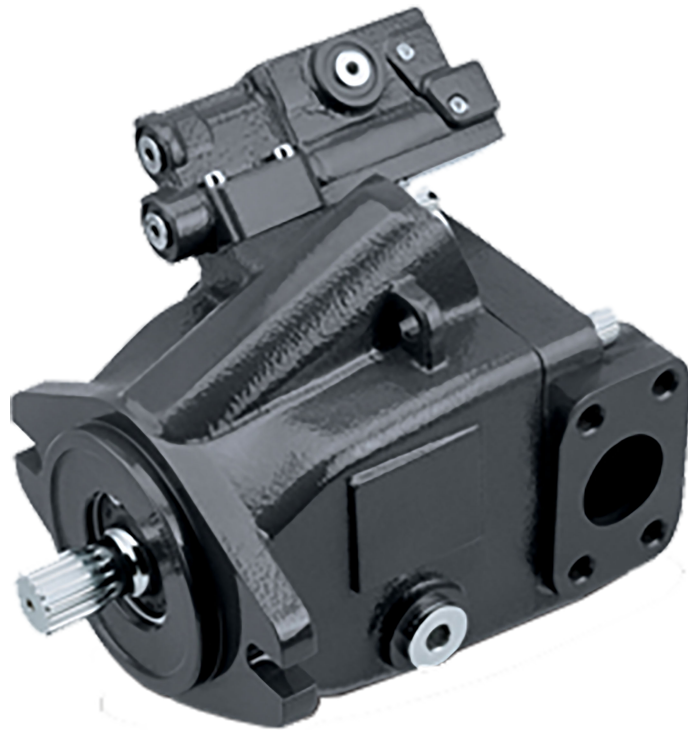


Repair Instructions

Axial Piston Open Circuit Pumps

Series 45 K2



Revision history*Table of revisions*

Date	Changed	Rev
April 2017	First edition	0101

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Introduction

Overview

This manual details the major repair procedures for Series 45 Frame K2 open circuit axial piston pumps. These include the complete disassembly, inspection, and reassembly of the unit. Where rework of worn or damaged components is possible, specifications are given to ensure these parts meet factory tolerances. Only Danfoss Authorized Service Centers (ASCs) are authorized to perform major repairs. Danfoss ASCs are trained by the factory to perform major repairs and their facilities are certified on a regular basis.

Warning

Use of components that do not comply with rework specifications may result in loss of performance, which may constitute a safety hazard. Do not reuse components that don't comply to given specifications: replace with genuine Danfoss service parts.

Minor repair procedures, adjustments, and troubleshooting information are given in the Series 45 Frame K2 Open Circuit Axial Piston Pumps Service Manual, AX00000304. Minor repairs include service operations that can be performed without removing the unit's endcap. Removal of the endcap voids your warranty.

General instructions

Follow these general procedures when repairing Series 45 variable displacement open circuit pumps.

Remove the unit



Prior to performing major repairs, remove the unit from the vehicle/machine. Chock the wheels on the vehicle or lock the mechanism to inhibit movement. Be aware that hydraulic fluid may be under high pressure and / or hot. Inspect the outside of the pump and fittings for damage. Cap hoses after removal to prevent contamination.

Keep it clean



Cleanliness is a primary means of assuring satisfactory pump life, on either new or repaired units. Clean the outside of the pump thoroughly before disassembly. Take care to avoid contamination of the system ports. Cleaning parts by using a clean solvent wash and air drying is usually adequate.

As with any precision equipment, all parts must be kept free of foreign materials and chemicals. Protect all exposed sealing surfaces and open cavities from damage and foreign material. If left unattended, cover the pump with a protective layer of plastic.

Lubricate moving parts



During assembly, coat all moving parts with a film of clean hydraulic oil. This assures that these parts will be lubricated during start-up.

Replace all O-Rings and gaskets



It is recommended that all O-rings be replaced. Lightly lubricate all O-rings with clean petroleum jelly prior to assembly.

Introduction

Secure the unit



For major repair, place the unit in a stable position with the shaft pointing downward. It will be necessary to secure the pump while removing and torquing the endcap bolts.

Safety Precautions

Always consider safety precautions before beginning a service procedure. Protect yourself and others from injury. Take the following general precautions whenever servicing a hydraulic system.

Unintended machine movement

Warning

Unintended movement of the machine or mechanism may cause injury to the technician or bystanders. To protect against unintended movement, secure the machine or disable / disconnect the mechanism while servicing.

Flammable cleaning solvents

Warning

Some cleaning solvents are flammable. To avoid possible fire, do not use cleaning solvents in an area where a source of ignition may be present.

Fluid under pressure

Warning

Escaping hydraulic fluid under pressure can have sufficient force to penetrate your skin causing serious injury and/or infection. This fluid may also be hot enough to cause burns. Use caution when dealing with hydraulic fluid under pressure. Relieve pressure in the system before removing hoses, fittings, gauges, or components. Never use your hand or any other body part to check for leaks in a pressurized line. Seek medical attention immediately if you are cut by hydraulic fluid.





























Personal safety

Warning

Protect yourself from injury. Use proper safety equipment, including safety glasses, at all times.

Introduction

Symbols used in Danfoss literature

	WARNING may result in injury		Tip, helpful suggestion
	CAUTION may result in damage to product or property		Lubricate with hydraulic fluid
	Reusable part		Apply grease / petroleum jelly
	Non-reusable part, use a new part		Apply locking compound
	Non-removable item		Inspect for wear or damage
	Option - either part may exist		Clean area or part
	Superseded - parts are not interchangeable		Be careful not to scratch or damage
	Measurement required		Note correct orientation
	Flatness specification		Mark orientation for reinstallation
	Parallelism specification		Torque specification
	External hex head		Press in - press fit
	Internal hex head		Pull out with tool – press fit
	Torx head		Cover splines with installation sleeve
	O-ring boss port		Pressure measurement/gauge location or specification

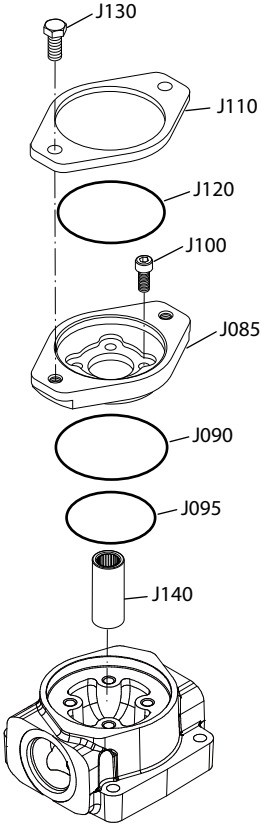
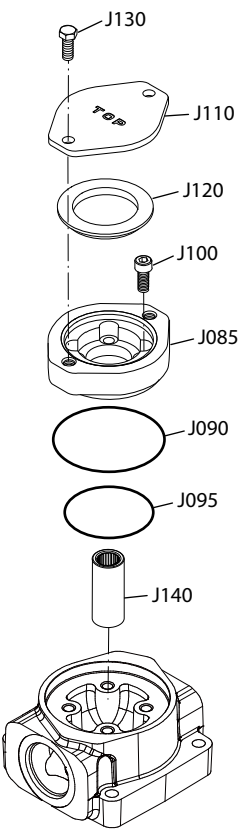
The symbols above appear in the illustrations and text of this manual. They are intended to communicate helpful information at the point where it is most useful to the reader. In most instances, the appearance of the symbol itself denotes its meaning. The legend above defines each symbol and explains its purpose.

Disassembly

Auxiliary pad

If a second pump is used, you must remove it. You don't need to remove auxiliary pads to remove the end cap.

1. Remove the plate cover screws (J130) and remove the cover plate (J110).
2. Remove the coupling (J140) and the pad seal (J120). If you have an auxiliary B pad, discard the O-ring (J120). The pad seal for an auxiliary A pad is reusable if undamaged.
3. Remove the auxiliary pad screws (J100) with an 8 mm internal hex wrench and remove the adapter (J085).
4. Remove and discard the O-rings (J090, J095).
5. Remove the coupling (J140).



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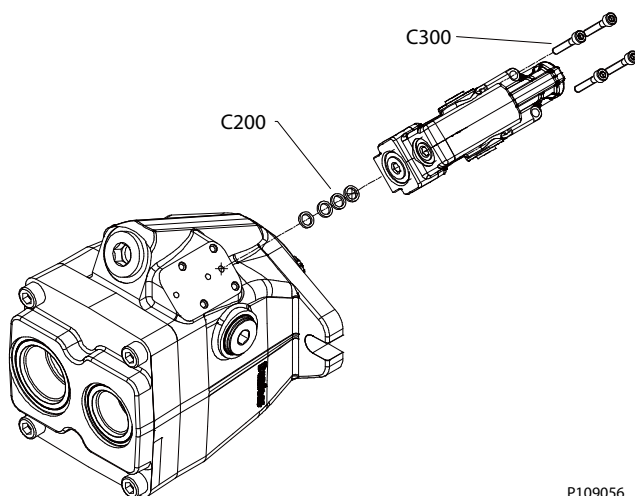
Item	Wrench size
J130	9/16 inch
J110	8 mm internal hex

Disassembly

Remove control

1. Using a 5 mm internal hex wrench, remove the 4 control screws (C300) that fasten the control assembly to the endcap (J020).
2. Remove the control from endcap. Discard interface O-rings. (C200).

