Service Manual
danfoss.com

CUT transmission 5144

Revision history

Table of revisions

Date	Changed	Rev
February 2026	First edition	0101

Introduction

Hydrostatics Servicing Overview

This manual includes information on installation, maintenance, and minor repair of the CUT transmission. It includes a description of the unit and its individual components, troubleshooting information, and minor repair procedures.

Performing minor repairs may require the unit to be removed from the vehicle/machine. Thoroughly clean the unit before beginning maintenance or repair activities. Since dirt and contamination are the greatest enemies of any type of hydraulic equipment, follow cleanliness requirements strictly. This is especially important when changing the system filter and when removing hoses or plumbing.

A worldwide network of Danfoss Global Service Partners is available for major repairs. Danfoss trains and certifies Global Service Partners on a regular basis. You can locate your nearest Global Service Partner using the distributor locator at *http://www.danfoss.com*.

For detailed technical information about the CUT transmission, please see the relevant technical information document.

Attention

Major repairs requiring the removal of a unit's center section, servo sleeves, or front flange voids the warranty unless a Danfoss Authorized Service Center performs them.

General Instructions

Follow these general procedures.

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 HST and fittings for damage. Cap hoses and plug ports after removal to prevent contamination.

Keep it clean

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

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

Lubricate moving parts

During assembly, coat all moving parts with clean hydraulic fluid. This assures that these parts are lubricated during start-up.

Replace all O-rings and gaskets

Danfoss recommends you replace all O-rings, seals, and gaskets during repair.Lightly lubricate all O-rings with clean petroleum jelly prior to assembly. Grease must be soluable in hydraulic fluid.

Secure the unit

For major repair, place the unit in a stable position with the shaft pointing downward. It is necessary to secure the transmission while removing and torquing components and fasteners.

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.

Hazardous material

Warning

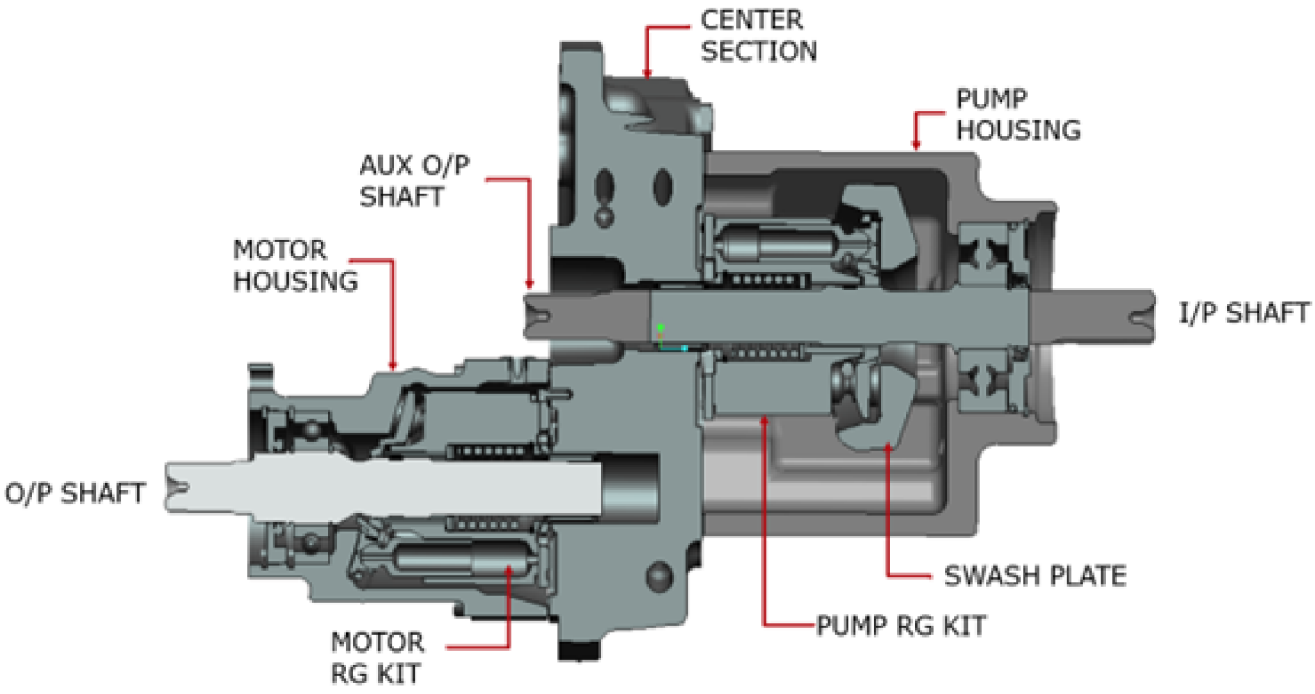
Hydraulic fluid contains hazardous material. Avoid prolonged contact with hydraulic fluid. Always dispose of used hydraulic fluid according to environmental regulations.

