

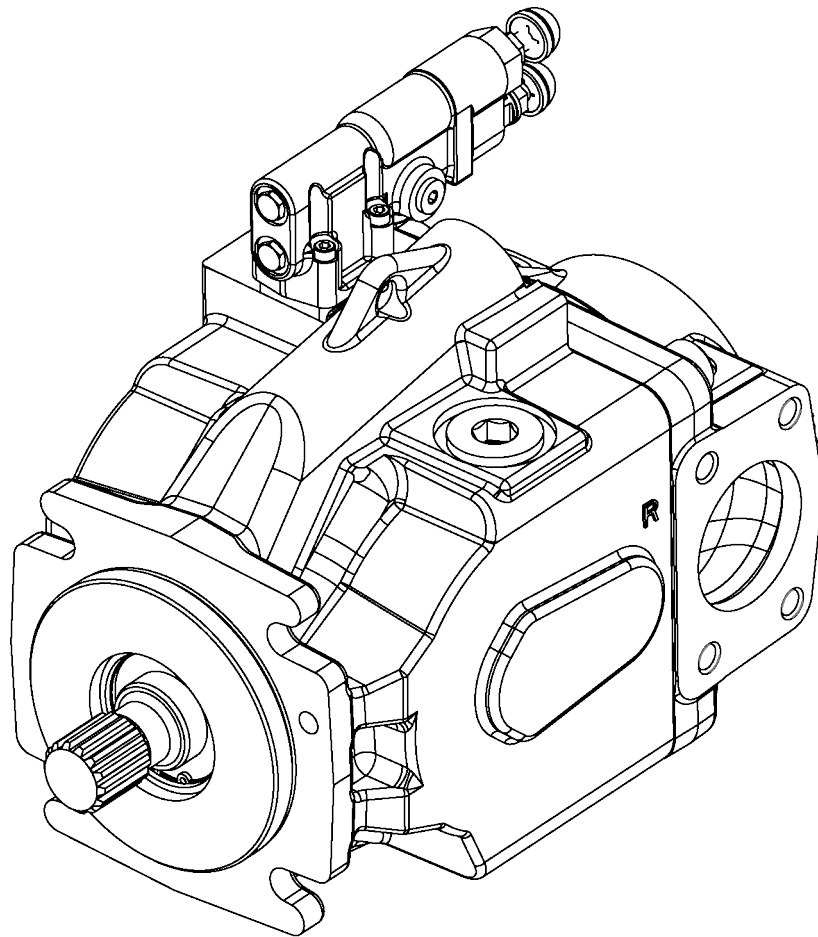
ENGINEERING
TOMORROW



Service Manual

X20 Series

620 Mobile Open Circuit Piston Pump



Revision history*Table of revisions*

Date	Changed	Rev
July 2024	Changed design of compensator; part number changes	0301
October 2023	Converted to Danfoss Formatting	0201
October 2023	First edition	0101

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Parts

Parts Identification

Item	Part number	Quantity	Description	Page Number
1	See table 4	1	Housing	12
2	See table 7	1	Seal, Shaft ■	14
3	101680-225	1	Ring, Retaining, Internal (Shaft Seal) ■	5
4	6021805-001	1	Bearing Assembly, Shaft (Front)	5
5	5989757-001	1	Spring, Bias	5
6	6021043-001	2	Bearing, Swashplate/Bearing Kit 9900761-000	5
7	114995-010	2	Screw, Cap, Socket/Bearing Kit 9900761-000	5
8	See table 6	1	Swashplate	13
9	See table 1	1	Shaft, Drive	9
	See table 1	1	Key, Driveshaft	9
11	See table 5	1	Rotating Group S/A	13
12	See table 3	1	Valve Plate	11
13	6021946-001	1	Bearing Assembly, Shaft (Rear)	5
14	Not Saleable	1	Ring, Crush/Bearing Shim Kit 9900776-000	5
15	96201-062	2	Slotted Spring Pin 1/4	5
16	6026023-001	1	Gasket (Endcover/Housing) ■	5
17	See table 2	1	End Cover S/A	10
18	114978-050	4	Screw, Cap (Housing/Endcover)	5
19	6023317-001	1	Piston, Control	5
20	See table 12	1	Plug, Adjustable Volume Stop △	17
21	See table 11	1	Plug (Top Case Drain Port)	17
22	See table 11	1	Plug (Bottom Case Drain Port)	17
23	115046-004	1	Plug (Housing)	5
24	107275-017	1	O-Ring (Compensator/Housing) ■	5
25	107275-011	2	O-Ring (Secondary Compensator/Housing) ■	5
26	See table 8	1	Compensator Kit	15
27	See table 9	4	Screw, Cap (Compensator Mounting)	16
28	See table 14	1	Coupler	18
29	104166-155	1	O-Ring (Endcover To Aux Mount) ■/Thru Drive Adapter Kit	6
30	See table 13	1	Adapter, Thru Drive/Thru Drive Adapter Kit	18
31	See table 13	1	O-Ring Adapter ■/Thru Drive Adapter Kit	18
32	See table 13	4	Bolts/Thru Drive Adapter Kit	18
33	See table 10	1	Cold Start Manifold (Destroke)	16
34	107275-011	3	O-Ring (Destroke)	14
35	6022841-001	1	Link, Feedback	33
36	114995-010	1	Screw, Cap, Socket, Flat, Countersunk	33
37	5990203-001	1	Magnet Carrier	33
40	6024371-002	1	Feedback sensor, Non-Contact	33
41	5996053-002	2	Screw, Button Head Cap (Sensor Mount)	33
45	4993571-325	1	Adjustable stop screw △	6
46	692867	1	Lock Nut △	6
47	115044-014	1	O-Ring △	6