Remove control



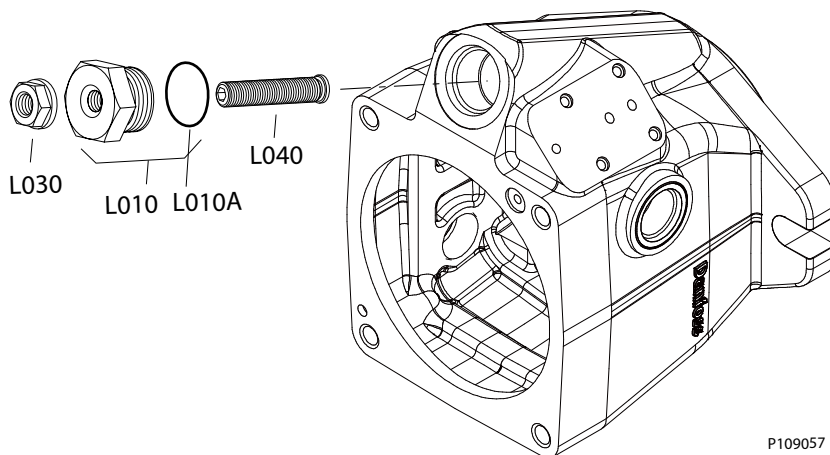
Item	Wrench size
C300	5 mm internal hex

Displacement limiter

1. Remove the adjustment seal/nut (L030).

The L030 adjustment seal/nut serves as a locking seal/nut, preventing the L040 screw from backing out.

2. Remove the adjustment screw (L040). Remove plug (L010) with a 1 1/4 in. wrench. Discard the O-ring (L010A).



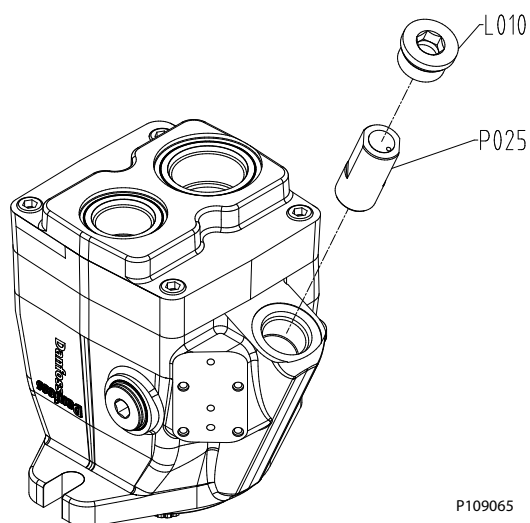
Disassembly

Item	Wrench size
L010	1 1/4 inch
L030	19 mm
L040	8 mm internal hex

Servo piston

Disassembly

1. Remove plug (L010) with a 1 1/4 in. wrench. Discard the O-ring (L010A).
2. Remove servo piston (P025) from housing.

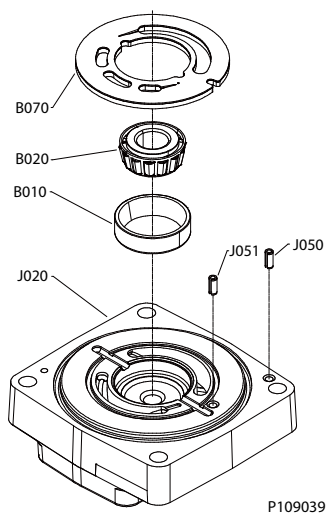
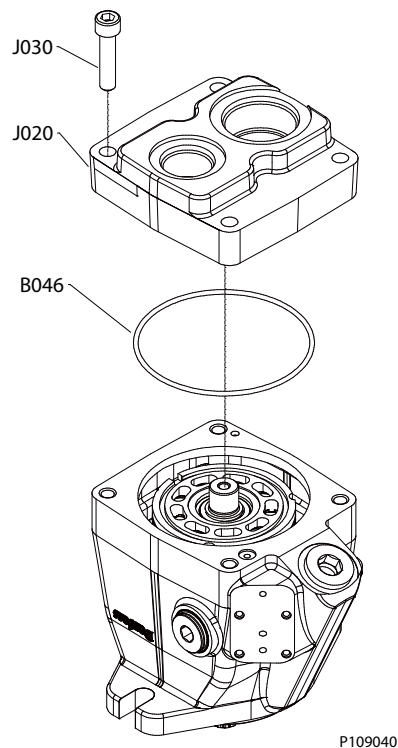


Endcap and valve plate

1. Remove the 4 endcap screws (J030) using an 8 mm internal hex wrench.

Disassembly

2. Remove the endcap. Remove the servo piston (L020) and guide (L080). Use care; valve plate (B070) may adhere to inside surface. Discard O-rings (B045, B046). Refer to Inspection chapter for more information.



3. Slide the rear tapered roller bearing cone (B020) from the bottom end of the shaft. The bearing cup (B010) may remain within the endcap.

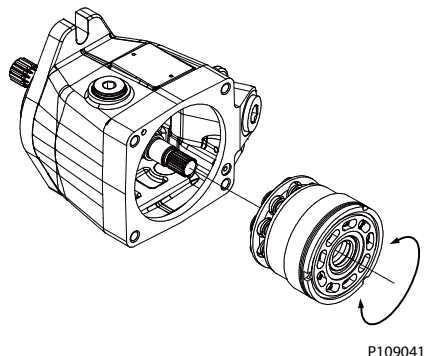
Cylinder kit

1. Position pump on its side.

Disassembly

2. Slide the cylinder block assembly (P010) out of the pump housing by pushing on the shaft. Push the shaft only far enough so that the cylinder kit may be removed by hand. Keep track of the three small hold-down pins (K046) located inside the cylinder kit.

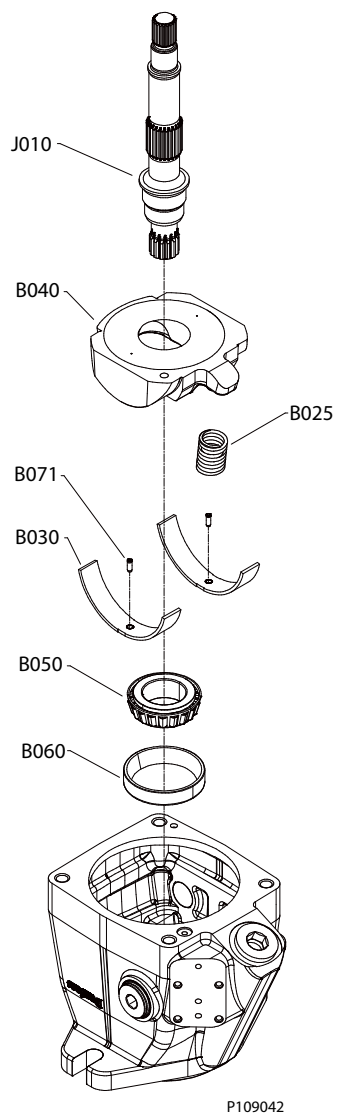
Once removed, set the cylinder kit in a protected area. Contamination or scratches may lead to poor performance or pump failure.



Input shaft and swashplate

1. Rotate the swashplate (B040) until level with pump housing.
2. Pull the shaft (J010) from the shaft seal and bearing kit.
3. Pull to remove the front tapered roller bearing (B050).
4. Carefully pry to remove the journal bearings (B030) and retaining pins (B071) from the pump housing. Record the location and orientation of the journal bearings if they are to be reused. If necessary, remove the front bearing cup (B060) from the pump housing.

Disassembly

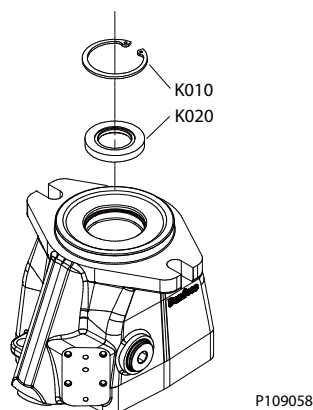


Shaft seal

Disassembly

Orient the housing with the flange facing up. Using snap-ring pliers, remove the snap ring (K010). Carefully pry out the shaft seal (K020).

If you are unable to pull the shaft seal out, try to push the seal out by going through the inside of the housing.



Control

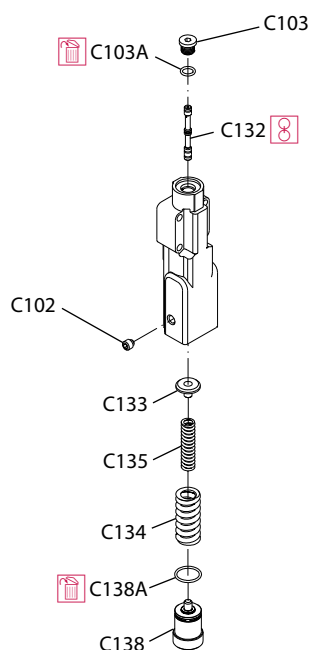
! CAUTION

If removing the LS or PC spool is not possible, be extremely careful when flipping or relocating the housing so you do not lose or damage the spool.