General description

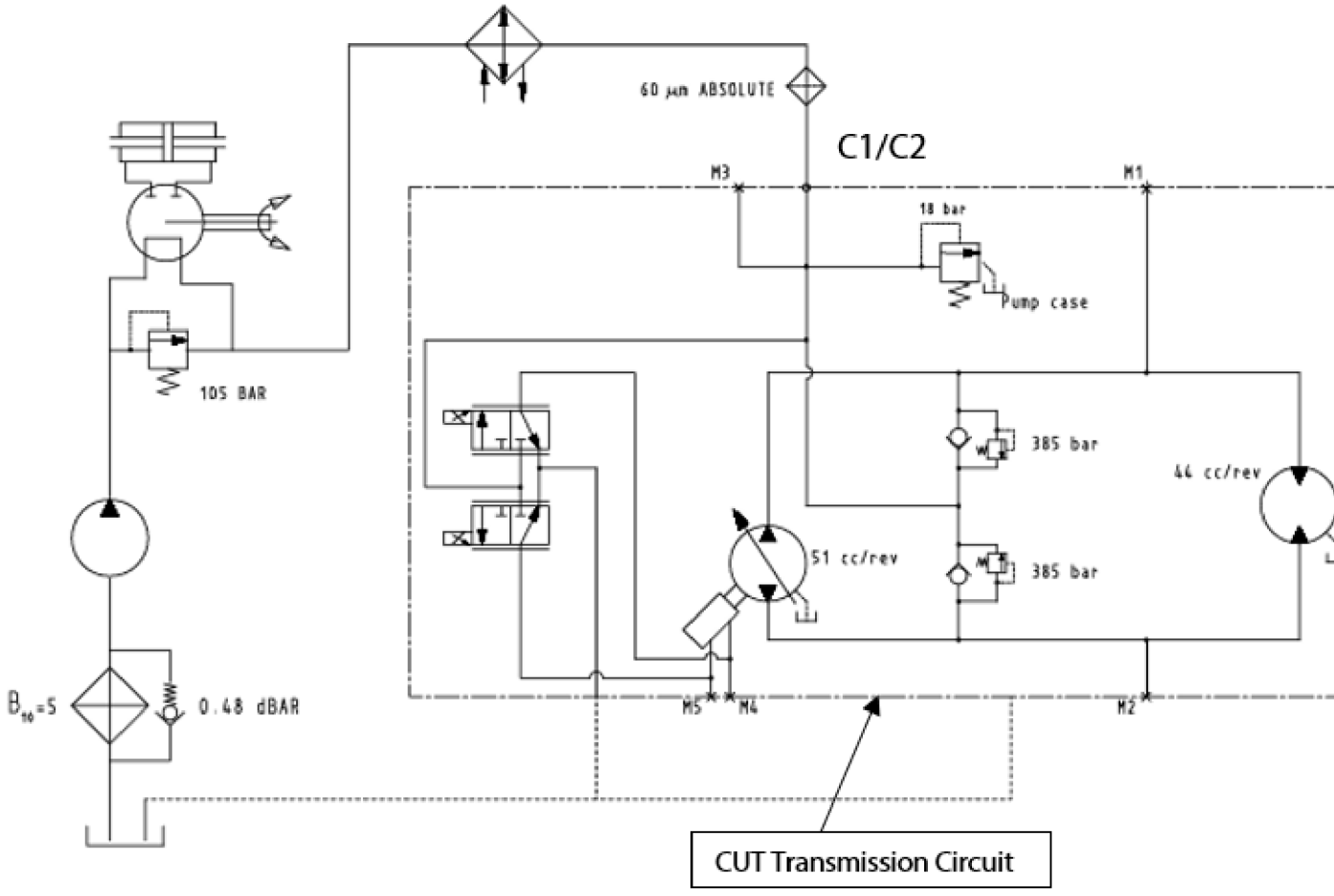
Basic design

CUT Transmission is a Z style configuration including a closed-circuit variable displacement piston pump with NFPE control and a fixed motor. The flow rate is proportional to the input speed and displacement. The angle of the swashplate controls the volume of fluid displaced into the system. The servo piston forces the swashplate into an inclined position (into stroke). Internal moments and centering springs within the servo piston return the swashplate to the neutral position (out of stroke). Flow direction is varied by tilting the swashplate to either side of the neutral (zero displacement) position of the pump. The fixed motor is bidirectional and motor output RPM is directly proportional to the pump flow. This unit is without a charge pump and needs external charge flow supply for the functioning.

