piston	14
Piston spring	15
Endcover	16
Assembly bolt	17
Shaft assembly	18
Dust seal	19





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# Chapter

# 2

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## **WS 350/351 Series Service Instructions**

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### Topics:

- *WS 350/351 Seal Kit Installation*
- *WS 350/351 Endcover Sub Assembly*

## WS 350/351 Seal Kit Installation

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dimensions: mm [in]

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. With the shaft facing down, secure the motor in a vise by clamping on the housing flange (7)

1. Loosen and remove four bolts (17) holding the motor assembly together. Remove the endcover assembly (16).
2. Flip the endcover assembly over. Remove the commutator (13), piston (14), and springs (15) from the endcover (16).
  - a) Place the piston (14) on a flat clean surface with piston seals (5 & 6) facing up.
  - b) Remove the piston seals from the piston (14) and discard.
3. Remove the driver (12), manifold (11), rotor set (10) and wear plate (8) from the motor. Remove all seals (4) from components and discard. Remove seal (3) from housing (7) and discard.



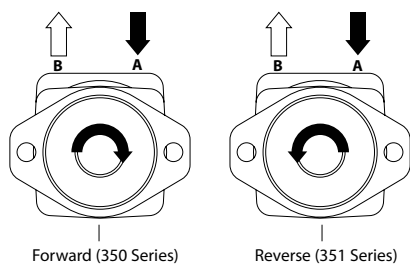
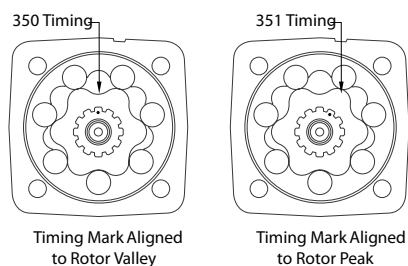
**Caution:** Do not allow rolls to drop from rotor assembly when removing rotor assembly from motor

4. To aid in the reassembly of the shaft sub-assembly make a “V” shaped set of line across the rear of the housing and the bearing retaining ring on the shaft assembly using either paint or a marker.
  - a) Remove the housing (10) from the vise and flip over.
  - b) Remove any shaft components from shaft (bolts, washers, keys, etc.)
5. Using a press, press the shaft assembly (18) out of the rear of the housing (7).
  - a) Remove shaft seal (2).
  - b) Remove either the excluder seal (1) or dust seal (19) from housing (7) and discard all seals.

**Note:** Refer to exploded view to see which seal is being used.

**Note:** Clean all parts in an oil-based solvent and dry using compressed air (for safety, observe OSHA safety guidelines). All new seals should be lightly coated in clean oil prior to installation.

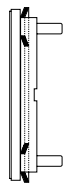
6. If dust seal (19) was used, install in housing (7) with lip facing up prior to flipping housing over to secure in vise. If excluder seal (1) was used flip housing over and install excluder seal (1) into housing (7) with the lip facing down.
7. Align shaft seal (2) with flat side of seal facing excluder seal (1) if used, and press seal in with a flat surface tool until seal stops. Press the shaft assembly (18) into housing (7) lining up the “V” set of lines on the bottom of the housing and shaft assembly
8. Install o-ring (3) after a slight stretch to expand the diameter of the seal into seal groove of housing (7). Install drive link (9) and seat into shaft assembly (18).
9. If a “V” shaped set of lines was drawn on the motor prior to disassembly, use them as a guide for reassembly to insure proper positioning of components.
10. Install the wear plate (8) with the counter bore towards the housing (7).
  - a) Replace seal (4) in the rotor set (10) and place onto the wear plate (8).
  - b) Place driver (12) on top of driveline (9) engaging splines in rotor set (10).  
Make sure timing mark on the driver is pointing away from drive link (see [Figure 1: Figure 1](#) on page 11 and [Figure 2: Figure 2](#) on page 11 for motor timing).
  - c) Replace seal (4) in the manifold (11) and place over driver and onto rotor set (10).

**Figure 1: Figure 1****Figure 2: Figure 2**

## WS 350/351 Endcover Sub Assembly

1. Place the endcover (16) on a flat clean surface with cavity facing up. Install the four springs (15) into holes in the bottom of the cavity.
2. Install the O.D. and I.D. piston seals (5 & 6) onto the piston (14).

The seals are cone shaped. The I.D. of the outer seal and the O.D. of the inner seal should be installed towards the piston. The opposite edges should be coming out away from the piston (see [Figure 3: Figure 3](#) on page 11 for installation of the piston seals).

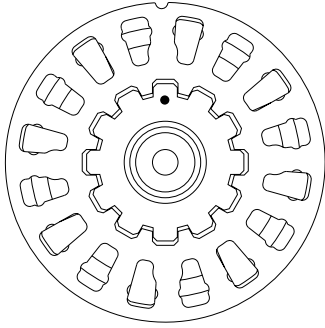
**Figure 3: Figure 3**

3. Install the piston (14) into the endcover (16).

The two pins on the piston (14) should engage two of the springs inserted into the endcover (16). If the two pins are seated correctly, the piston will not spin in the endcover.

4. Install the commutator (13) into the endcover (16) with the I.D. splines facing up and replace the last seal (4) on the endcover subassembly.