PC only

Remove the plug (C103) and O-ring (C103A). Discard the O-ring. Remove the screw (C102). Remove the spool (C132). Note the orientation of the spool for reinsertion. There may be differences in reinserting into the same bore. Remove the adjusting screw (C138) and O-ring (C138A). Discard the O-ring. Remove the springs (C134, C135) along with the spring guide (C133).

Disassemble the PC control



Disassembly

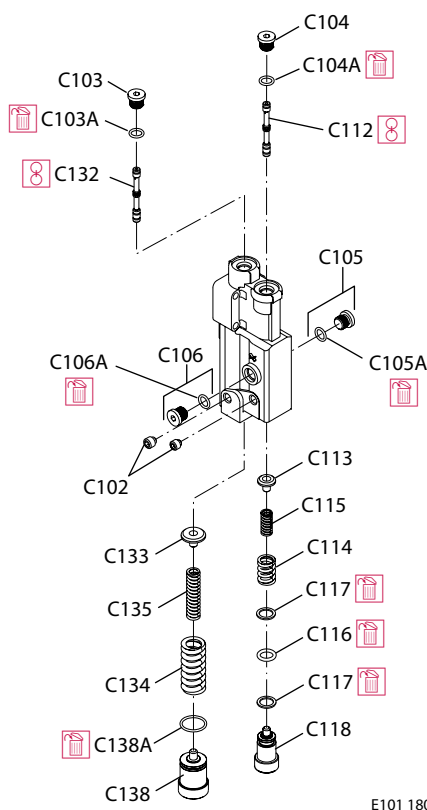
PC/LS

Remove the 4 plugs (C103, C104, C105, C106) and their O-rings (C103A, C104A, C105A, C106A). Discard the O-rings. Remove the 2 set screws (C102). Remove the spools (C112, C132). Note which bore each spool came out of. Also note the orientation of each spool for reinsertion. There may be differences in reinserting into the same bore.

Remove the adjusting screw (C138) and the O-ring (C138A). Discard the O-ring. Remove the springs (C134, C135) and spring guide (C133).

Remove the adjusting screw (C118), O-ring (C116) and 2 backup rings (C117). Discard the O-ring and backup rings. Remove the springs (C114, C115) and spring guide (C113).

Disassemble the PC / LS control



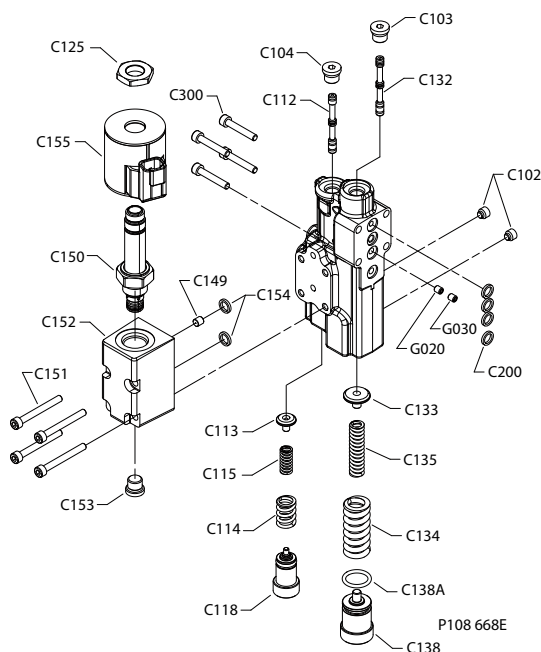
Electric control

1. Remove four screws (C300).
2. Remove the control and discard the four O-rings (C200).
3. Remove set screws (C102), PC adjusting plug (C138) with O-ring (C138A), springs (C134, C135), and seat (C133). Discard the O-ring if it is damaged.
4. Remove plug (C103). Remove PC spool (C132). Note orientation of the spool for reassembly.
5. Remove plug (G030), and orifice (G020).
6. Remove LS adjusting plug (C118), springs (C114, C115), and seat (C113).
7. Remove plug (C104), and spool (C112). Note the orientation of the spool for reassembly.
8. Remove four screws (C151). Remove the manifold (C152) and discard the two interface O-rings (C154).
9. For electric proportional controls only:
Remove the electric control manifold drain orifice (C149).

Disassembly

- 10.** Remove plug (C153). Remove the cartridge valve nut (C125), electric solenoid (C155), and cartridge valve (C150) from the electric control manifold.

Disassemble electric control



Electronic Torque Limiting Control

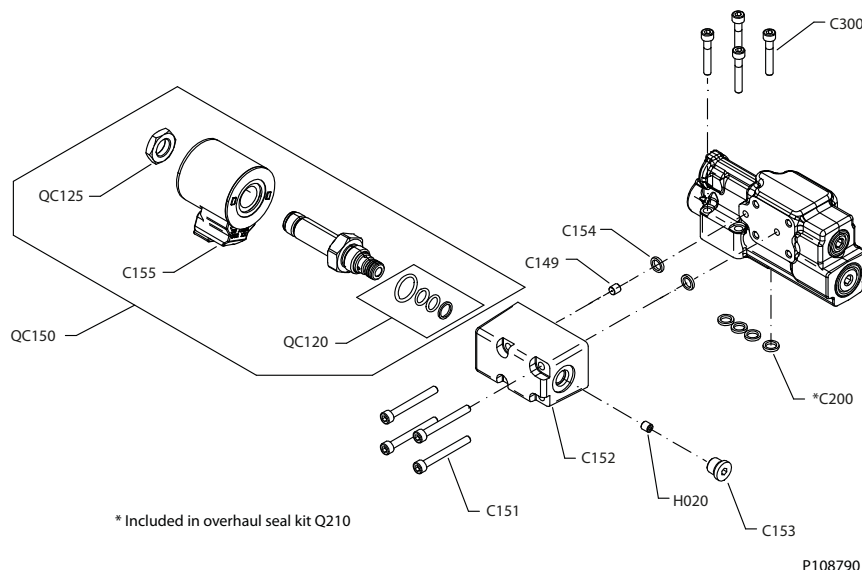
Repair

Disassembly, inspection and reassembly steps are the same as the steps in the previous topic (Electric Controls). This includes repair of the spools and plugs.

The solenoid (C155), nut (QC125), and O-rings (QC120) for the valve are available as separate repair parts. The valve is only available as a complete assembly (QC150).

If it is necessary to remove the orifice (H020), use a 3 mm internal hex wrench. Torque it to 2.7 Nm [24 in-lb] when it is installed in the manifold.

Disassembly



Item	Description	Wrench size	Torque
C149	Orifice	3 mm internal hex	2.7 Nm [24 in-lb]
C151	Screws		6.4 Nm [4.7 lbf-ft]
C152	Manifold	-	-
C153	Plug	5 mm internal hex	12 Nm [8.9 lbf-ft]
C154	O-ring	-	-
C155	Solenoid	-	-
C200	O-rings	-	-
C300	Screws		6.4 Nm [4.7 lbf-ft]
QC120	O-rings		
QC125	Nut		8.7 Nm [6.4 lbf-ft]
QC150	Valve assembly		27.7 Nm [20.4 lbf-ft]
H020	Manifold orifice	3 mm internal hex	2.7 Nm [24 in-lb]

Fan Drive Control

Disassembly

Use the wrench sizes and torques listed in the table.

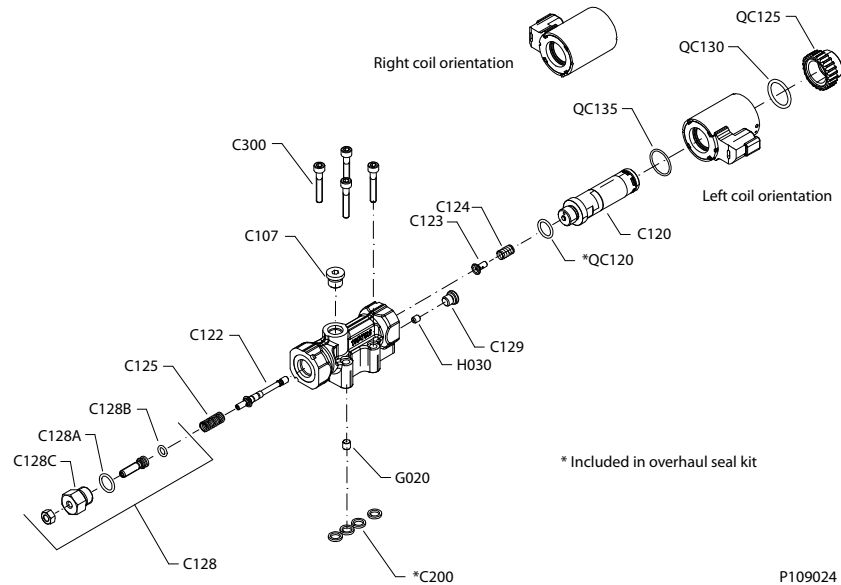
1. Remove four screws (C300).
2. Remove the control and discard the 4 interface O-rings (C200).
3. Remove the coil plastic nut (QC125) Remove the coil.