CUT transmission cross-sectional view



CUT system circuit diagram



Operation

Closed circuit operation

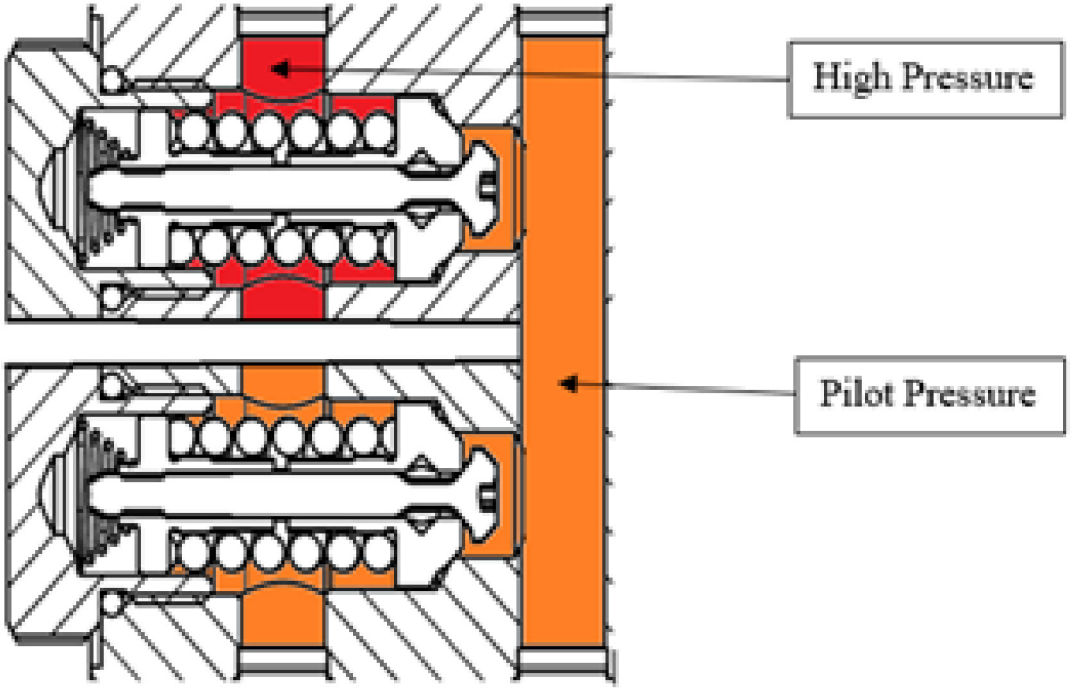
Hydraulic lines connect the main ports of the pump to the main ports of the motor internally. Fluid flows in either direction from the pump to the motor and back. Either of the hydraulic lines can be under high pressure. The position of pump swashplate determines which line is high pressure as well as the direction of flow

Case drain and heat exchanger

Both the pump and motor must drain fluid. A case drain line achieves this. In CUT transmission the motor and pump case is open to the atmosphere (wet chamber). Fluid cooling demands may require a heat exchanger with a bypass valve to cool the drain fluid before it returns to the reservoir.

High Pressure Relief Valve (HPRV) and Charge Check Valve

The unit is equipped with a combination of high-pressure relief and charge check valve. The high-pressure relief function is a dissipative (with heat generation) pressure control valve for the purpose of limiting excessive system pressures. The charge check function acts to replenish the low-pressure side of the working loop with charge oil. Each side of the transmission loop has a dedicated HPRV valve that is non-adjustable with factory set pressure. When system pressure exceeds the factory setting of the valve, oil is passed from the high-pressure system loop, into the charge gallery, and into the low-pressure system loop via the charge check or into the transmission case via charge pressure relief valve (CPRV).



Note

Image shown is for illustration purposes, position of HPRV may be different in actual unit.

CUT transmission High pressure relief valve setting

High pressure	Flow (test stand)	Viscosity
385 ± 19.5 Dbar	4.8 lpm	20 cstokes

Caution

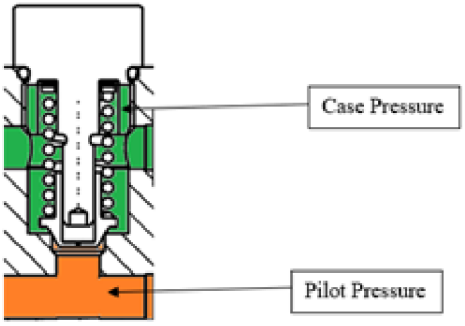
HPRVs are factory set at a low flow condition. Any application or operating condition which leads to elevated HPRV flow will cause a pressure rise with flow above a valve setting. Consult factory for application review.

Caution

The High Pressure Relief Valve (HRPV) function is intended for short duration over-pressure protection / regulation only.