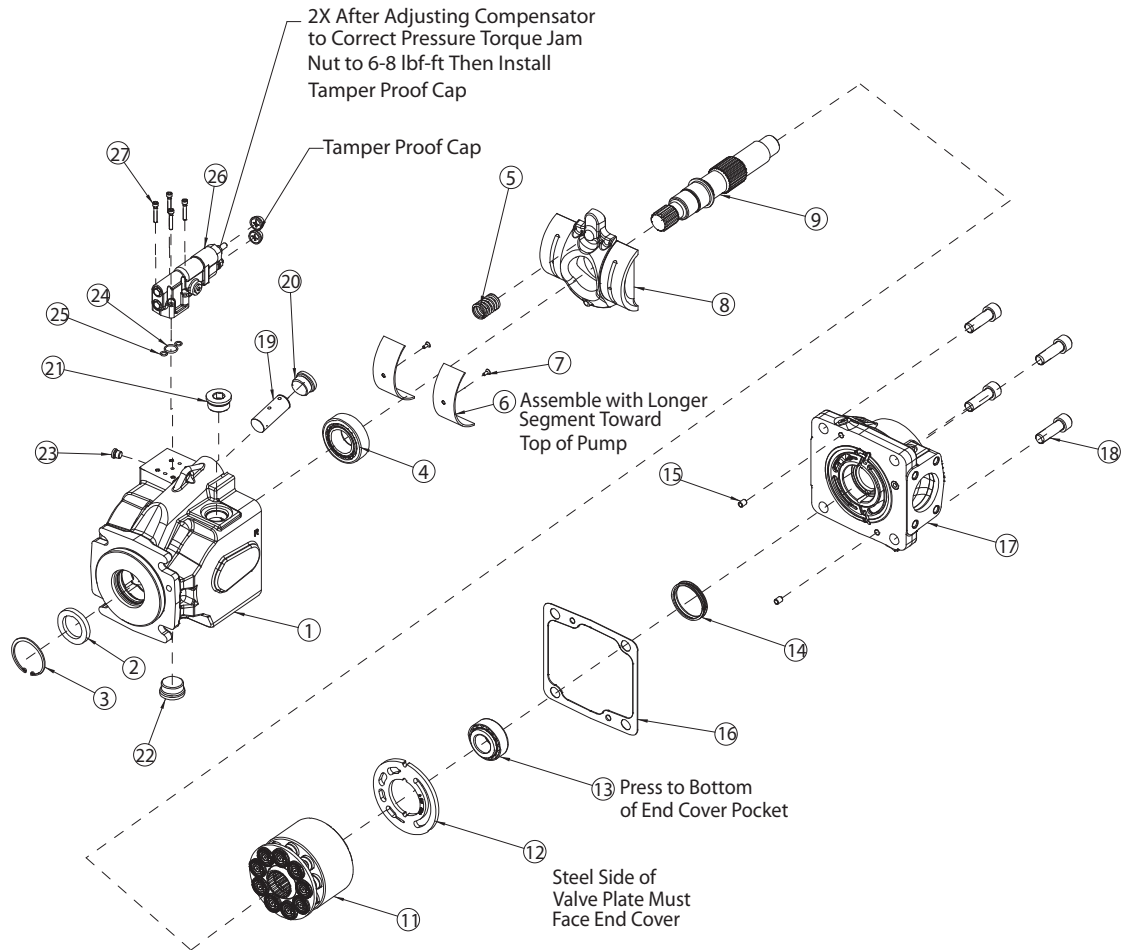
Parts

Item	Part number	Quantity	Description	Page Number
48	See table 15	1	Cover	19
49	See table 16	2	Hex Head Cap Screw	19
50	6026587-001	1	Cover Plate Sealing/Cover Plate Kit 9900782-000	32
51	6026902-001	1	Gasket, Cover Plate/Cover Plate Kit 9900782-000	32
52	114977-020	4	Screw, Cap/Cover Plate Kit 9900782-000	32

- Standard Seal Kit: 9900758-000
- △ Adjustable Maximum Displacement Volume Stop Kit: 9900772-000

Parts

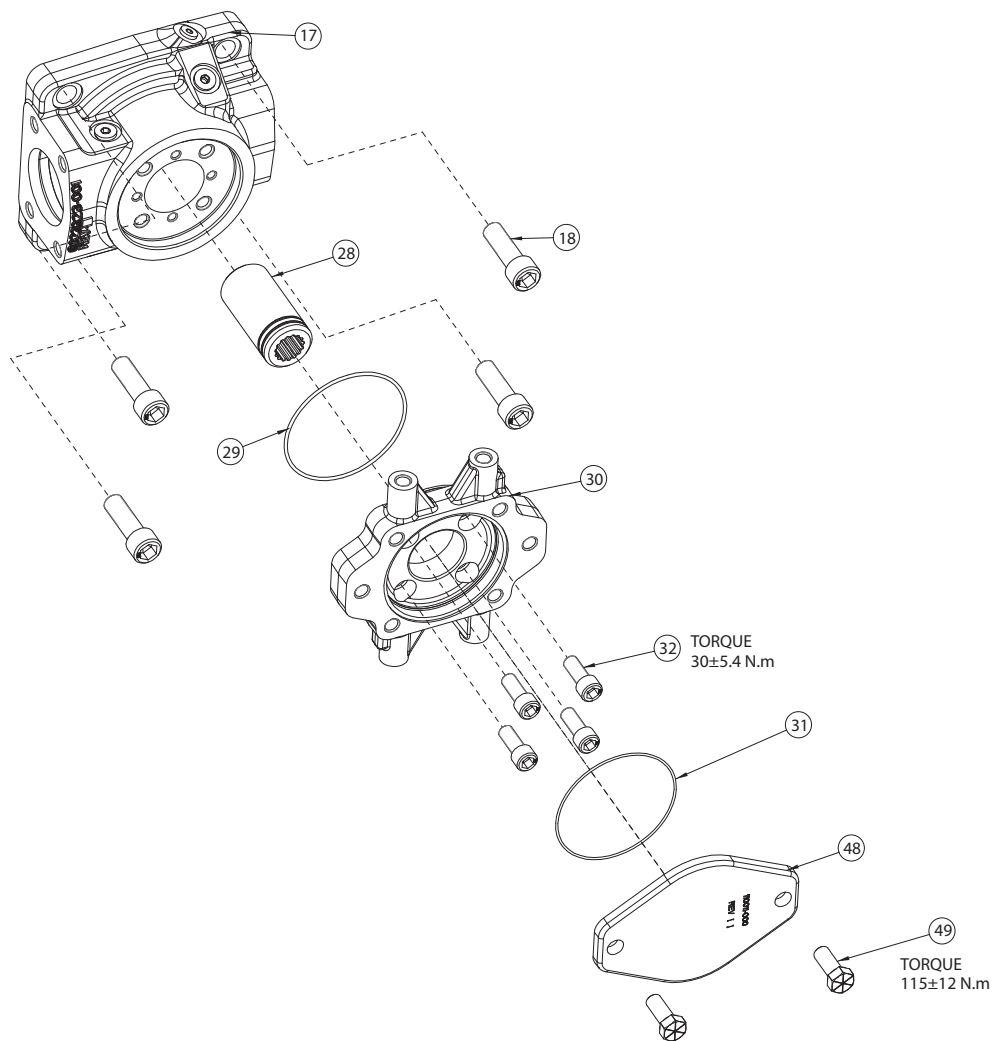
Exploded Assembly



Parts

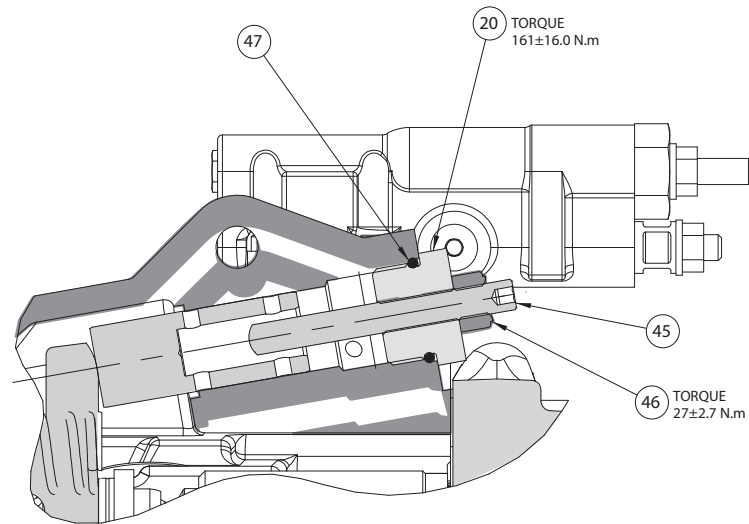
Optional Assembly

Thru-Drive Part Option



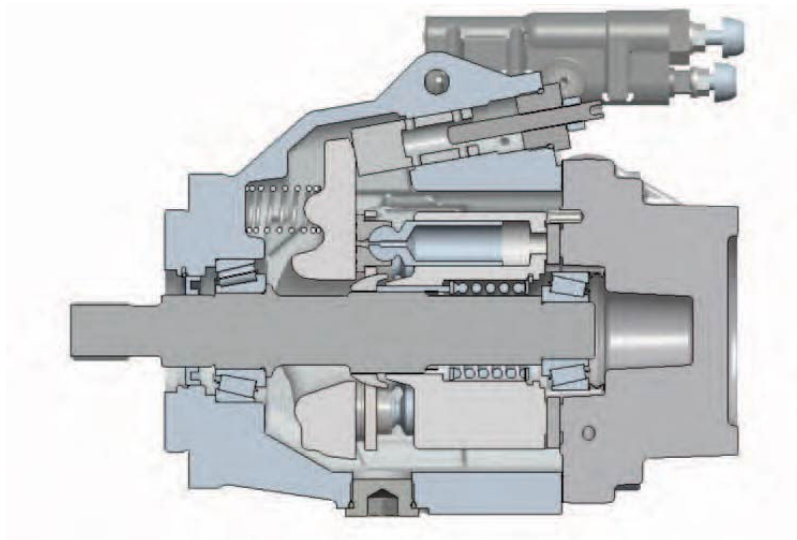
Parts

Adjustable Maximum Stop Option



Typical Cross Section

Side View



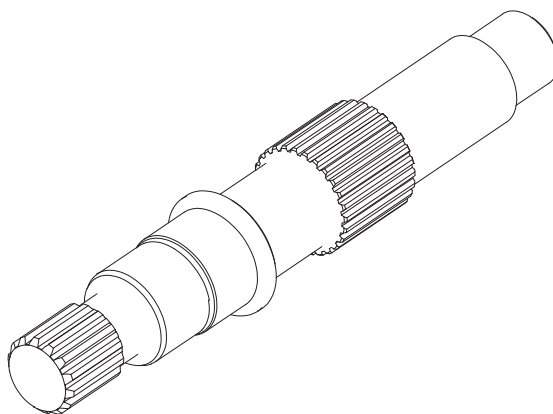
Parts

Shaft, Drive, and Key— Items 9 & 10

Table 1 - Shaft, Drive and Key (Items 9 & 10)

