

# MOTORS

## Repair Instructions

*CE 410, 411, 420 & 421 SERIES MOTORS*



*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

## CE 410, 411, 420 & 421 WITH ONE PIECE SHAFT SEAL

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For Use with Seal Kit(s): 400444300EB , PE444300B

dimensions: mm [in]

- a) Remove all shaft components from the shaft, (20), (i.e., keys, wire rings, nuts). 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 onto the housing, (7). Loosen and remove the seven bolts, (19), holding the motor assembly together. Remove the endcover, (17), from the motor.
- b) Remove the balance plate, (15), rotor set, (14), and the manifold, (13), from the motor. Remove all seals from the components and discard. (Caution - when removing the balance plate, do not allow the three check balls, (16), to fall out of the plate. Do not allow the rolls to drop out of the rotor set assembly when removing it from the motor.) Remove drive link, (12), from the motor and lay aside. Remove the thrust bearing, (11), from the housing and lay aside. From the front of the housing, gently tap the shaft, (20), upward and remove through the rear of the housing.
- c) Using a slide and hammer type bearing puller, (see Figure 2), remove the rear housing bearing, (10), from the housing. Remove the thrust bearing, (9), and lay aside, remove the thrust washer, (8), and lay aside. Remove the shaft seal, (3), and discard. Turn the housing over and remove the dust seal (1).
- d) 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.
- e) Remove and replace the front roller bearing (6) or pack the bearing with grease.
- f) Place the integral thrust washer/bearing, (9), onto the shaft. The washer side should be against the shoulder of the shaft. Place a thrust washer, (8), onto the shaft on top of the thrust bearing. Coat the shaft seal, (3), with a light coat of oil and install onto the shaft with the lip side down.
- g) With the pilot of the housing placed down, install the output end of the shaft through the rear bore of the housing.
- h) The rear bearing is now ready to be installed. With the writing side of the bearing facing up, place the bearing, (10), into the housing bore. Using a hand press, the bearing should be pressed into the bore. It is necessary that the bearing be pressed 3,0-3,3mm (.12 - .13") deep into the bore of the housing to accommodate the width of the thrust bearing.
- i) Install a thrust bearing, (11), on top of the shaft.

- j) Install a lightly oiled body seal, (2), into the seal groove in the housing. Make sure that this seal is in the seal groove and protruding approximately 0,2mm (0.007") over the top of the housing surface. (Caution - if a bump is felt in the seal, remove the seal and make sure that there is no grit on the seal or in the seal groove.)
- k) Install the drive link, (12), into the housing. The proper end of the drive link has a 'hat' machined in the top of the drive link on the 120 – 260cc (07-16in<sup>3</sup>) displacement. The drive link is to be placed in the shaft with the hat facing up on these displacements. The 300cc (18 in<sup>3</sup>) displacements and above have a symmetrical head and either end can be put into the motor. Once the drive link has been installed, the shaft can be seated. This is done by bringing the arbor of the hand press down and putting pressure on the drive link. (Caution - do not use excessive pressure as this could deform the thrust bearing and/or bearing races.)
- l) Place the manifold, (13), (seven teardrop hole side down) on the housing. Line the bolt hole notches in the outside diameter of the manifold up with the seven bolt holes in the housing.
- m) Install two oil coated body seals, (4), one on each side, into the seal grooves of the rotor set, (14). Place the deep groove side of the of the rotor set down on the manifold, (13).
- n) Place the balance plate, (15), on top of the rotor set with the check balls, (16), up. If the check balls were removed, install three check balls into the countersunk holes in the balance plate, one ball per hole.
- o) Install an oil coated body seal, (5), into the seal groove of the endcover, (17). Place the endcover onto the motor with the tag holes directly above the housing ports. (Caution - it is very important that the body seal does not fall out of the endcover while being installed. Extra care must be used to ensure that this doesn't happen.)
- p) Install the seven bolts, (19), into the motor. Pre-torque bolts to 13,6 Nm (10 ft. lbs). The final torque on the bolts is to be 69,8±7,5Nm (51.1 ± 5.5 ft. lbs).