CPRV (Charge Pressure Relief Valve)

The charge pressure relief valve maintains charge pressure at a designated level above case pressure. The charge pressure relief valve is a direct acting poppet valve which opens and discharges fluid to the hydrostatic transmission case when pressure exceeds a designated level. For external charge flow the CPRV is set according to the table below.



Note

Image shown is for illustration purposes, actual position of CPRV may be different in unit.

CUT transmission charge pressure setting

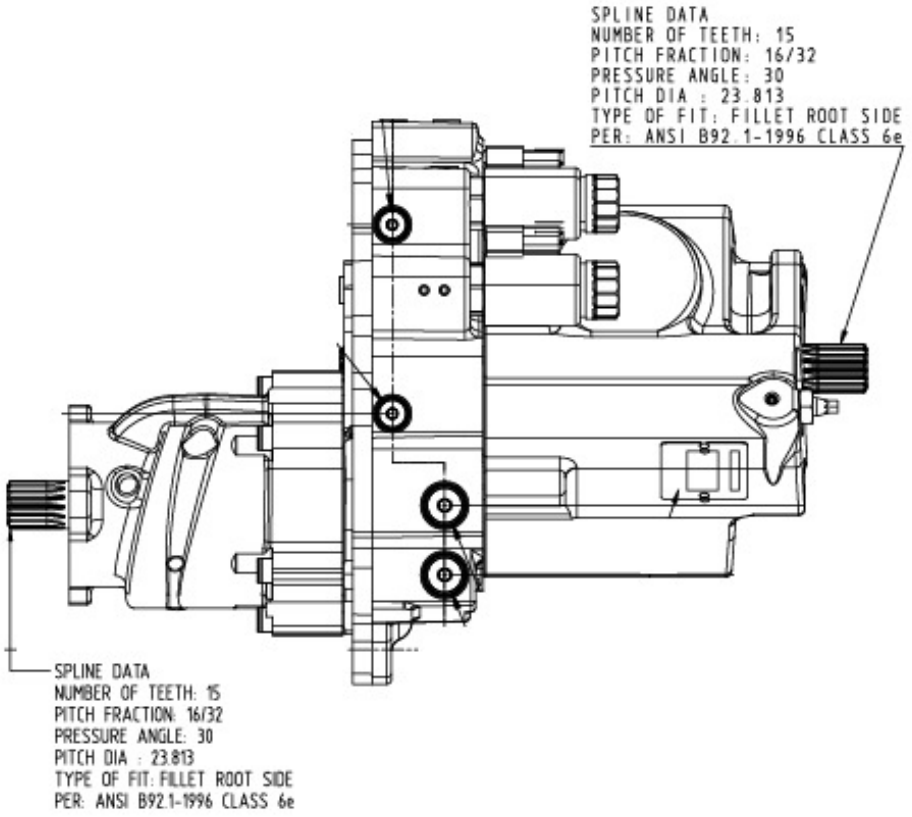
Charge pressure	Flow (test stand)	Viscosity
18 ± 1 Dbar	18 lpm	20 cstokes

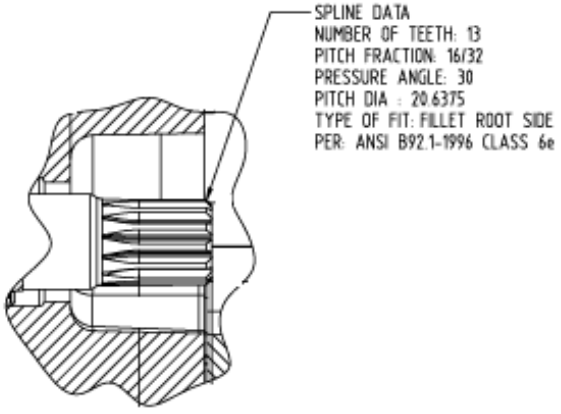
Non-feedback proportional electric (NFPE) control

The Non-Feedback Proportional Electric (NFPE) control is an electric control. A PWM input signal to one of two solenoids on the control valve ports charge pressure to one side of the servo piston. Pump displacement is proportional to the signal current. However, because this control does not use mechanical feedback, displacement also depends on input speed and system pressure. This characteristic provides a power limiting function by reducing displacement as system pressure increases.

Shaft

Transmission shaft specifications are as shown





Technical Specifications

Operating parameters

Feature		Units	Entry
Displacement	Motor	cm^3/rev	43.5
	Pump		51
Minimum input speed		rpm	900
Maximum input speed			2850
Maximum output speed			3300
Maximum intermittent output speed			4100
Maximum working pressure		bar [psi]	300 [5075]
Maximum system pressure, intermittent			385 [5580]

Case pressure

The motor case and pump case are independently vented to atmosphere.