Code Position			Key (Item 10)	Part Number	Description
4, 5, 6	8, 9	24, 25			
098	05	00	4992730-004	4999808-001	Shaft, Drive, 1.25 Straight Key, 56 Ext
098	05	not 00	4992730-004	4999809-001	Shaft, Drive, 1.25 Straight Key, 56 Ext Thru Drive
098	06	00	-	6021804-001	Shaft, Drive, Input 17 Tooth, 56 Ext Thru Drive
098	06	not 00	-	4999303-001	Shaft, Drive, Input 14 Tooth, 56 Ext Thru Drive
098	07	00	4992730-005	4999810-001	Shaft, Drive, 1.50 Straight Key, 62 Ext
098	07	not 00	4992730-005	4999811-001	Shaft, Drive, 1.50 Straight Key, 62 Ext Thru Drive
098	08	00	-	4999806-001	Shaft, Drive, Input 17 Tooth, 62 Ext
098	08	not 00	-	4999807-001	Shaft, Drive, Input 17 Tooth, 62 Ext Thru Drive
098	10	not 00	14392-004	6023400-001	Shaft, Drive, 1.25 Tapered, Str Key, Thru Drive

620 Series Mobile Piston Pump Drive Shaft



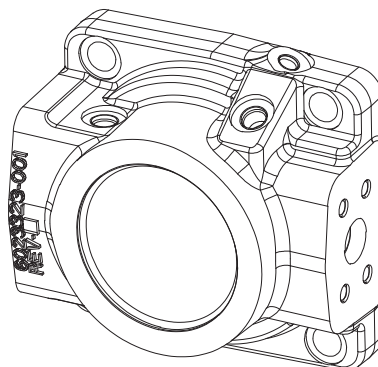
Parts

End Cover S/A — Item 17

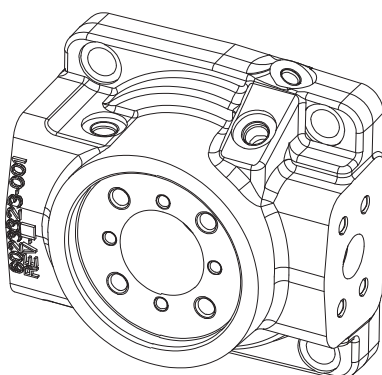
Table 2 - End Cover S/A (Item 17)

Code Position					Part Number	Description
4, 5, 6	7	10, 11	13	24,25		
098	L, R	AB	1	00	6023848-001	End Cover S/A, Side Port 98 cc (Diag Ports)
098	L, R	AB	1	Not 00	6023824-001	End Cover S/A, Thru Drive 98 cc (Diag Ports)
098	L, R	AD	1	00	6023848-002	End Cover S/A, Side Port 98 cc Metric (Diag Ports)
098	L, R	AD	1	Not 00	6023824-002	End Cover S/A, Thru Drive 98cc Metric (Diag Ports)
098	L, R	AB	0	00	6023848-003	End Cover S/A, Side Port 98 cc

620 Series Mobile Piston Pump End Cover Views



Side Ported



Thru Drive

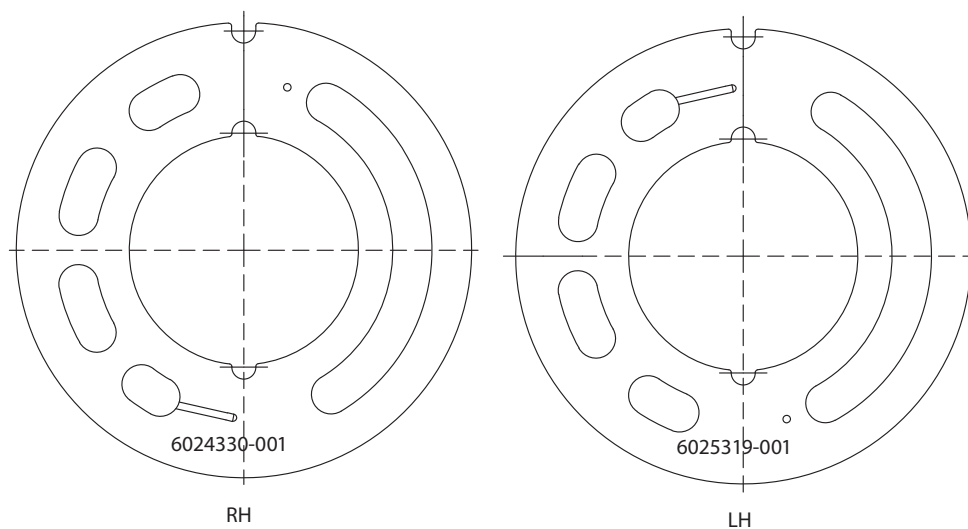
Parts

Valve Plate — Item 12

Table 3 - Valve Plate (Item 12)

Code Position		Part Number	Description
4, 5, 6	7		
098	R	6024330-001	Plate, Valve (RH 98 cc)
098	L	6025319-001	Plate, Valve (LH 98 cc)

Valve Plate Identification

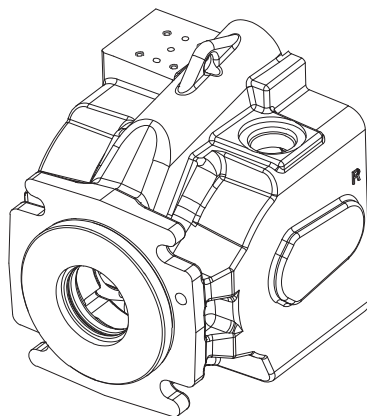


Parts

Housing — Item 1

Table 4 - Housing Table (Item 1)

Code Position				Part Number	Description
8, 9	12	26	27, 28		
05, 06, 07, 08, 10	1, 2	1	00	6023256-001	Housing
05, 06, 07, 08, 10	3, 4	1	00	6023256-002	Housing Metric Drain Port
05, 06, 07, 08, 10	1, 2	1	AB	6022838-001	Housing (Feedback Sensor)
05, 06, 07, 08, 10	3, 4	1	AB	6022838-002	Housing (Feedback Sensor) Metric Drain Port

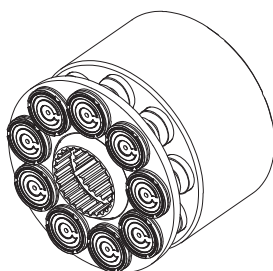


Parts

Rotating Group — Item 11

Table 5 - Rotating Group (Item 11)

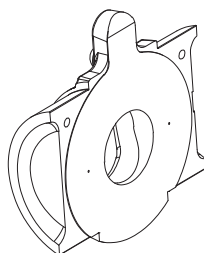
Code Position		Part Number	Description
4, 5, 6	27, 28		
098	00, AA, AB	6021400-001	Rotating Group S/A (98cc)



Swashplate — Item 8

Table 6 - Swashplate (Item 8)

Code Position		Part Number	Description
27, 28			
not AB		6022840-002	Swashplate
AB		6022840-001	Swashplate (Feedback Sensor)

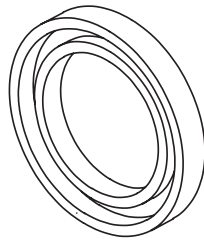


Parts

Shaft Seal — Item 2

Table 7 - Shaft Seal (Item 2)