## Exploded view

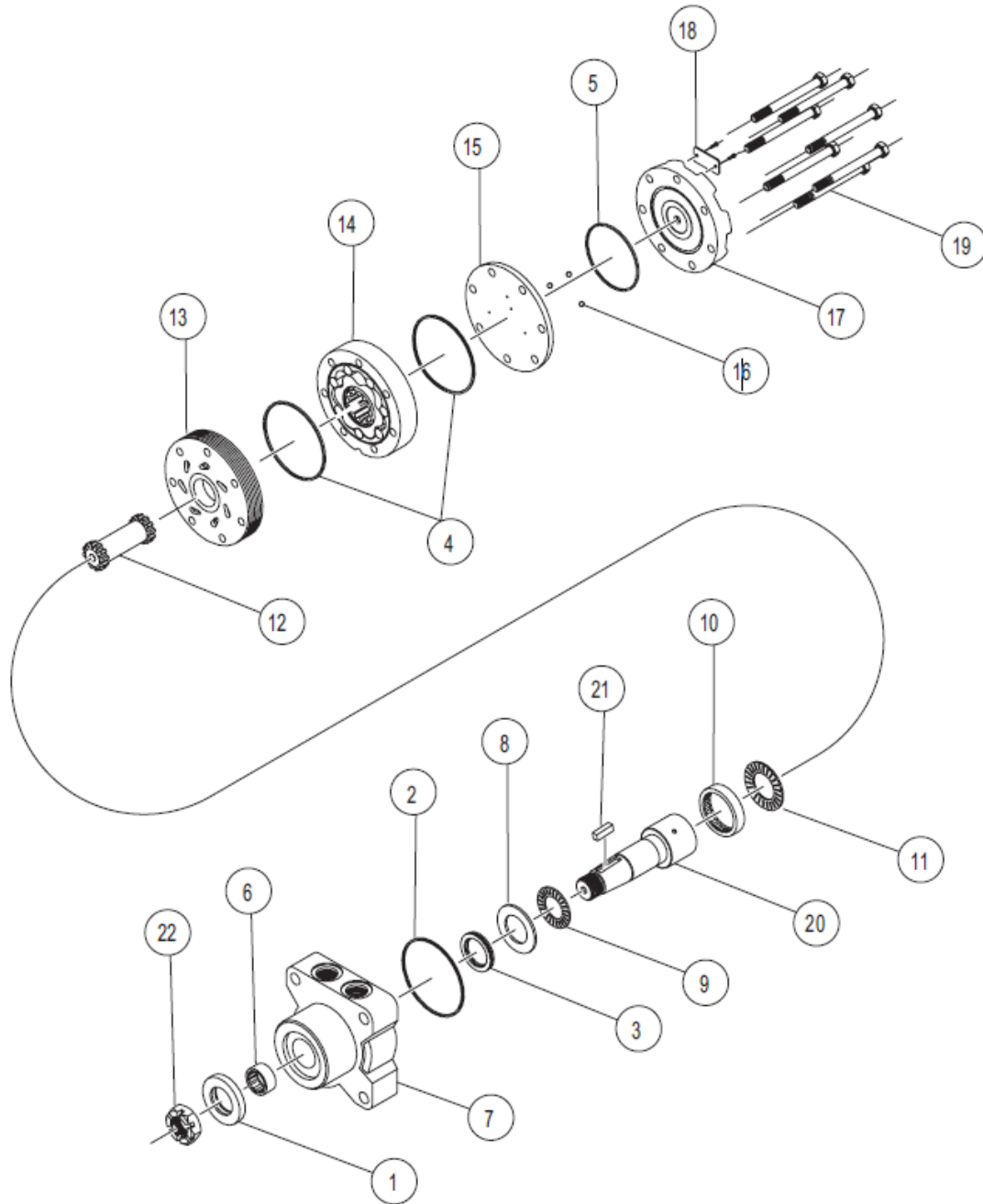


Figure 1: CE [410, 411, 420 & 421] Exploded view



Figure 2: Bearing puller

Description	Item Number	Included in Seal kit	
		400444300EB	PE444300B
Dust seal	1		
Housing seal	2		
Shaft seal	3		
Body seals (2)	4		
End cover seal	5		
Front housing bearing	6		
Housing	7		
Thrust Washer	8		
Front Thrust Bearing	9		
Rear Housing Bearing	10		
Thrust Bearing	11		
Drive link	12		
Manifold	13		
Rotor Assembly	14		
Balance Plate	15		
Steel Balls (3)	16		
End cover	17		
I. D. Tag	18		
Assembly Bolts (7)	19		
Shaft	20		
Shaft key	21		
Shaft nut	22		

Table 1 CE [410, 411, 420 & 421] Component list

## Chapter 2

# CE 410, 411, 420 & 421 WITH FRONT HOUSING BEARING

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dimensions: mm [in]

For Use with Seal Kit(s): PE444300E

**NOTE:** All internal seals on products manufactured after July 1, 2016 are o-ring seals. Prior to this date the internal 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.