Fluid and filter maintenance

To ensure optimum life of Transmission, perform regular maintenance of the fluid and filter. Contaminated fluid is the main cause of unit failure. Take care to maintain fluid cleanliness when servicing.

Check the reservoir daily for proper fluid level, the presence of water, and rancid fluid odor. Water in the fluid may be noted by a cloudy or milky appearance or free water in the bottom of the reservoir. Rancid odor indicates the fluid has been exposed to excessive heat. Change the fluid immediately if these conditions occur. Correct the problem immediately.

Change the fluid and filter per the vehicle/machine manufacturer's recommendations

Change the fluid more frequently if it becomes contaminated with foreign matter (dirt, water, grease, etc.) or if the fluid is subjected to temperature levels greater than the recommended maximum.

Change the fluid more frequently if it becomes contaminated with foreign matter (dirt, water, grease, etc.) or if the fluid is subjected to temperature levels greater than the recommended maximum.

Note

Dispose of used hydraulic fluid properly. Never reuse hydraulic fluid.

Note

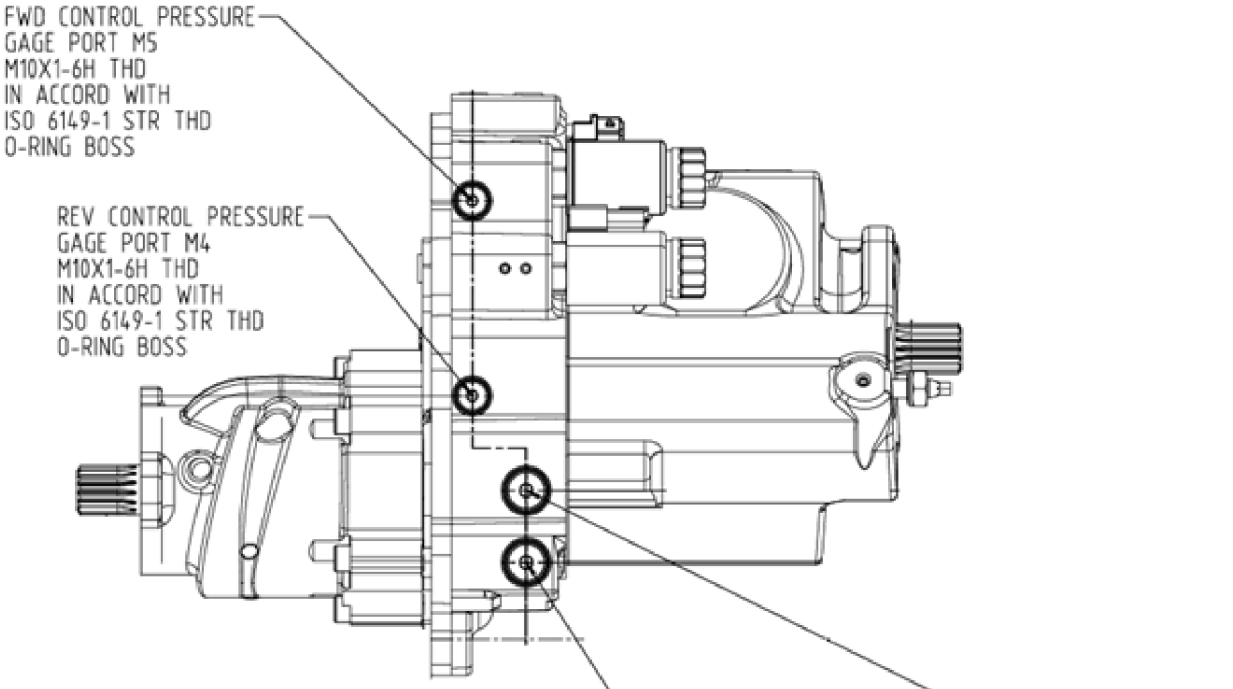
Change filters whenever the fluid is changed or when the filter indicator shows that it is necessary to change the filter.

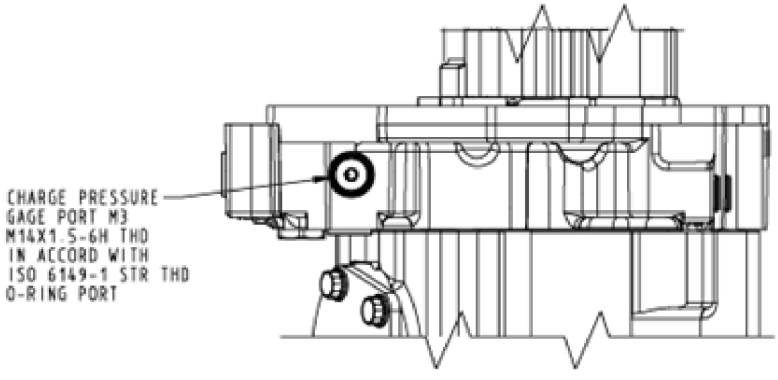
Pressure measurement

You can perform the service procedures in this manual using common mechanic's hand-tools. Calibrate gauges frequently to ensure accuracy. Use snubbers to protect pressure gauges.