[Remember the correct coil connector orientation.](#)

4. Remove the solenoid cartridge (C120). Remove O-ring (QC120).
5. Remove spring (C124) and spring guide (C123).
6. Remove the pressure limiter adjuster (C128).
7. Remove spring (C125) and spool (C122).
8. Remove plug (C107) and plug (C129).
9. Remove gain orifice (H030).

Disassembly

10. Remove servo control orifice (G020).



Item	Description	Wrench size	Torque
G020	Servo control orifice	3 mm internal hex	2.7 N•m [2 lbf•ft]
H030	Gain orifice	2,5 mm internal hex	2.7 N•m [2 lbf•ft]
C129	Plug 5/16"	1/8" internal hex	6.2 N•m [4.67 lbf•ft]
C107	Plug 7/16"	3/16" internal hex	13.7 N•m [9.9 lbf•ft]
C128C	Nut 9/16"	17 mm exter hex	23.7 N•m [17.5 lbf•ft]
C120	Solenoid cartridge	17 mm exter hex	25.75 N•m [19 lbf•ft]
QC125	Coil plastic nut	26 mm 12 pt socket	3.5 N•m [2 lbf•ft]
C300	Screws	4 mm internal hex	6.5 N•m [4.75 lbf•ft]

Cylinder block Kit disassembly

Disassemble the cylinder block kit

1. Pull to remove the slipper retainer (K049) with the pistons (K050) from the cylinder kit.

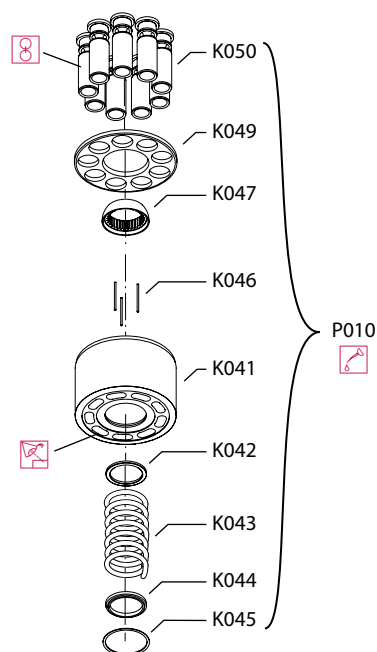
The pistons are not selectively fitted, however units with high hourly usage may develop wear patterns. Number the pistons and bores for reassembly if they are to be reused.

2. Remove the ball guide (K047).
3. Remove the 3 pins (K046).

Most repairs do not require block spring removal. Perform this procedure only if you suspect problems with the block spring.

Disassembly

Disassemble the cylinder block kit



E101 012

Block spring removal

Turn the block over. Using a press, apply pressure on the block spring washer (K044) to compress the block spring (K043). Compress the spring enough to safely remove the spiral retaining ring (K045). While maintaining pressure, unwind the spiral retaining ring. Carefully release the pressure and remove the outer block spring washer, block spring, and inner block spring washer (K042) from the cylinder block.

⚠ Warning

Risk of personal injury: Compressing the block spring requires about 350 to 400 N [80 to 90 lbf]. Use a press sufficient to maintain this force with reasonable effort. Ensure the spring is secure before attempting to remove the spiral retaining ring. Release the pressure slowly after the retaining ring is removed.

Inspection

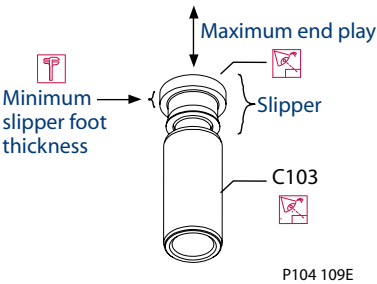
Pistons and slippers

1. Inspect the pistons for damage and discoloration. Discolored pistons may indicate excessive heat; do not reuse.
2. Inspect the running surface of the slippers. Replace any piston assemblies with scored or excessively rounded slipper edges. Measure the slipper foot thickness. Replace any piston assemblies with excessively worn slippers. Check the slipper axial end-play. Replace any piston assemblies with excessive end-play.

Minimum slipper foot thickness and maximum axial end-play are given in the table to the right.

K2 Frame	
Slipperfoot thickness	4.07 mm [0.16 in]
Piston/slipper end play	0.102 mm [0.004 in]

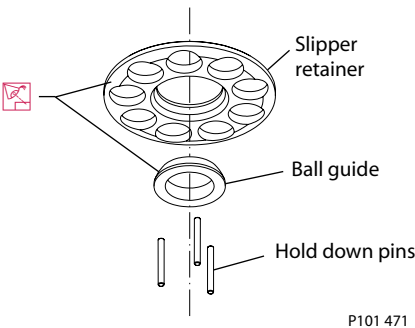
Inspect pistons



Ball Guide, Slipper retainer, and Hold-Down Pins

The ball guide should be free of nicks and scratches, and should not be excessively scored. Examine for discoloration that may indicate excessive heat or lack of lubrication. The slipper retainer should be flat, and slippers should fit in the retainer with minimal side play. Place the hold-down pins on a flat surface and roll them to make sure they are straight. Discard and replace any damaged parts.

Inspect guide, retainer, and pins

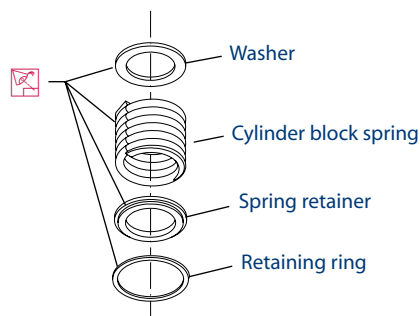


Block spring, and washers

If cylinder kit was fully disassembled, visual inspection of the cylinder block, spring, and washers should indicate minimal wear. Replace if cracks or other damage is present.

Inspection

Inspect block spring and washers



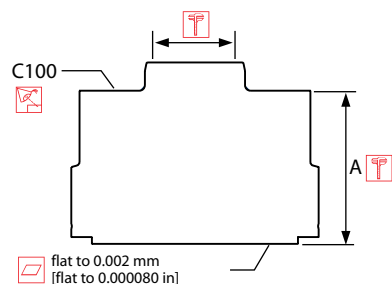
P101 472

Cylinder block

Examine the running face of the cylinder block. The surface should be smooth and free of nicks and burrs. Ensure that no scratches or grooves exist; these may drastically reduce output flow.

K Frame	38 cc	45 cc
Minimum cylinder block height (A)	56.48 mm [2.224 in]	
Maximum block bore diameter (B)	16.44 mm [0.65 in]	17.98 mm [0.71 in]

Inspect cylinder block



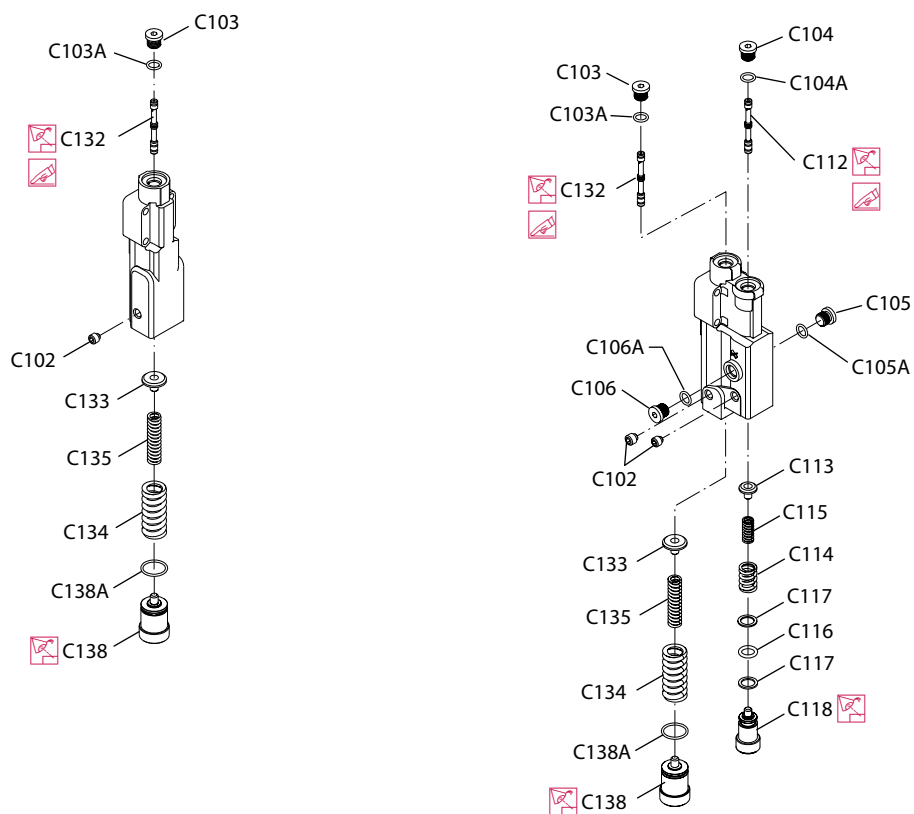
P101 358

Control

Carefully examine the PC (and LS) plug(s) for signs of wear. Also check the small tip of the plug(s) for heavy wear and replace if necessary. Inspect each spool's springs to make sure they are intact. Check the inside and outside surfaces of the springs for wear and replace if necessary. Check the spool's outside diameter for scratches and / or burrs. Clean and coat all spools, bores, and seals with a light coating of hydraulic oil.