Code Position	Part Number	Description
26		
1, 3	589332	Seal, Shaft, Fluorocarbon



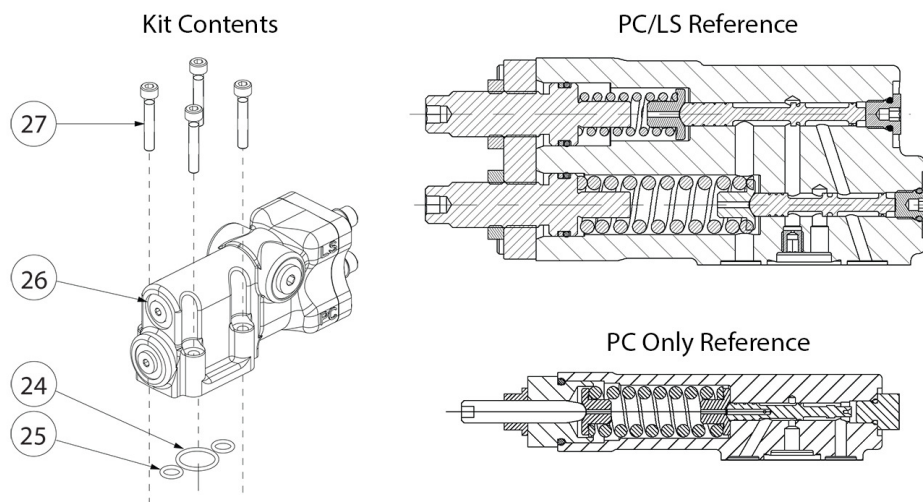
Parts

Compensator — Items 24, 25, 26 & 27

Table 8 - Compensator (Items 24, 25, 26, and 27)

Code Position						
14	15, 16	Pressure Limit Setting	17, 18	Flow Setting	21, 22	Part Number
A	28	276-284 Bar [4003-4119 lbf/in ²]	20	19-21 Bar [276-305 lbf/in ²]	00	9901219-002
A	20	196-204 Bar [2843-2959 lbf/in ²]	20	19-21 Bar [276-305 lbf/in ²]	00	9901219-003
A	28	276-284 Bar [4003-4119 lbf/in ²]	14	13-15 Bar [189-218 lbf/in ²]	00	9901219-004
A	20	196-204 Bar [2843-2959 lbf/in ²]	14	13-15 Bar [189-218 lbf/in ²]	00	9901219-005
C	28	276-284 Bar [4003-4119 lbf/in ²]	00	-	00	9901219-006
C	20	196-204 Bar [2843-2959 lbf/in ²]	00	-	00	9901219-007

The compensator has been redesigned. Please see [X20 Compensator Design Change](#) on page 16 for the old compensator design and how to identify which compensator is on the unit.

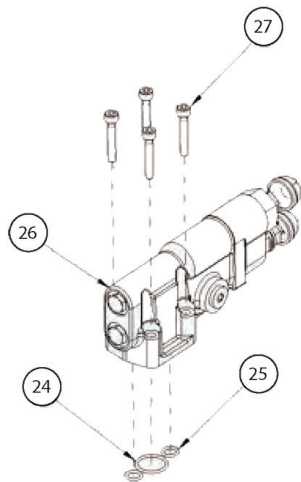


Parts

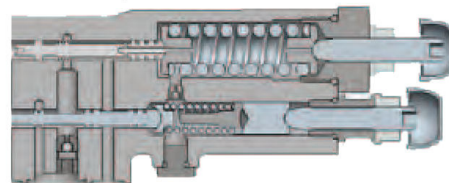
X20 Compensator Design Change

The X20 compensator has been redesigned. The information below details the old design and how to identify the design used on the unit.

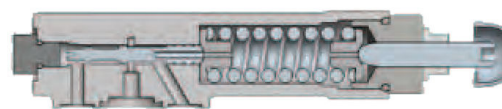
Legacy compensator design



Pressure Flow Compensator

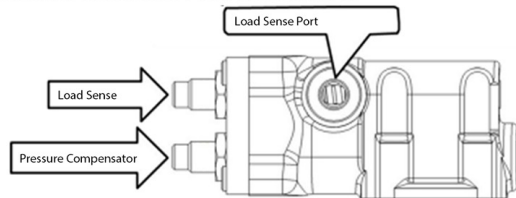


Pressure Compensator Only

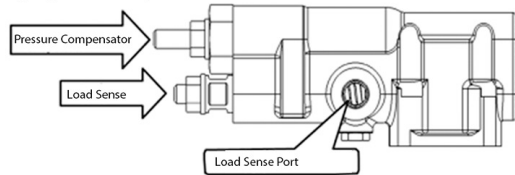


X20 compensator identification

X20 Next Generation Compensator (NGC):



Legacy X20 Compensator:



Parts

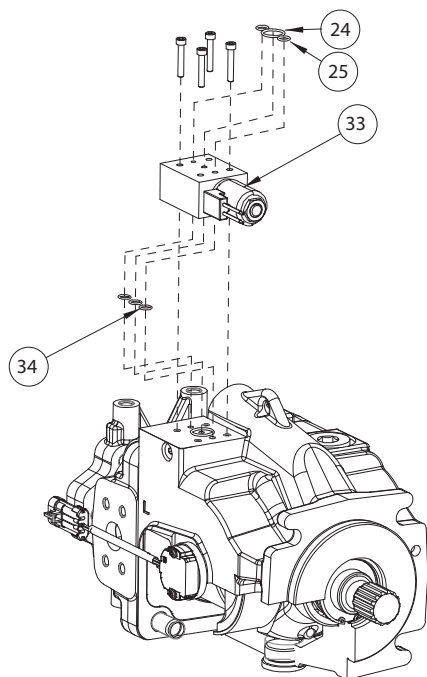
Compensator Mounting Screws — Item 27

Table 9 - Compensator Mounting Screws (Item 27)

Code Position	Part Number	Description
21, 22		
00, 0A	114953-030	Screw, Cap (Compensator Mounting)
0B, 0C	114953-065	Screw, Cap (Compensator Mounting)

Table 10 - Cold Start Manifold (Destroke) (Item 33)

Code Position	Part Number	Description
21, 22		
0D	631AA00035A-001	Destroke Manifold with Metri-Pack Connector
0E	631AA00035A-003	Destroke Manifold with Integrated Deutsch Connector



Parts

Plugs — Items 20, 21 & 22

Table 11 - Case Drain Plugs (Item 21, 22)

Code Position	Part Number	Description
12		
1	115046-016	Plug 1.3125-12
2	115046-016	Plug 1.3125-12
3	9237-006	Plug M33 X 2.0
4	9237-006	Plug M33 X 2.0

Table 12 - Plug, Adjustable Volume Stop (Item 20)

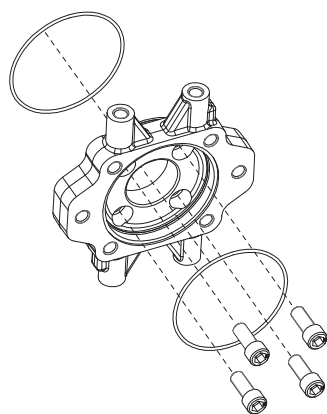
Code Position	Part Number	Description
23		
1	5994111-001	Plug Assembly
2	6024779-001	Plug

Parts

Adapter Kit — Items 29, 30, 31 & 32

Table 13 - Adapter Kit, Thru Drive (Item 29, 30, 31 and 32)

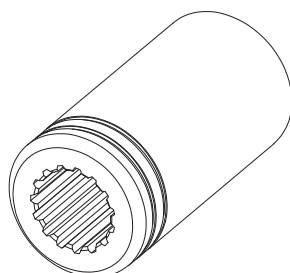
Code Position	Part Number	Item 29	Item 30	Item 31	Item 32	Description
24, 25						
AC, AD	9900774-001	104166-155	4999353-001	8761-159	114977-035	SAE C-pad Adapter
AE, AF	9900774-002	104166-155	4999463-001	8761-152	114977-030	SAE A-Pad Adapter
AA, AB	9900774-003	104166-155	4999351-001	8761-155	114977-030	SAE B-Pad Adapter



Coupler — Item 28

Table 14 - Coupler (Item 28)

Code Position		Part Number	Description
4, 5, 6	24, 25		
098	AA	4999426-001	Coupler, 9 Tooth
098	AB	4999427-001	Coupler, 11 Tooth
098	AC	6024980-001	Coupler, 13 Tooth
098	AD	6024112-001	Coupler, 15 Tooth
098	AE	864458	Coupler, 14 Tooth
098	AF	864461	Coupler, 17 Tooth