Port locations and pressure gauge installation

CUT transmission port locations are as shown.





Ports and pressure gauges

Proper service and diagnosis may require pressure measurement at various points in the hydraulic circuit. The unit has several locations at which to take these measurements. The following illustration shows the locations of the various gauge ports. The table shows the recommended gauge size and the fitting size for each port. Refer to this information when installing pressure gauges.

Gauge	Pressure measured	Recommended gauge	O-ring boss
M1 and M2	System pressure ports for A	600 bar [8700 psi]	M10 x 1
M3	Charge pressure	60 bar [870 psi]	M14 x 1.5
M4 and M5	Servo pressure	60 bar [870 psi]	M14 x 1.5

Initial start-up procedure

Start-up procedure

Key objectives:

- Avoid a dry start up or prolonged starvation of charge supply/pressure.
- Housing(s), loop kidneys, and external charge supply line(s) must be primed and full of oil prior to any initial cranking of Prime mover. HST unit and transmission case filling with the oil during the transmission level testing.

Steps to follow for HST filling

Install a measurement tee in the external supply line that feeds HST port 'C1' from the charge/gear pump. This adaptor will offer a measurement port of charge pressure (M3) during testing. Using a low flow mobile charge cart and the M3 measurement port, supply the C1 port with a 21-bar supply. 21 bar to the M3 will force oil over the 18bar CPRV. Check the case oil flowing over the motor drain hole.

Steps to follow on vehicle for Initial Start- Up

1. Prior to any initial start-up procedures, vehicles must be made safe by eliminating any possibility of movement or risk of un-commanded wheel rotation; generally achieved by lifting vehicles in air and/or removing tires.
2. Connect the pump to the prime mover. Ensure that pump shaft is properly aligned with the shaft of the prime mover.
3. Fill the reservoir with recommended hydraulic fluid. Always filter fluid through a 10 micron absolute filter pouring into the reservoir. Never reuse hydraulic fluid Fill the charge/gear pump suction line.
4. Ensure/confirm that vehicle is in a safe state in the event of un-commanded HST propel output.
5. Crank engine for not longer than 30 secs.
6. At idle and with vehicle in a safe state, slowly cycle the HST for/rev. Sluggish control is expected until air is purged from control and servo system. M3 will flutter and drop 1-3 bar with HST operation.
7. After the control has been cycled and air discharged, record the control current in both for/rev that leads to wheel/axle movement.
8. In neutral, slowly increase engine rpm. At high idle, record the control current in both for/rev that leads to wheel/axle movement.

For Vehicle sitting idle for long time

Design of reservoirs and drain lines should not lead to an evacuation of the HST housing and charge supply lines during extended periods of rest. Once properly started and primed, the system should remain primed and ready for startup. Engine start should lead to immediate charge pressure with normal oil temps. Cold starts up often leads to charge pressure flutter.

Troubleshooting

This section provides general steps to follow if you observe undesirable system conditions. Follow the steps listed until you solve the problem. Some of the items are system specific. Always observe the safety precautions listed in the Introduction section and any precautions related to your specific equipment.

System operating hot

Item	Description	Action
Oil level in reservoir.	Insufficient hydraulic fluid does not meet cooling demands of system.	Fill reservoir to proper level with clean hydraulic oil.
Heat exchanger (if equipped).	Heat exchanger is not sufficiently cooling the system.	Check air flow and input air temperature for the heat exchanger. Clean, repair or replace heat exchanger.
SCR (System Check Relief) valves	A partially activated SCR valves or SCR valves with relief settings too low may result in heat generation within the system.	Verify that the SCR valve is seated properly and is at the correct relief setting. Repair or replace it as necessary.
Oil filters	Clogged oil filters may result in an insufficient supply of cool oil to the system.	Inspect the oil filters and verify that they are still operable. Replace them if necessary.
Machine load	Excessive loads or extreme duty cycles could result in the pump and/or motor operating at speeds and pressures beyond system design limitations.	Verify that the machine is operating within the parameters for which it was designed. If necessary, reduce the load on the machine.