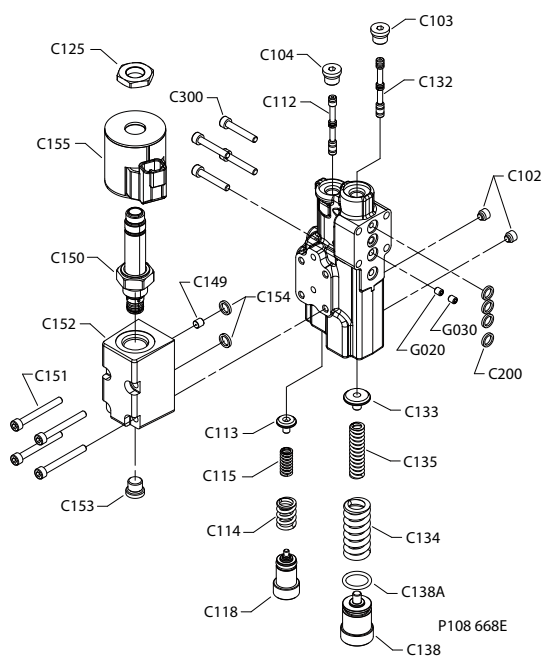
Inspection

Inspect the PC control, Inspect the PC/LS control



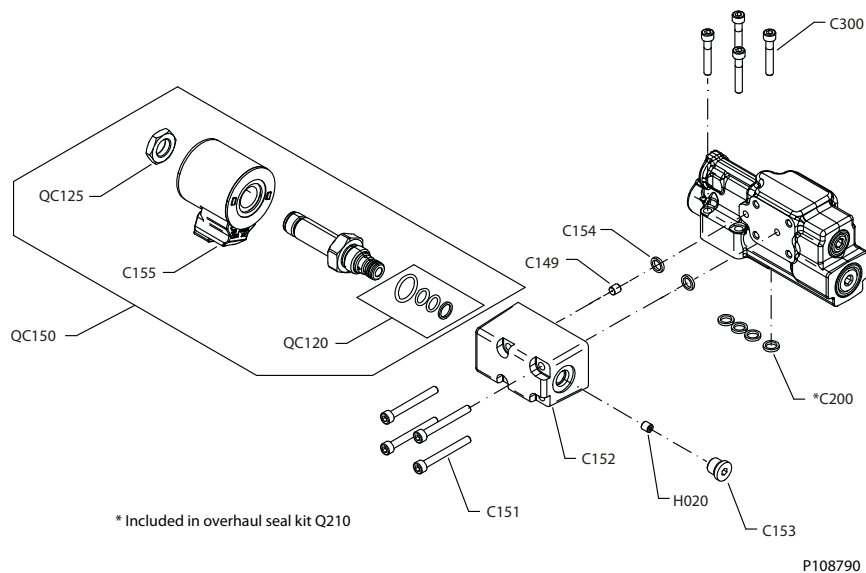
E101 181

Electric control



Inspection

Electronic Torque Limiter



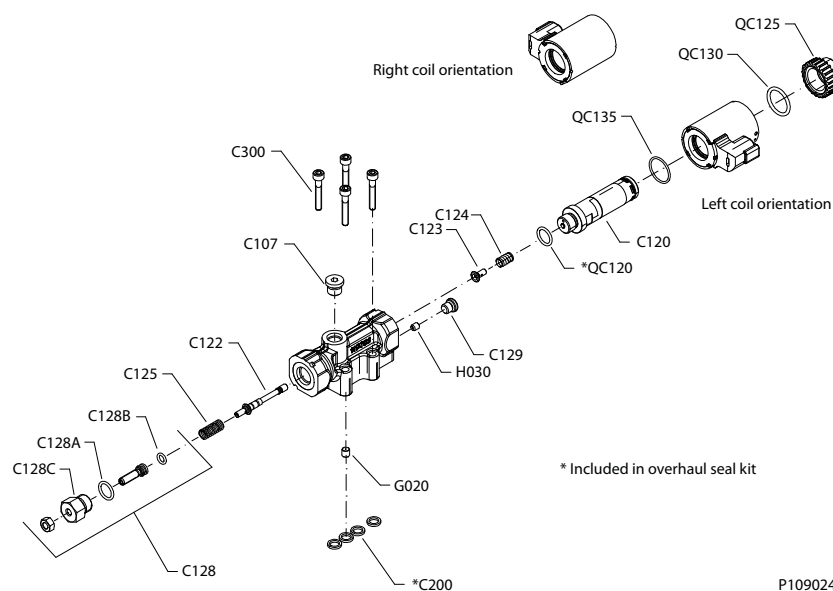
Fan Drive Control

Inspection

1. Inspect the pressure limiter for wear. Check for contamination and damage to the O-rings, replace if necessary.
2. Inspect the control housing for damage. Check the spool bores for excessive wear. Remove debris from orifices if necessary.
3. Carefully inspect the spool. Ensure the sealing lands are free of nicks, burrs and scratches. Check the ends that contact the spring guides for wear. Replace the spool if necessary.
4. Check the spool for free (smooth) movement in housing bore.
5. Check the orifices (H030 and G020) for contamination, and for cavitation damage.
6. Check the solenoid cartridge for damage, bending, free pin movement.
7. Check the coil for damage. Check the plastic plug for contamination.
8. Check the coil connector for contamination or overheat marks, deformation, connector pins are not damaged or bent, or missing. Replace the coil if necessary.
9. Check the control o-rings for damage, or cracks and replace if necessary.
10. Clean and lubricate all spools, bores, and seals with a light coating of hydraulic oil.

Inspection

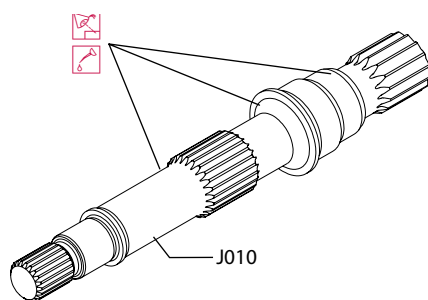
FDC Control



Shaft

Inspect the shaft for any signs of damage. Replace the shaft if a groove exists at the sealing land surface that may let dirt into or hydraulic fluid out of the unit. If necessary, clean the sealing area with a non-abrasive material. Inspect the input splines or keyway, block spines and output splines. Replace the shaft if damaged. Ensure that the shaft's splines are straight and lubricate the shaft with a light coating of hydraulic fluid.

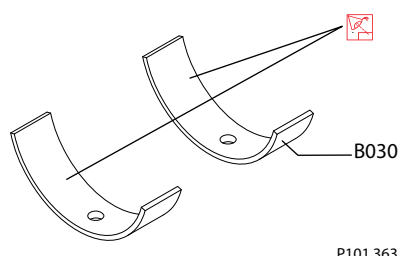
Inspect shaft



Journal Bearing

Inspect the journal bearings for damage or excessive wear. Replace journal bearings if scratched, warped, or excessively worn. The polymer wear layer must be smooth and intact.

Inspect journal bearings



Inspection

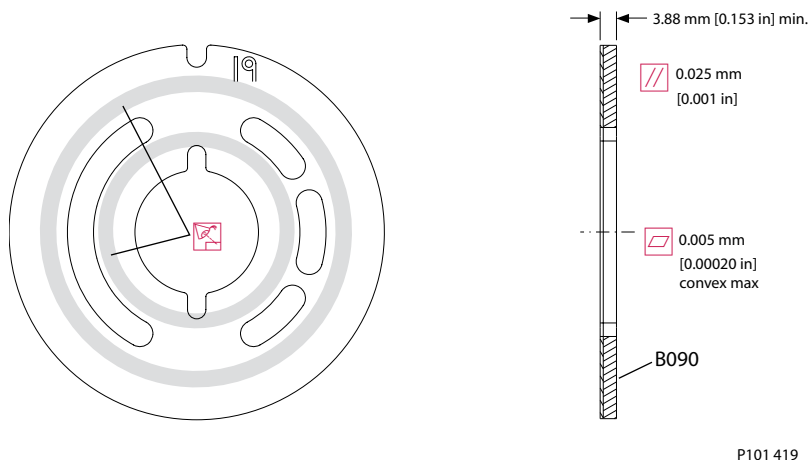
Valve Plate

Inspect the valve plate for scratches and grooves. Check the plate for evidence of any cavitation along the running face of the valve plate. If pitting from cavitation exists, replace the valve plate. Check for excess wear on the brass running face. If any discoloration or burn marks are observed, replace the valve plate.