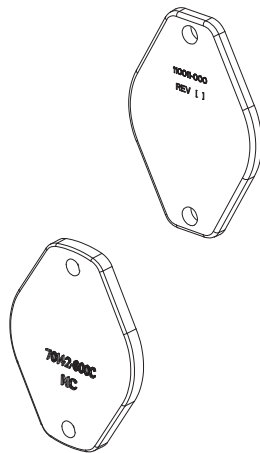
Service Manual
X20-620 Mobile Open Circuit Piston Pump

Parts

Cover — Item 48

Table 15 - Cover (Item 48)

Code Position		Part Number	Description
24, 25	27, 28		
AA, AB	AA	70142-600	Cover, A-Pad
AC, AD	AA	110011-000	Cover, B-Pad



Hex Head Cap Screw — Item 49

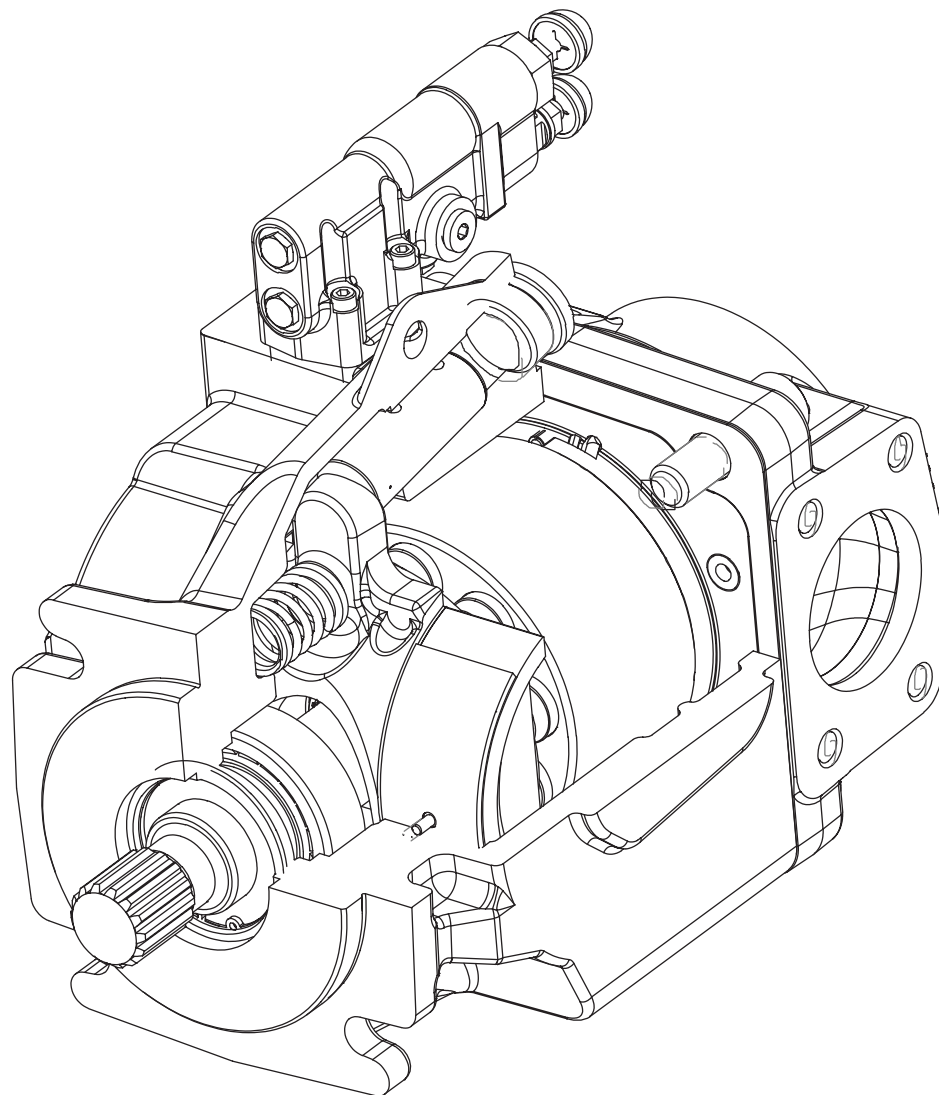
Table 16 - Hex Head Cap Screw (Item 49)

Code position		Part Number	Qty	Description
24, 25	27, 28			
AA, AB	AA	16136-607	2	Hex Head Cap Screw
AC, AD	AA	16136-812	2	Hex Head Cap Screw

Repair

620 Mobile Piston Pump Repair

Cut Section



Repair

General Information

Read this assembly manual thoroughly before starting work on the pump. This manual assumes appropriately trained technicians with specialized knowledge of mechanical and hydraulic component assembly and disassembly.

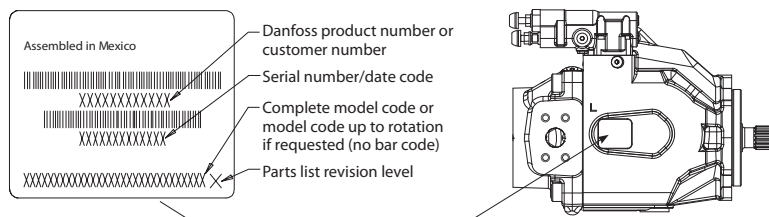
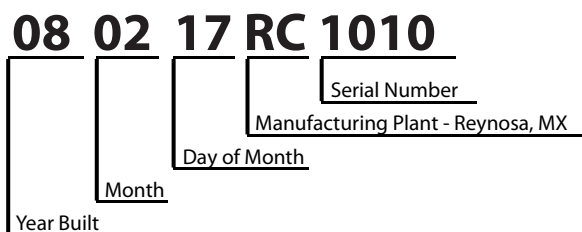
Replacement Parts

When ordering replacement parts, give the product number, date code, part number and quantity of parts required. This product information is found on name tag which is located on the side of the housing.

When Danfoss Model 620 pressure, pressure-flow compensated piston pump is repaired, thoroughly clean pump before any repairs are attempted.

The part number and serial number are on the tag.

Serial Number/Date Code Interpretation



Required Tools

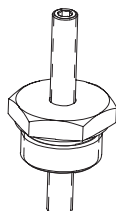
Standard Tools for Disassembly

- Ball Pin Hammer
- Plastic Tip Hammer
- Flat Tip Screw Driver
- Snap Ring Pliers
- Torque wrench
- Magnet Stick
- 11/16" Wrench
- 1-3/8" Wrench
- 4mm Allen Wrench
- 3/32" Allen Wrench
- Impact Screwdriver
- Sliding Bearing Remover Hammer
- Dial Indicator and Accessories
- Marker or Paint Pen
- Petroleum Jelly
- Cleaning Solvent

Repair

Special Tools

- Assembly Tool Kit for 620 Pump 9900773-000
- Swashplate Locator Tool Kit 9900773-001



- Swashplate Hold Down Plug 4999331-001



Repair**Disassembly**

Before attempting to disassemble, clean the pump exterior. Dispose of leakage oil and oily cloths in an environmentally responsible manner. All parts within the unit must be kept clean during the overhaul process. Handle each part with great care, marking as necessary to ensure proper reassembly. The close tolerance of the parts make this requirement very important. Clean all the parts that are removed from the unit with a commercial solvent that is compatible with the system fluid. Compressed air may be used in the cleaning process. However it may be filtered to remove water and other contaminants.

1. Remove Control Piston Plug Assembly and install Swashplate Locator Tool



2. Install Swashplate Hold Down Plug and adjust the Swashplate Locator Tool.



The swashplate locator tool and hold down plug will prevent the swashplate from moving. This step is designed to force the swashplate to a neutral position to enable easy removal of the rotating group while retaining the swashplate. With the locator tool in place, tighten the adjustment screw so that control piston is compressed.

3. Remove compensator



4. Remove end cover and cap screws



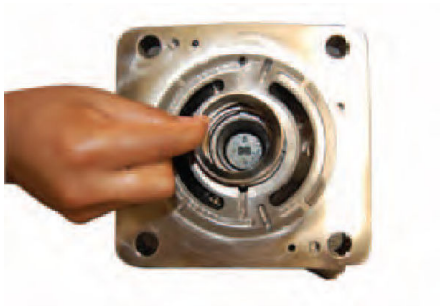
Repair

The valve plate may stick to end cover. Use caution so that valve plate does not fall off. Mark the housing and end cover to ensure the correct orientation. Remove the four cap screws that hold the end cover in place.