- a) Remove all shaft components from the shaft, (22), (i.e., keys, wire rings, nuts). 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 onto the housing, (9). Loosen and remove the seven bolts, (21), holding the motor assembly together. Remove the endcover, (19), from the motor.
- b) Remove the balance plate, (17), rotor set, (16), and the manifold, (15), from the motor. Remove all seals from the components and discard. (Caution - when removing the balance plate, do not allow the three check balls, (18), to fall out of the plate. Do not allow the rolls to drop out of the rotor set assembly when removing it from the motor.) Remove drive link, (14), from the motor and lay aside. Remove the thrust bearing, (13), from the housing and lay aside. From the front of the housing, gently tap the shaft, (22), upward and remove through the rear of the housing.
- c) Using a slide and hammer type bearing puller, (see Figure 2), remove the rear housing bearing, (12), from the housing. Remove the thrust bearing, (11), and lay aside, remove the thrust washer, (10), and lay aside. Remove the shaft seal, (5), and discard, remove the back-up seal, (4), and discard, remove the metal shim, (3), and discard. Turn the housing over and remove the dust seal (1).
- d) 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.
- e) Remove and replace the front roller bearing (8) or pack the bearing with grease.
- f) Place the integral thrust washer/bearing, (11), onto the shaft. The washer side should be against the shoulder of the shaft. Place a thrust washer, (10), onto the shaft on top of the thrust bearing. Coat the shaft seal, (5), with a light coat of oil and install onto the shaft with the lip side down. Place a light coat of oil on the back-up seal, (4), and place over the shaft seal. Place the metal back-up shim, (3), over the back-up seal.
- g) With the pilot of the housing placed down, install the output end of the shaft through the rear bore of the housing.



- h) The rear bearing is now ready to be installed. With the writing side of the bearing facing up, place the bearing, (12), into the housing bore. Using a hand press, the bearing should be pressed into the bore. It is necessary that the bearing be pressed 3.0 - 3.3mm [.120 - .130"] deep into the bore of the housing to accommodate the width of the thrust bearing.
- i) Install a thrust bearing, (13), on top of the shaft.
- j) Install a lightly oiled body seal, (2), into the seal groove in the housing. Make sure that this seal is in the seal groove and protruding approximately 0.2mm [.007"] over the top of the housing surface. (Caution - if a bump is felt in the seal, remove the seal and make sure that there is no grit on the seal or in the seal groove.)
- k) Install the drive link, (14), into the housing. The proper end of the drive link has a ‘hat’ machined in the top of the drive link on the 120 – 260cc (07-16in3) displacement. The drive link is to be placed in the shaft with the hat facing up on these displacements. The 300cc (18 in<sup>3</sup>) displacements and above have a symmetrical head and either end can be put into the motor. Once the drive link has been installed, the shaft can be seated. This is done by bringing the arbor of the hand press down and putting pressure on the drive link. (Caution - do not use excessive pressure as this could deform the thrust bearing and/or bearing races.)
- l) Place the manifold, (15), (seven teardrop hole side down) on the housing. Line the bolt hole notches in the outside diameter of the manifold up with the seven bolt holes in the housing.
- m) Install two oil coated body seals, (6), one on each side, into the seal grooves of the rotor set, (16). Place the deep groove side of the of the rotor set down on the manifold, (15).
- n) Place the balance plate, (17), on top of the rotor set with the check balls, (18), up. If the check balls were removed, install three check balls into the countersunk holes in the balance plate, one ball per hole.
- o) Install an oil coated body seal, (7), into the seal groove of the endcover, (19). Place the endcover onto the motor with the tag holes directly above the housing ports. (Caution - it is very important that the body seal does not fall out of the endcover while being installed. Extra care must be used to ensure that this doesn’t happen.)
- p) Install the seven bolts, (21), into the motor. Pre-torque bolts to 13.6 Nm [10 ft. lb.]. The final torque on the bolts is to be 69.8 ± 7.5 Nm [51.5 ± 5.5 ft. lb.].