Run a fingernail or pencil tip across the diameter of the sealing land surface (see illustration). No deep or outstanding grooves should be felt, as these may decrease pump flow. Lap or replace if grooves or nicks are present. Inspect the mating surfaces of the endcap and valve plate for any possible contamination; even a few thousandths of an inch may affect pump operation.

Measure the thickness of the valve plate. Ensure that valve plate parallelism is equal to or less than 0.025 mm [0.001 in]. Appearance should be flat and smooth on both the running face and the bottom surface. The valve plate should be flat to 0.005 mm [0.0002 in] convex. A magnetic particle inspection is recommended to detect cracks. The valve plate must be replaced if any cracks exist.

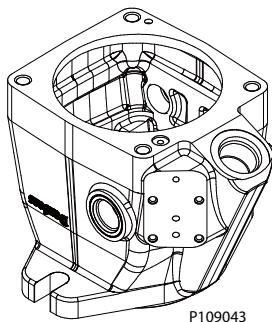
Inspect valve plate



P101 419

Housing

1. Inspect the housing to ensure that it is clean and free of foreign material. Inspect the swashplate, bearing surfaces, and endcap mating surfaces.
2. Check the corresponding servo piston bore for galling or excessive wear.



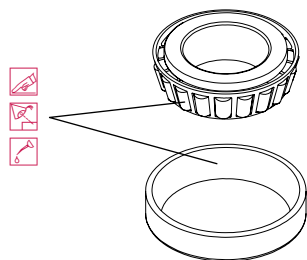
Shaft bearing kits

The tapered roller bearing kits consist of a cup and cone. Both the cup and cone should be free of excessive wear and contamination. Rotate the bearings to check for smoothness. If a contaminated bearing is suspected, clean with a solvent and lubricate with hydraulic fluid. If the problem is not

Inspection

remedied by cleaning, replace the bearing. Also inspect for uneven wear. If abnormal wear is found, replace the bearing kit.

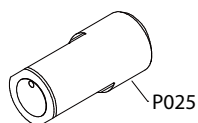
Inspect shaft bearings



P101 366

Servo piston

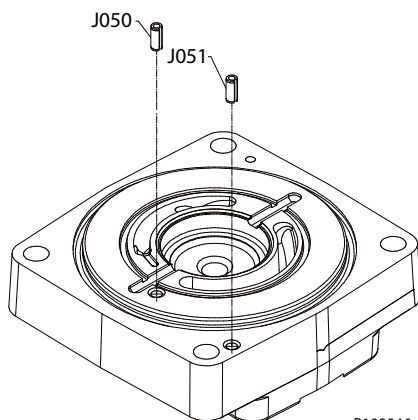
Inspect the servo piston (L020) for wear on its end and for scratches along its cylindrical surface. Replace if any wear is noticeable.



P109045

Endcap

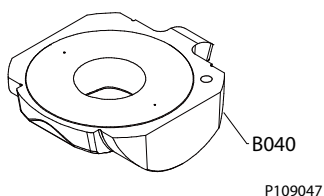
1. Inspect the endcap.
2. Check and record the orientation of the timing pin (J050).
3. Carefully check the bearing cup for wear.



Swashplate

Inspection

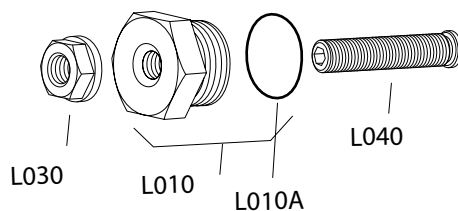
1. Carefully inspect each surface of the swashplate for wear. All swashplate surfaces should be smooth. Inspect the swashplate's slipper running surface for brass transfer. Excessive brass transfer from slippers may indicate that the slippers should be replaced.
2. Check the swashplate bearing journal for scratches. Replace the swashplate if necessary.



Displacement Limiter

Inspect the displacement limiter screw threads (L040). Ensure that the screw is not bent. Also, inspect the seal/nut (L030) for irregular wear. Replace if necessary. Replace the O-ring (L010A).

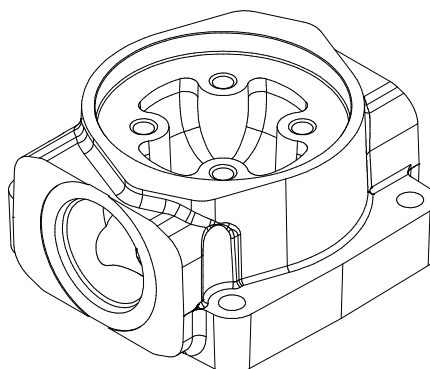
Displacement Limiter



P109060

Auxiliary Pad

Inspect all machined surfaces on the auxiliary pad. If any damage or wear is found, replace the auxiliary pad.



P109059

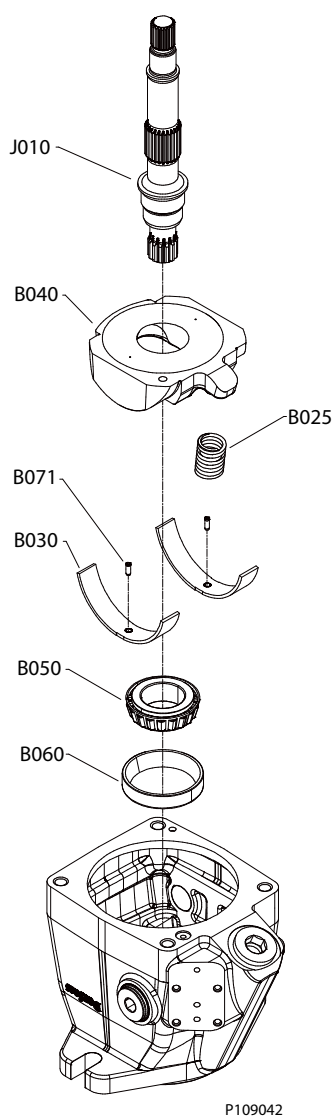
Reassembly

Journal bearing

Coat the journal bearings (B030) with hydraulic fluid and install them into the pump housing. Punch in retaining pins (B071) a minimum of 0.5 mm [0.002 in] below the bearing surface.

If journal bearings are reused, reinstall them in their original orientation and position.

Install housing components



Bias Spring, swashplate, and Bearing

Reinstall shaft bearing cup (B060) and cone (B050). Before replacing the bias spring (B025), coat the curved surface of the swashplate (B040) with hydraulic fluid. Tilt the bias spring inward towards the center of the pump housing. To insert the swashplate, tilt the servo arm downward and into the

Reassembly

pump housing. Make sure the cast knob on the swashplate fits over the bias spring and that it settles properly unto the journal bearings.

Input shaft

Insert the input shaft (J010) through the bearing into the housing.

Cylinder kit assembly

1. Coat all parts with hydraulic fluid prior to reassembly.
2. Install the inner block spring washer (K042), block spring (K043), and outer washer (K044) into the cylinder block. Using a press, compress the block spring enough to expose the retaining ring groove. Wind the spiral retaining ring (K045) into the groove in the cylinder block.

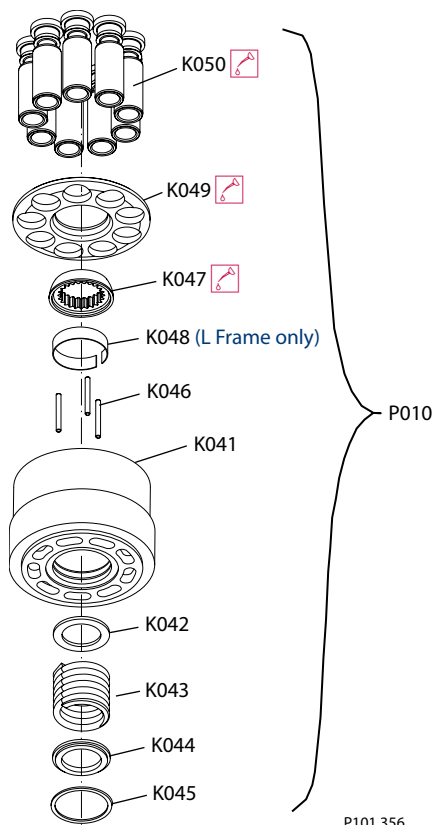
Warning

Risk of personal injury: Compressing the block spring requires about 350 to 400 N [80 to 90 lbf]. Use a press sufficient to maintain this force with reasonable effort. Ensure the spring is secure before attempting to install the spiral retaining ring. Release the pressure slowly after the retaining ring is installed.

3. Turn the block over and install the retaining ring (L Frame only; K048), hold-down pins (K046), and ball guide (K047) to the cylinder block.
4. Install the pistons (K050) to the slipper retainer (K049). Install the piston/retainer assembly into the cylinder block. Ensure the concave surface of the retainer seats on the ball guide. If you're reusing the pistons, install them to the original block bores. Lubricate the pistons, slippers, retainer, and ball guide before assembly. Set the cylinder kit aside on a clean surface until needed.