The commutator must be timed correctly. There is one notch on the O.D. of the commutator (13). This notch must be aligned with the timing mark on the driver (12). See [Figure 4: Figure 4](#) on page 12 for timing the commutator correctly.



**Figure 4: Figure 4**

5. Pick up the endcover sub-assembly and flip over. A small screwdriver can be inserted into a port to make sure the components stay together.
  - a) Slide the endcover assembly over the driver (12) making sure that the notch in the commutator (13) aligns with the timing mark on the driver (12).

The notch in the commutator does not need to be at a particular position in the endcover. With the notch aligned with the timing mark and the driver splines engaged in the commutator, the endcover assembly may be rotated to align the endcover with the rest of the motor.

**Note:** Do not align endcover with the rest of the motor unless the driver is engaged in the commutator and the notch and mark are in alignment as it could result in motor operation in the wrong direction.

6. Install assembly bolts (17) into endcover.

Pre-torque to 13.6 Nm [10 ft. lb.]. Final torque all bolts to  $69.8 \pm 7.5$  Nm [ $51.5 \pm 5.5$  ft. lb.].

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# Chapter

# 3

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## WS 350/351 Series Parts Listing

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### Topics:

- [WS 350/351 Replacement Kits](#)

## WS 350/351 Replacement Kits

### Available Parts Kits

Note: Refer to the [Exploded View](#) on page 6 for item numbers

**Table 2: Seal kits**

Description	Exploded View Item Number	Qty. In Kit	Order Number
Excluder seal	1	1	355355001 (Includes item numbers 1-6 & 19)
Shaft seal	2	1	
Housing seal	3	1	
Body seal	4	3	
Large piston seal	5	1	
Small piston seal	6	1	
Dust seal	19	1	

**Table 3: Miscellaneous kits**

Description	Exploded View Item Number	Order Number
Wear plate	8	355012005
Manifold	11	350015100
Driver	12	350014100
Driver (For 80CC only)	12	350014135
Commutator	13	350012107
Endcover piston	14	355018036
Piston spring	15	355018032
1000 psi relief valve	Not shown	500018228
2000 psi relief valve	Not shown	500018231
3000 psi relief valve	Not shown	500018221
M24 X 1.5 Slotted hex nut	Not shown	500449306
1.125-18 UNEF slotted hex nut	Not shown	700018038
1.125-18 UNEF solid hex nut	Not shown	700018054
1.00-20 UNEF solid nut	Not shown	500449303
1.00-20 UNEF locked nut	Not shown	300339303P
1.00-20 UNEF slotted nut	Not shown	500449304

### Rotors, drive links, and bolts

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

<b>Exploded View Item Number</b>	<b>10</b>	<b>9</b>	<b>17</b>
<b>Displacement</b>	<b>Standard Rotor Kit</b>	<b>Drive Link Kit</b>	<b>Bolt Set Kit</b>
080	350057004	350014137	300335018
100	350067004	355014103	300335018
110	350077004	355014104	300334024
130	350087004	355014105	300334018L
160	350107004	355014106	300335114
200	350127004	355014107	300335024
230	350147004	355014108	300334024L
250	350157004	355014112	300335024
320	350207004	355014109	355335024
400	350247004	355014113	355335024
500	350317004	355014110	350335500

### Housing kits

Exploded view item # 7

<b>Description</b>	<b>Order Number</b>
A0 & A7 2-hole SAE A mount	350013111
A2 & A8 4-hole magneto mount	350013114
AG & AH 4-hole square SAE A mount	350013118
B0 & B7 2-hole SAE B mount	350013115
Y2 & Y8 4-hole wheel mount (4.25" pilot)	350013117

### Shaft/bearing kits

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

<b>Exploded View Item Number</b>	<b>18</b>	<b>Not Shown</b>	<b>Not Shown</b>
<b>Description</b>	<b>Shaft Kit</b>	<b>Key Kit</b>	<b>Nut Kit</b>
#02 6B Spline	35011002	-	-

<b>Exploded View Item Number</b>	<b>18</b>	<b>Not Shown</b>	<b>Not Shown</b>
<b>Description</b>	<b>Shaft Kit</b>	<b>Key Kit</b>	<b>Nut Kit</b>
#10 1" Straight	35011010	200229100	See <a href="#">Table 3: Miscellaneous kits</a> on page 14
#12 25mm Straight	35011012	355018046	
#20 1-1/4" Straight	35011020	355018038	
#21 32mm Straight	35011021	355018047	
#22 1-1/4" Tapered	35011022	355018039	
#23 14 Tooth spline	35011023	-	
#28 35mm Tapered	35011028	355018048	
#31 1-1/2" Tapered	35011031	500449105	

### **Endcover kits**

Exploded view item #16

Endcover kits come assembled with exploded view item numbers 5, 6, 14, & 15. To order a relief valve for the valve cavity endcovers, see [Table 3: Miscellaneous kits](#) on page 14 listing for relief valve kits numbers.

<b>Description</b>	<b>Standard Endcover Kit</b>	<b>Valve Cavity Endcover Kit</b>
#1 7/8" O-ring (side ports)	350160100	350160100R
#1 7/8" O-ring (end ports)	350160103	-
#2 1/2" BSP.F (side ports)	350160118	350160118R
#2 1/2" BSP.F (end ports)	350160122	-
#6 1-1/16" O-ring 180° (side ports)	350160106	-
#B Offset manifold (side ports)	350160146	-