System response is sluggish

Item	Description	Action
Oil level in reservoir.	Insufficient hydraulic fluid does not meet cooling demands of system.	Fill reservoir to proper level with clean hydraulic oil.
Input control signal	The pump receives a faulty control signal (NFPE - faulty or inadequate electrical signal).	Verify that the input signal is correct and identical in both directions.
Pump control	A damaged pump control or control spool will not correctly transmit the control input signal to the pump.	Verify that the pump's control is operating properly and that the control spool is not damaged or worn and moves freely within its bore. Clean, repair, or replace it as necessary.
SCR (system check relief) valves	One or both SCR valves may be binding within their bores.	Verify that the SCR valves operate freely. Repair or replace them as necessary.
Charge pressure (in neutral)	The is low charge pressure resulting due to low charge flow or low charge pressure relief valve setting.	Inspect the charge flow supply, verify the charge pressure relief valve setting. Repair or replace it as necessary.
Charge pressure (in stroke)	There is low charge pressure resulting from internal leakage within the system.	Repair or replace the component or components within the system causing the internal leakage.
Servo pressure	There is insufficient pressure differential across the servo piston.	Check servo pressures at port M4 and M5 to verify sufficient pressure delta. Verify that the servo supply and drain paths.

System will not operate in either direction

Item	Description	Action
Oil level in reservoir	There is insufficient hydraulic fluid to supply the system loop.	Fill the reservoir to the proper level with clean hydraulic oil.
Input control signal	The unit receives a faulty control signal	Verify that the input signal is correct and identical in both directions. Adjust, clean, repair, or replace the input device as necessary.

(continued)

Item	Description	Action
Oil filters	Clogged oil filters may result in an insufficient supply of oil to the system.	Inspect the oil filters and verify that they are still serviceable. Replace them as necessary.
Charge pressure (in neutral)	Charge pressure may be insufficient to recharge the system loop.	Inspect the charge pump for damage and verify that the charge pressure relief valve is at the proper setting. Repair or replace it as necessary.
Charge pressure (in stroke)	There is low charge pressure resulting from internal leakage within the system.	Repair or replace the component or components within the system causing the internal leakage.
Servo pressure	There is an insufficient pressure differential across the servo piston.	Check servo pressures to verify sufficient pressure delta. Verify that the servo supply and drain paths are unobstructed and that any orifices are of the correct size and free of debris. Clean, repair, or replace them.
External charge flow	The is low charge pressure resulting due to low charge flow.	Inspect the charge flow supply, Correct the charge flow supply as recommended.
SCR (system check / relief)	The SCR valves are malfunctioning or improperly set	Verify that the SCR valves are operating and properly set. Repair or replace them as necessary.

System will not operate in one direction

Item	Description	Action
Input control signal	The pump is receiving a faulty control signal	Verify that the input signal is correct and identical in both directions. Adjust, clean, repair, or replace the control module as necessary.
SCR (System Check Relief) valves	The SCR valves are malfunctioning or improperly set.	Verify that the SCR valves are operating properly. Repair or replace them as necessary.
HST control	A damaged or biased pump control may be sending a signal commanding the unit to stroke only in one direction.	Verify that the unit's control is functioning properly. Repair or replace it as necessary.
Servo pressure	The drain or supply path to one side of the servo piston may be blocked.	Verify that the servo supply and drain paths are unobstructed and that any orifices are of the correct size and free of debris. Clean or repair them as necessary.

Neutral difficult or impossible to find

Item	Description	Action
Input control signal	The unit is receiving a faulty control signal.	Verify that the input signal is correct and identical in both directions. Adjust, clean, repair, or replace control module as necessary.
System pressure	With no input signal to the control, a pressure delta may exist between the two sides of the working loop.	Readjust pump neutral setting. Refer to adjustment procedure.
Servo pressure	With no input signal to the control, a pressure delta may exist across the servo piston.	Readjust the control neutral setting. Refer to adjustment procedure.

System noise or vibration

Item	Description	
Reservoir level low	Low oil levels leads to cavitation.	Fill reservoir.
Aeration of the oil/charge inlet vacuum	Air in the system decreases efficiency of units and controls. Air in the system is indicated by excessive noise in HST, foaming in oil, and hot oil.	Find location where air is entering into the system and repair. Check that inlet line is not restricted and is proper size.
Cold oil	If oil is cold, it may be too viscous for proper function and pump cavitates.	Allow the oil to warm up to its normal operating temperature with engine at idle speed.
Charge inlet vacuum	High inlet vacuum causes noise/cavitation	Check that inlet line is not restricted and is proper size. Check filter.
Shaft couplings	A loose shaft coupling causes excessive noise.	Replace loose shaft coupling.
Shaft alignment	Misaligned HST and prime mover shafts create noise.	Align shafts.
Charge check/HPRVs	Unusual noise may indicate sticking valves. Possible contamination.	Clean/replace valves and test the unit.