Be sure to install the slipper retainer so it mates correctly with the ball guide (concave side of the slipper retainer against the convex side of the ball guide).

Assemble cylinder kit

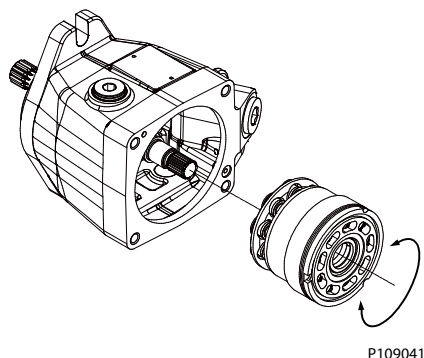


Reassembly

Cylinder kit installation

Set the pump on its side. Secure the end of the shaft with one hand and keep it horizontal. Insert the cylinder kit onto the shaft. While holding the shaft still, slightly rotate the cylinder block kit to help start the shaft splines into the ball guide and align it with the block splines. When the cylinder block kit slides completely over the shaft splines, reposition the unit with the flange facing downward.

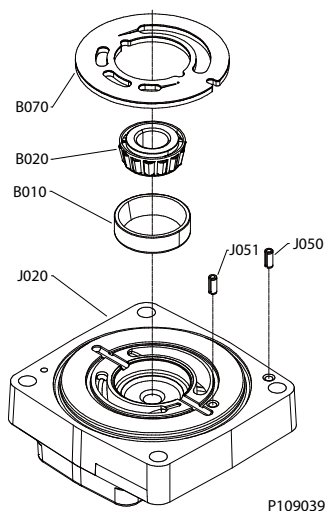
Install cylinder block



Valve plate and Endcap

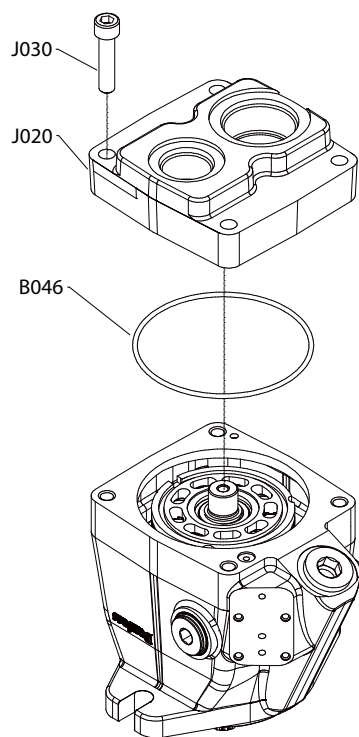
1. Clean the valve plate (B070) and endcap (J020). Install the timing pin (J050) in the endcap and verify that it is properly oriented with the split facing into or out of the slot in the valve plate. The timing pin should be installed 3.6 ± 0.25 mm [0.14 ± 0.01 in] above the endcap surface. Apply a liberal amount of assembly grease to the backside of the valve plate surface to hold it in position. Install the valve plate over the timing pin, check valve, and bearing cup.
2. Using assembly grease to hold seals, install the endcap to the housing. Ensure that seals remain properly seated and are not pinched during assembly. Install and torque endcap screws at 47.5 to 61 N•m [35 to 45 lbf•ft], using the criss cross pattern, and retorquing the first screw to ensure proper torque retention.

Install endcap components



Reassembly

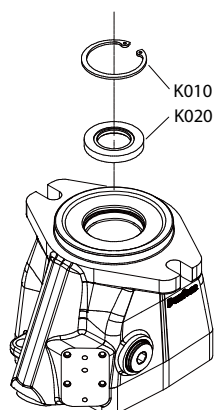
Install endcap



P109040

Shaft seal

1. Cover shaft splines with an installation sleeve.
2. Install a new shaft seal (K020) with the cup side facing the pump.
3. Press the seal into the housing until it is deep enough to allow the retaining ring to be installed. Press evenly to avoid binding and damaging the seal.
4. Install snap ring (K010).



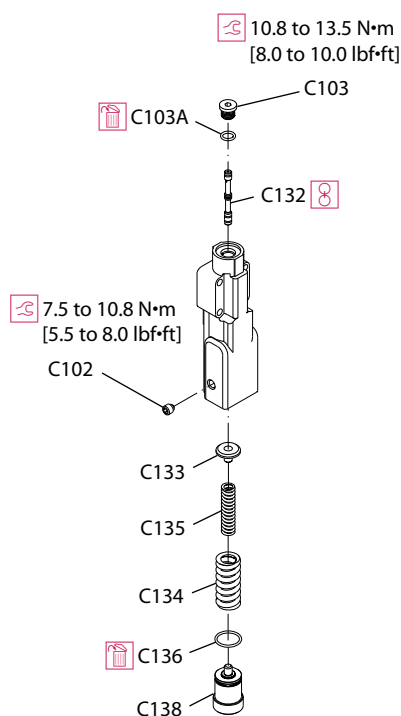
P109058

Reassembly

PC control

1. Clean all control parts and cover with a light coating of hydraulic fluid prior to reassembly.
2. Install the spherical end of the PC spool (C132) into the PC bore (refer to illustration). Install the PC plug (C103) using a new O-ring (C103A). Torque at 10.8 to 13.5 N·m [8 to 10 lbf·ft].
3. Place the two PC springs (C134, C135) onto the PC spring guide (C133) and install into the PC bore. Place a new O-ring onto the PC plug and install it so that it sits one turn below the surface of the control housing. Install and tighten set screw (C102) at 7.5 to 10.8 N·m [5.5 to 8.0 lbf·ft] to retain the adjusting plug.

Assemble PC (only) control



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LS control (optional)

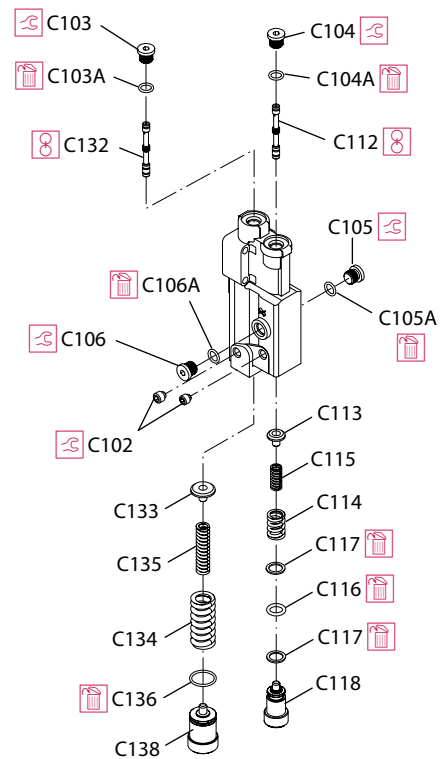
Install the PC portion as described in [PC control](#).

1. Hold the control in a horizontal position. Install the spherical end of the LS spool (C112) into the LS bore (see illustration). Using a new O-ring, install the LS plug (C104), torque at 10.8 to 13.5 N·m [8 to 10 lbf·ft].
2. Place the 2 LS springs (C114, C115) onto the LS spring guide (C113) and install into the LS bore. Place a new O-ring (C116) and back-up rings (C117) onto the LS adjustment screw (C118). Install the LS plug assembly so that it sits one turn below the surface of the control housing.
3. Install and tighten set screw (C102) at 7.5 to 10.8 N·m [5.5 to 8.0 lbf·ft]. Also, install the plugs (C105, C106) with new O-rings. Torque the plugs at 10.8 to 13.5 N·m [8 to 10 lbf·ft].

PC and LS spools need to be adjusted to proper setting according to tag nomenclature.

Reassembly

Assemble PC/LS control



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Reassembly

Fan Drive Control

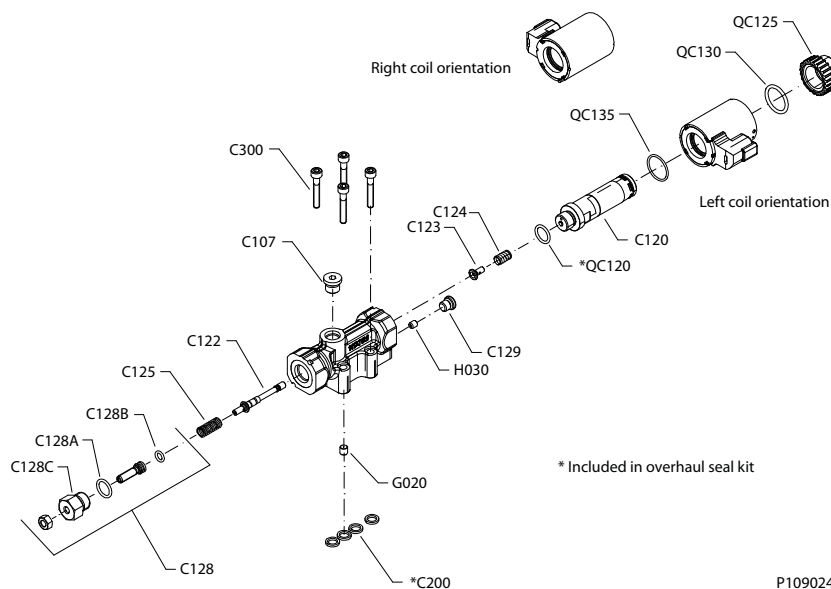
Reassembly

1. Install the servo control orifice (G020). Install the gain orifice (H030).
2. Install plugs (C129) and (C107).
3. Install spool (C122) spherical end first, into the spool bore. Install spring (C125).
4. Install the pressure limiter adjuster (C128).
5. Install the spring guide (C123) and spring (C124). Ensure the spring guide is properly seated on the spools spherical head.
6. Install the solenoid cartridge with its O-ring.
7. Install the coil and O-rings. Ensure that the O-rings are correctly installed. Ensure the coil connector is in **right** orientation.
8. Install the coil plastic nut (QC125).