- Remove valveplate from end cover



- Remove Bearing Race from End Cover



- Remove Crush Ring (if required)



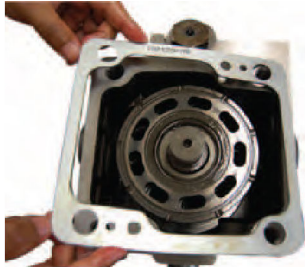
The Crush Ring located under the bearing cup in the end cover does not need to be removed. The only time the crush ring needs to be removed is when the front or rear shaft tapered roller bearings, bearing cups, drive shaft, end cover or housing assembly is replaced. A shim kit is required if the crush ring is replaced.

- Remove Bearing from Shaft



Repair

9. Remove Gasket



10. Remove Rotating Group



Carefully remove the rotating group.

11. Remove Shaft



12. Remove Swash Locator



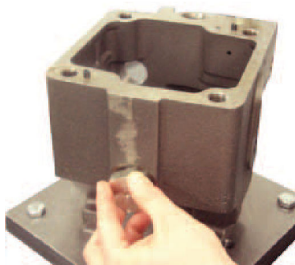
13. Remove Control Piston



The open end of the control piston is positioned up. The control piston is allowed to rotate.

Repair

14. Remove Swashplate Hold Down Plug



15. Remove Swashplate



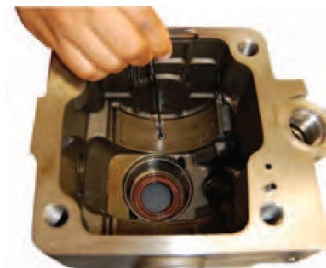
16. Remove Bias Spring



17. Remove Bearing



18. Remove Cradle Bearings Screws and Discard



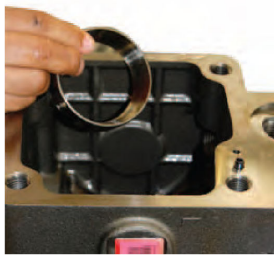
CAUTION: Socket head cap screws are easily damaged during repair with improper tool.

Repair

19. Remove Cradle Bearings



20. Remove Front Bearing Race



21. Remove Snap Ring, Shaft Seal and Discard



Repair

Inspection, Repair, and Part Replacement

Inspection

Before inspection of parts, clean with a solvent that is compatible with system fluid.

Rotating Group Parts

1. Inspect cylinder block face for wear, scratches and/or erosion. If cylinder block condition is questionable, replace the entire rotating group.
2. Remove the pistons, shoe retainer, and pivot from piston block. The piston block assembly does not need to be disassembled unless the internal pins or springs are damaged.
3. Check each cylinder block bore for excessive wear. Use the piston and shoe S/A for this purpose. The pistons should be a very close fit and slide in and out of the cylinder block bores. **NO BINDING CAN BE TOLERATED.** If binding occurs, clean the cylinder block and pistons. Lubricate the cylinder block bores with clean oil and try again. Even minor contamination of the fluid may cause a piston to freeze up in a cylinder bore.
4. Inspect each of the nine piston and shoe subassemblies for maximum end play of 0.08 mm between the piston and shoe.
5. Inspect shoe retainer and pivot for wear and/or scratches. If condition is questionable, replace entire rotating group.

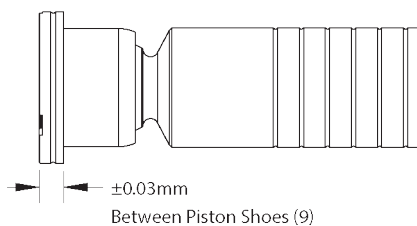
Retainer Plate



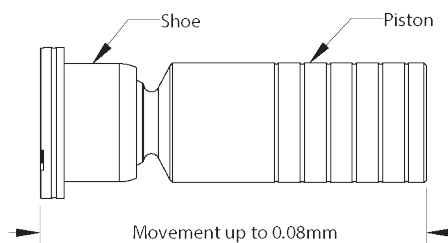
Do not lap the face of cylinder block assembly

Piston S/A Tolerances

This dimension must be maintained on all nine shoes within 0.03 mm



Shoe face rides on swash plate. Shoe must swivel smoothly on ball.



Repair**End Cover & Associated Parts**

1. Inspect end cover for erosion, cracks and burrs. Clean up minor burrs with an India stone. If erosion or cracks are found, replace the end cover.
2. Inspect roller bearing and bearing race for nicks and pitting. Make sure the roller bearing turns freely within the bearing race. If the roller bearing needs replacement, both the roller bearing and the bearing race must be replaced.
3. Inspect valve plate for erosion, excessive wear, heavy scratches and cracks. If any of the above conditions are found, replace the valve plate.
4. Inspect control position and maximum displacement screw for burrs, scratches and cracks. If any of the above conditions are found, replace the control piston. The control piston should move freely in the bore.

Swashplate Parts

1. Inspect swashplate face for wear, roughness or scoring. Check the swashplate hubs and bearing surfaces for wear and cracks. Replace if defective.
2. Inspect saddle bearing surfaces for wear, pitting, and smooth operation. Replace if necessary.

Shaft/Housing Parts

1. Inspect drive shaft for wear, stripped splines and burrs. Remove burrs with India stone. Inspect the contact of the area bearing and shaft seal. Replace the drive shaft if wear or scoring is greater than .0127mm T.I.R. (Total Indicator Reading)
2. Inspect drive shaft bearing for roughness, pitting of rollers and excessive end play. Replace if defective. If the bearing needs to be replaced, the bearing race also requires replacement
3. Inspect housing mounting flange for nicks and burrs. Remove minor nicks and burrs with an India stone. Also check the housing for damaged or stripped threads. If any thread is damaged, replace the housing.
4. Check remaining pump parts for excessive wear, damaged threads, burrs, cracks and erosion. Replace any part that is in questionable condition

Repair

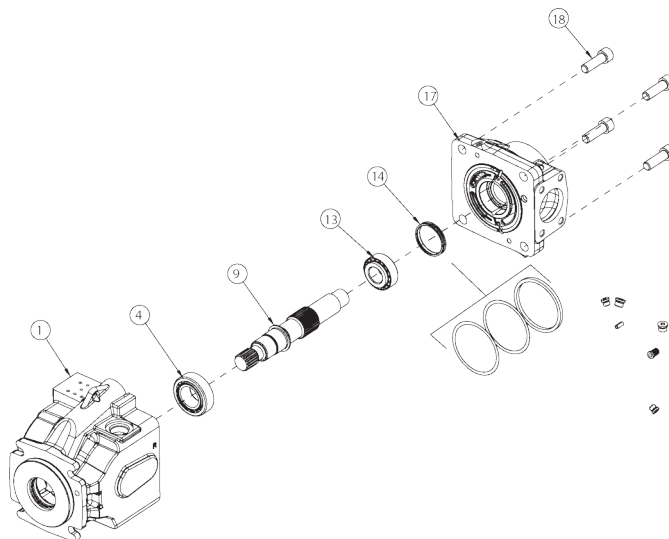
Shimming Process

Kit 9900776-000

Shimming Process Installation Information

This shim kit is to replace the crush ring within the pump end cover.

If the housing, drive shaft, shaft bearings or end cover is replaced during servicing, the original can no longer be used to assure proper bearing set.



Shimming Procedures

1. Measure the thickness of the existing crush ring.
2. To obtain a starting point, stack shims to a few thousandths of an inch less than the measurement of existing crush ring. Then insert shims into the housing in the same location as the removed crush ring.
3. Assemble the housing shaft bearings, shaft and end cover. Install the end cover cap screws and torque to 384 +/- 28 N.m.
4. Using a dial indicator, measure drive shaft end play. Target bearing set is .03 to .08mm clearance. Add shims to achieve proper bearing set. If no movement of the shaft is observed, shims will need to be removed and steps 3 and 4 be repeated.
5. Finish the assembly of the pump.