## Exploded view

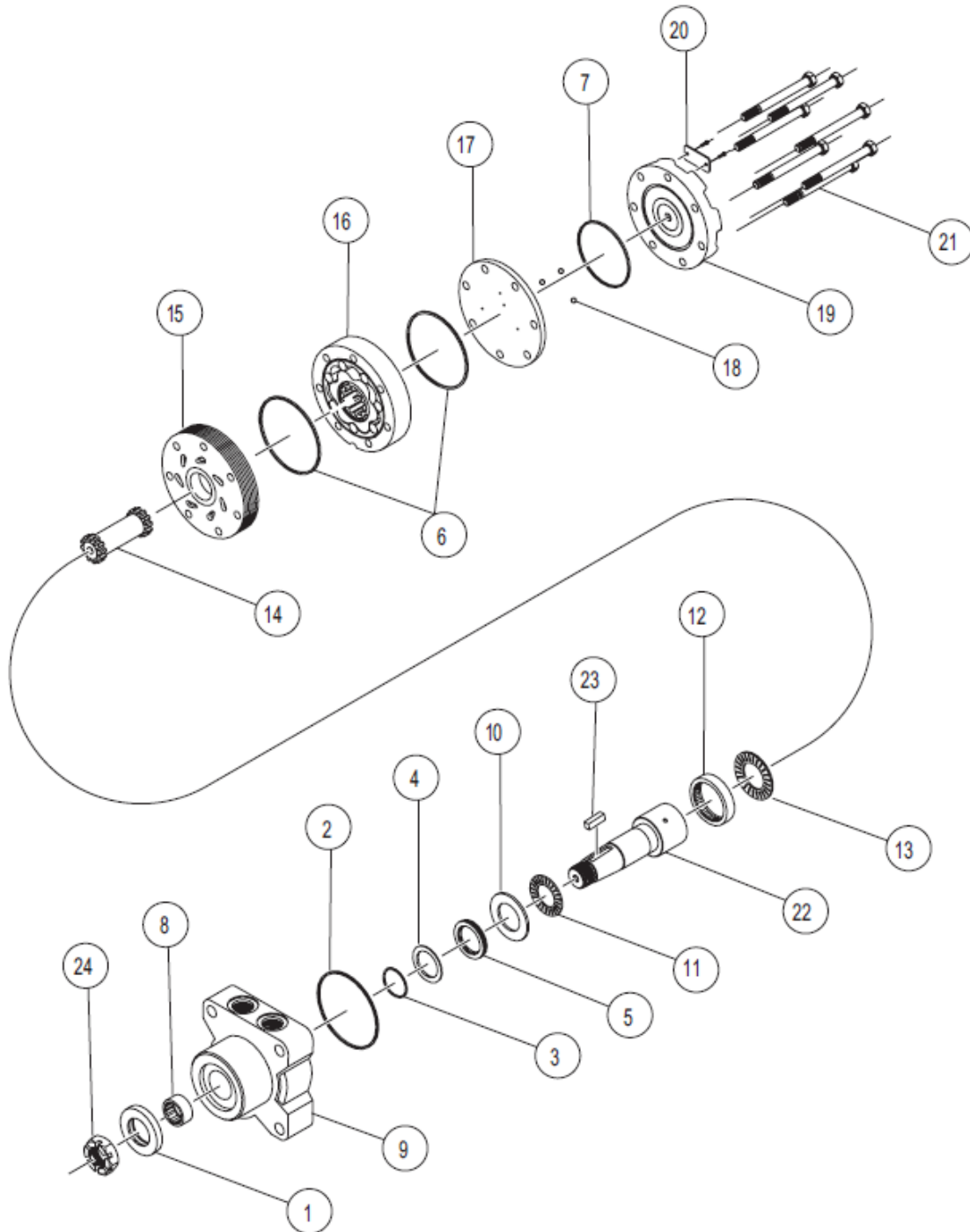


Figure 3: CE [410, 411, 420 & 421] Exploded view (WITH FRONT HOUSING BEARING)

Description	Item Number
Dust seal*	1
Housing seal*	2
Metal Back-Up*	3
Back-Up Seal*	4
Shaft Seal*	5
Body Seals (2)*	6

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End cover Seal*	7
Front Housing bearing*	8
Housing	9
Thrust Washer	10
Front Thrust Bearing	11
Rear Housing Bearing	12
Thrust Bearing	13
Drive link	14
Manifold	15
Rotor Assembly	16
Balance Plate	17
Steel Balls (3)	18
End cover	19
I. D. Tag	20
Assembly Bolts (7)	21
Shaft	22
Shaft key	23
Shaft nut	24

Table 2: CE [410, 411, 420 & 421] Exploded view (WITH FRONT HOUSING BEARING)

\* Contained in seal kit PE444300E



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