Use the proper wrench, do not damage the plastic nut.

9. Using petroleum jelly to retain them, install the four interface O-rings (C200) in the recesses on the control housing.
10. Install the control assembly onto the endcap using four screws (C300). Torque screws in a criss-cross pattern and re-torque the first screw to ensure proper torque retention.

Fan Drive Control



Item	Description	Wrench size	Torque
G020	Servo control orifice	3 mm internal hex	2.7 N•m [2 lbf•ft]
H030	Gain orifice	2,5 mm internal hex	2.7 N•m [2 lbf•ft]
C129	Plug 5/16"	1/8" internal hex	6.2 N•m [4.67 lbf•ft]
C107	Plug 7/16"	3/16" internal hex	13.7 N•m [9.9 lbf•ft]
C128C	Nut 9/16"	17 mm exter hex	23.7 N•m [17.5 lbf•ft]
C120	Solenoid cartridge	17 mm exter hex	25.75 N•m [19 lbf•ft]

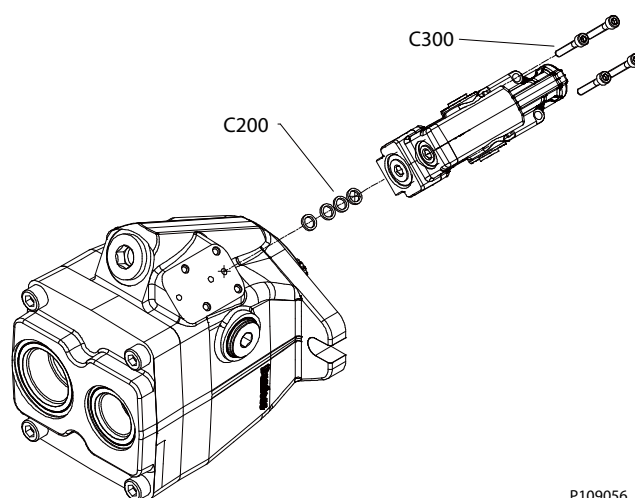
Reassembly

Item	Description	Wrench size	Torque
QC125	Coil plastic nut	26 mm 12 pt socket	3.5 N·m [2 lbf·ft]
C300	Screws	4 mm internal hex	6.5 N·m [4.75 lbf·ft]

Install the control

1. Using petroleum jelly to retain them, install 4 new seal rings (C200) in the recesses on the control housing.
2. Install the control assembly onto the endcap using the 4 screws (C300). Torque at 5.4 to 7.5 N·m [4.0 to 5.5 lbf·ft] using a criss cross pattern and retorque the first screw to ensure proper torque retention.

Install the control

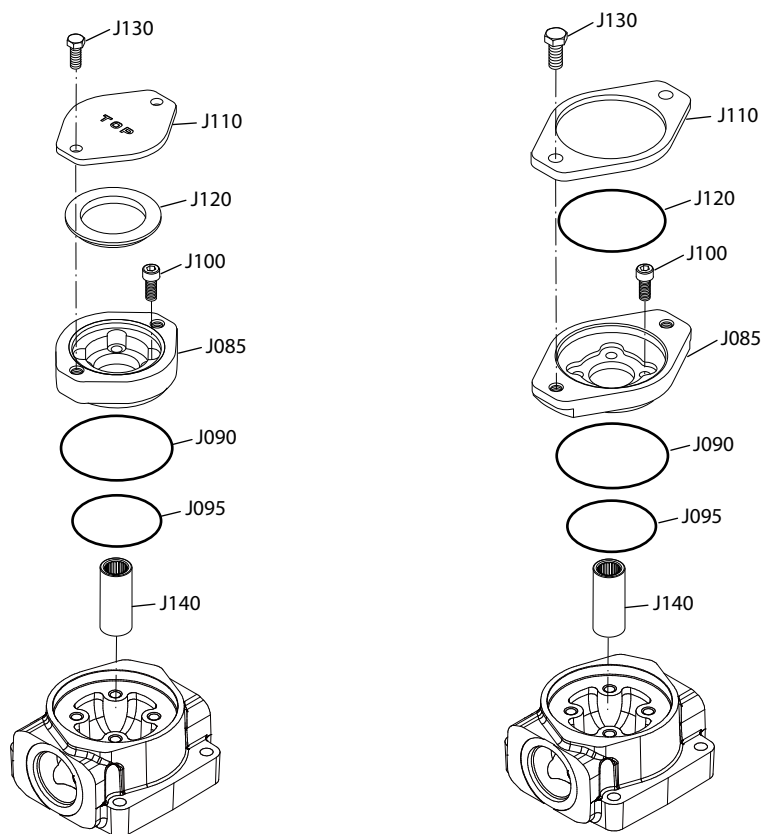


Install auxiliary mounting pad

1. Install the adapter (J080) with new O-rings (J090, J095). Tighten the screws (J100) at 47.5 to 61 N·m [35 to 45 lbf·ft].
2. Install the coupling (J140) onto the shaft.

Reassembly

3. Install the plate cover (J130) and seal (J120). If you have auxiliary pad B or C, install a new O-ring (J120). Tighten the plate cover screws (J130) at 91 to 111 N·m [67 to 82 lbf·ft]. If you have an auxiliary A pad, install the J130 screws at 37 to 50 N·m [27 to 37 lbf·ft].



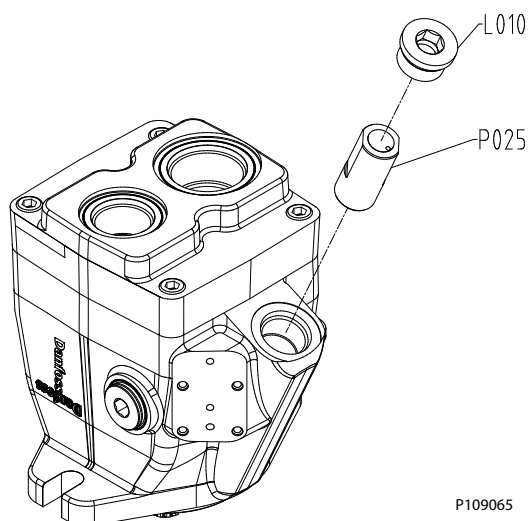
P109053

Install servo piston

1. Lubricate servo piston and install in the housing.

Reassembly

2. Install plug.

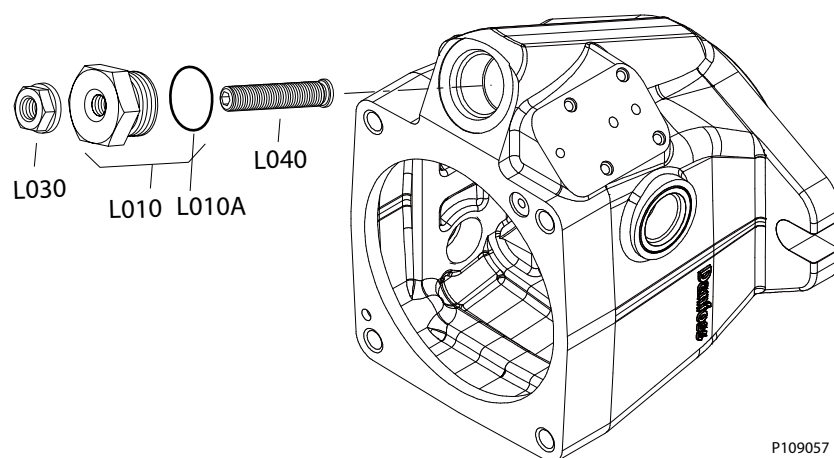


Install displacement limiter

1. Install displacement limiter screw (L040) into plug (L010).
2. Install new O-ring (L010A) onto plug (L010). Thread plug with limiter into endcap. Torque to 77 N•m [57 lbf•ft].
3. Turn adjustment / seal nut (L030A) onto displacement limiter.
4. Using a 19mm exter hex wrench torque the adjustment seal/nut (L030) to 54 N•m [40 lbf•ft].

Refer to *Frame K2 Service Manual* **AX00000301** for instructions on adjusting displacement limiter.

Displacement Limiter



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