Repair**Assembly**

Assembly must be conducted in a clean environment. Dispose of leakage oil and oily cloths in an environmentally responsible manner. Before assembly carefully clean all the parts and blow out holes with compressed air. Tighten all the screw plugs to the specified torque. Exceptions are specified in the text. Lubricate O-rings and shaft sealing rings lightly with an acid free lubricant and to hold the O-ring in place in its groove or cavity.

1. Install Snap Ring and Shaft seal

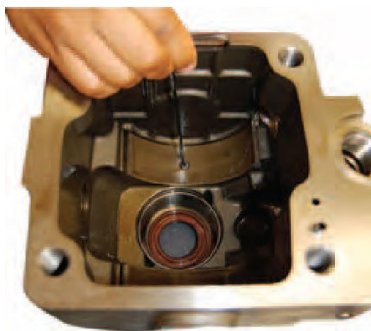
Press shaft seal inside till the face of the seal exactly matches with inner surface of retaining ring groove.

2. Install the Shaft Bearing Race**3. Install Cradle Bearings**

The cradle bearings are asymmetrical. Install with longer side towards the top of the pump (controller side).

Repair

4. Install Cradle Bearing Screws



The old cap screws can not be reused and must be replaced with new ones because the screws will be damaged during disassembly. The new cap screw threads will be coated with loctite.

5. Install Bearing



6. Install Bias Spring



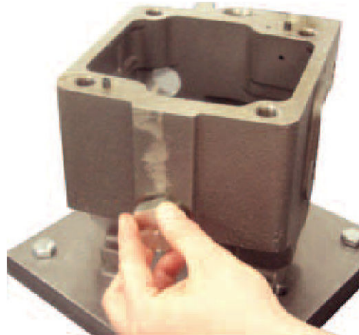
7. Install Swashplate



With the Bias spring in place, tile the swashplate toward the spring and install the swashplate. **Ensure that Bias spring is engaged.**

Repair

8. Install Swashplate Hold Down Plug



9. Install Control Piston

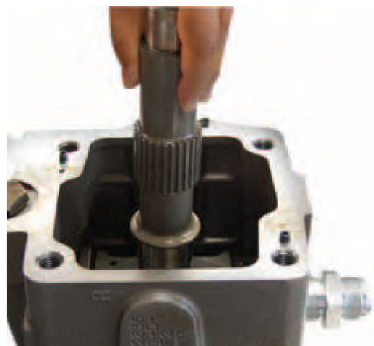


10. Install Swashplate Locator Tool and Adjust



Install Swashplate Locator Tool 9900773-001 and adjust the screw until the swashplate is near neutral (will look flat in housing).

11. Install Shaft



Use care while inserting shaft end through shaft seal.

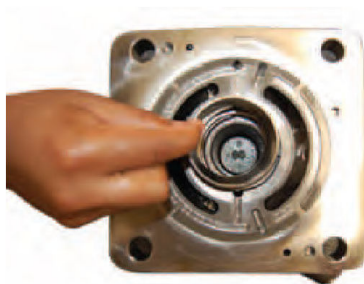
Repair

12. Install the Rotating Group



Carefully install Rotating Group. Ensure shaft is engaged with bearing race while installing Rotating Group.

13. Install Bearing Race



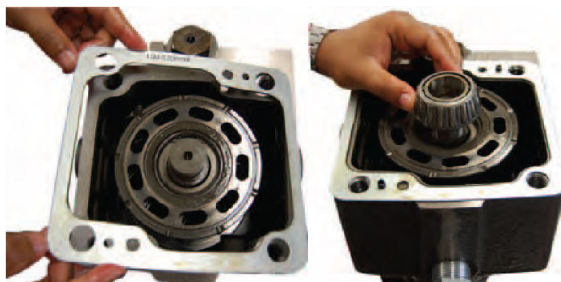
Install shims, if required, and the bearing race to ensure correct number of shims are used to get the correct end play. Shim installation instructions are on page 26.

14. Install Valve Plate



Lightly coat the steel side of the valve plate with petroleum jelly for retention during assembly. Install the valve plate over the bearing race aligning the small slot on the outside of the valve plate with the dowel pin in the End Cover.

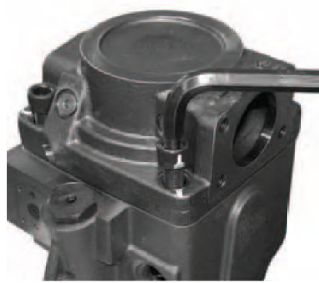
15. Install Gasket and Bearing



After Installation of Bearing, lubricate all components with clean hydraulic oil.

Repair

16. Install End Cover and Cap Sleeve



Ensure correct orientation. Use caution so that valve plate does not fall off.

17. Install Compensator



18. Remove Swash plate Locator Tool and Hold Down Plug. Install Control Piston Plug Assembly.

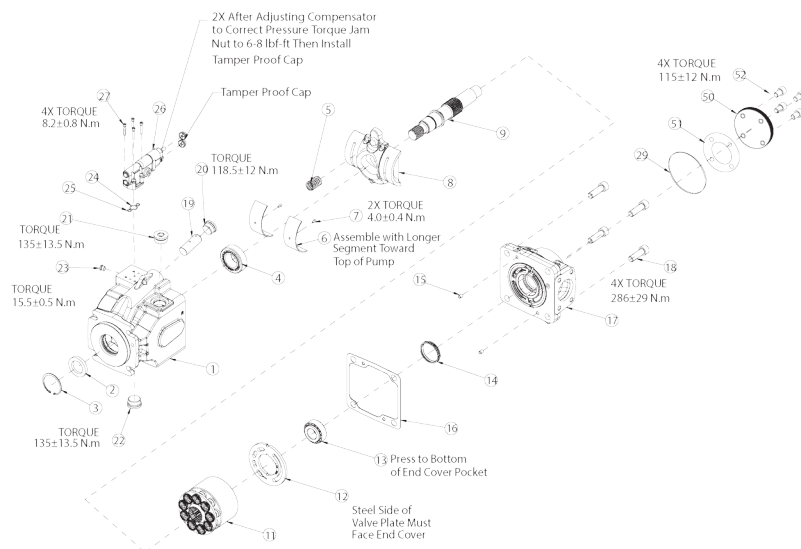


19. Testing

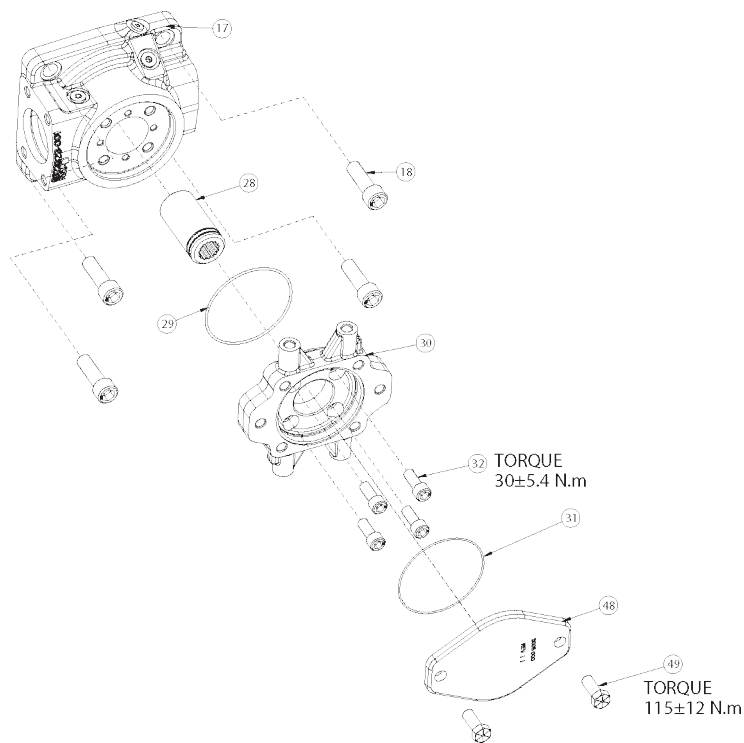
Perform functional test on pump according to Danfoss test procedure. Contact your area sales manager for more information.

Repair

Assembly Torque Valves

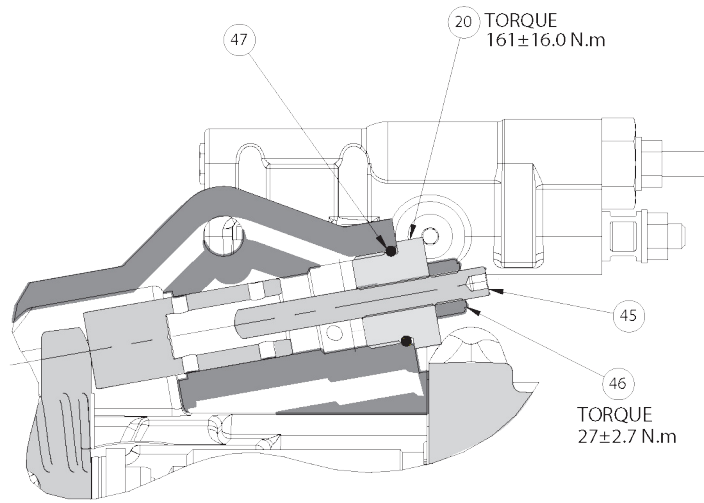


Thru-Drive Part Option



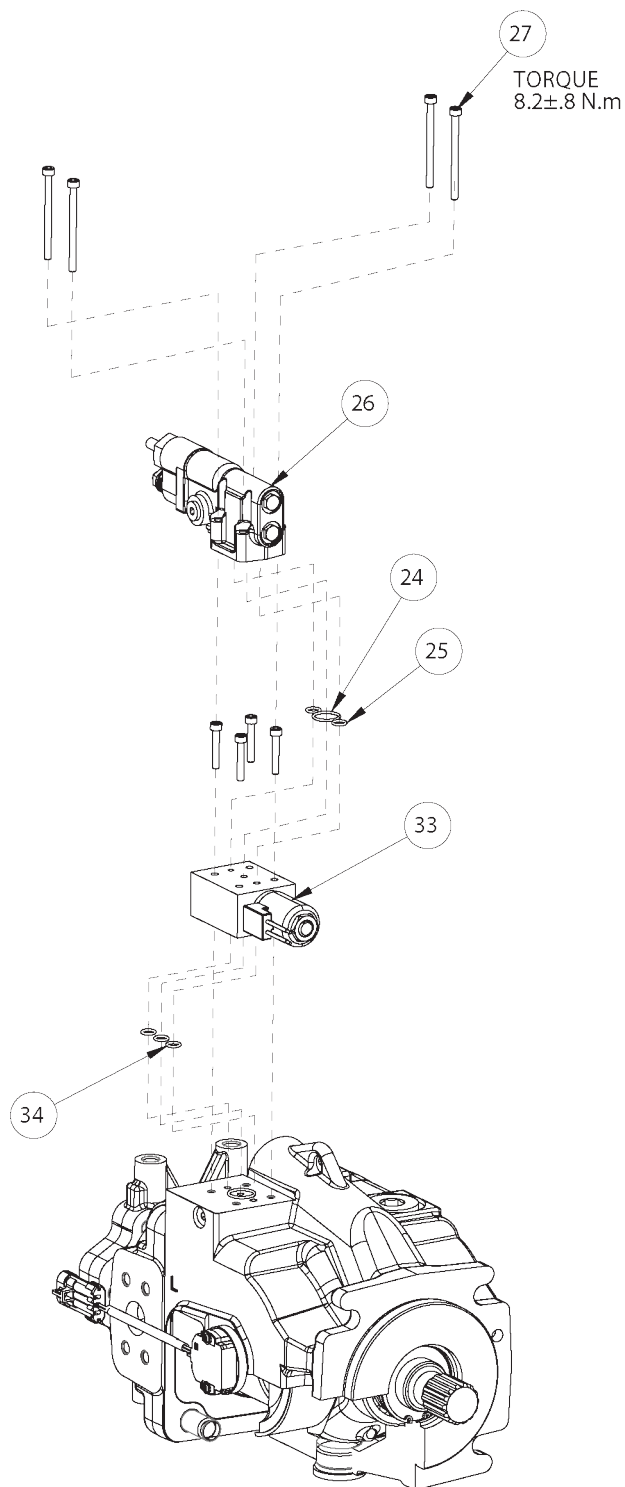
Repair

Adjustable Maximum Stop Option



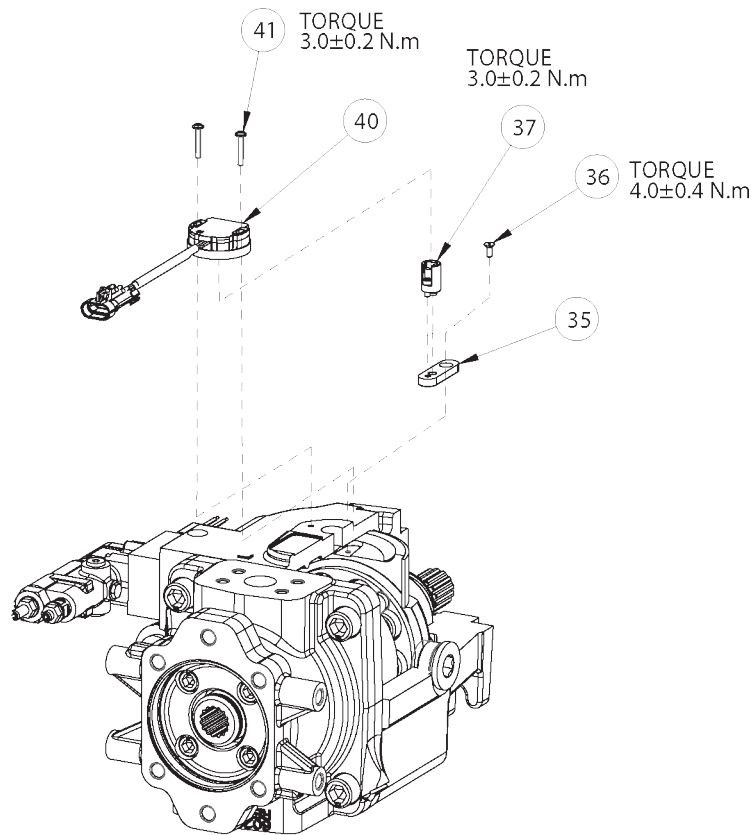
Repair

Cold Start Manifold (Destroke)

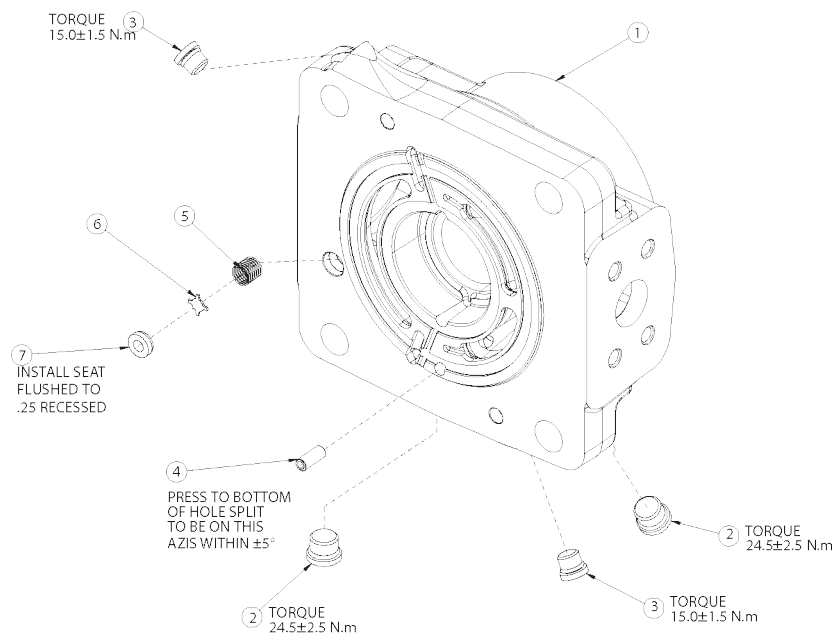


Repair

Feedback Sensor Option



End Cover



Products we offer:

- Cartridge valves
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- Electric machines
- Electric motors
- Gear motors
- Gear pumps
- Hydraulic integrated circuits (HICs)
- Hydrostatic motors
- Hydrostatic pumps
- Orbital motors
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- PLUS+1® joysticks and pedals
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