Required tools and standard procedures

Required tools

The service procedures described in this manual can be performed using common mechanic's hand tools. Special tools, if required, are shown. When testing system pressure, calibrate pressure gauges frequently to ensure accuracy. Use snubbers to protect gauges.

Standard procedures

Caution

Contamination can damage internal components and void the warranty. Take precautions to ensure system cleanliness when removing and reinstalling system lines.

1. With the prime mover off, thoroughly clean all dirt and grime from the outside of the transmission. Ensure the surrounding areas are clean and free of contaminants such as dirt and grime.
2. If removing the transmission, tag each hydraulic line connected to the transmission. If you disconnect hydraulic lines, plug each open port to keep dirt and contamination out of the transmission.
3. Inspect the system for contamination. Look at the hydraulic fluid for signs of system contamination, such as oil discoloration, foam in the oil, sludge, or small metal particles.
4. Remove the transmission.

   Caution

   Be careful not to damage solenoids and electrical connections when using straps or chains to remove transmission from machines.
5. Perform transmission function test.
6. Before re-installing the transmission on the machine, test for leaks, drain the system, flush all lines, replace all filters, and fill with new hydraulic fluid.

Adjustments

Charge check / HPRV adjustments

The Charge Check/HPRV combines the charge check and high pressure relief functions. Whenever you replace a Charge Check/HPRV, operate the vehicle/machine through its full range of functions to ensure proper HST operation. The Charge Check/HPRVs are preset at the factory. No adjustment is possible.

Checking for proper charge check / HPRV operation

If you suspect Charge Check / HPRV malfunction, swap valves and test operation. If the symptoms switch direction, replace the faulty valve.

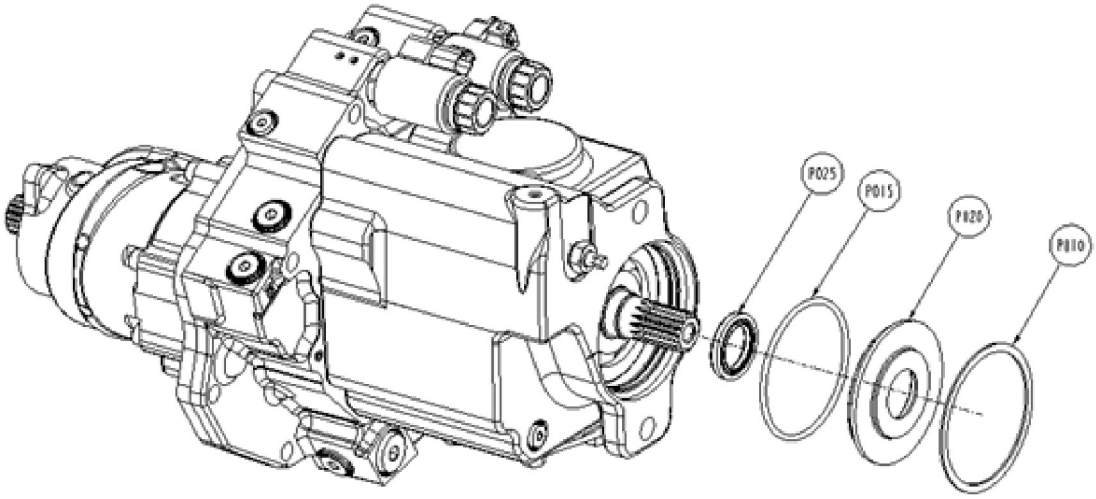
Minor repair

Shaft seals

1. Position the unit with the shaft facing up.

   Note

   If the unit is positioned horizontally when the shaft is removed, the cylinder block could move out of place, making shaft installation difficult.
2. Remove the spiral retaining ring (P010). Using a screwdriver, pry the end of the ring free and unwind the remainder of the ring out of the groove.
3. Remove the seal carrier assembly (P020). Loosen it from the unit by prying on the raised surface of the seal carrier with a screwdriver.
4. Remove and discard O-ring (P015).
5. Pry or press lip seal (P025) from the seal carrier (P020); use caution to avoid damaging the seal carrier. Discard the seal.
6. Inspect the seal carrier (P020) for damage.
7. Press the new seal (P025) into the shaft bearing side of the seal carrier. Be careful to only press on the outside diameter of the lip seal. Orient the seal as shown in the illustration. Be careful not to damage the seal.



Pump shaft

Pump shaft replacement

1. Grip the shaft assembly with the splines or keyed end and remove from the pump Housing.
2. Inspect the shaft for damage. Ensure the shaft and splines are straight and free of damage or heavy wear. Inspect the surface where the rear shaft bearing contacts the shaft. If spalling is present, replace the shaft and rear shaft bearing.

   Replacement of shaft rear bearing is a major repair and violates the unit's warranty policy unless performed by an authorized Danfoss Global Service Partner.

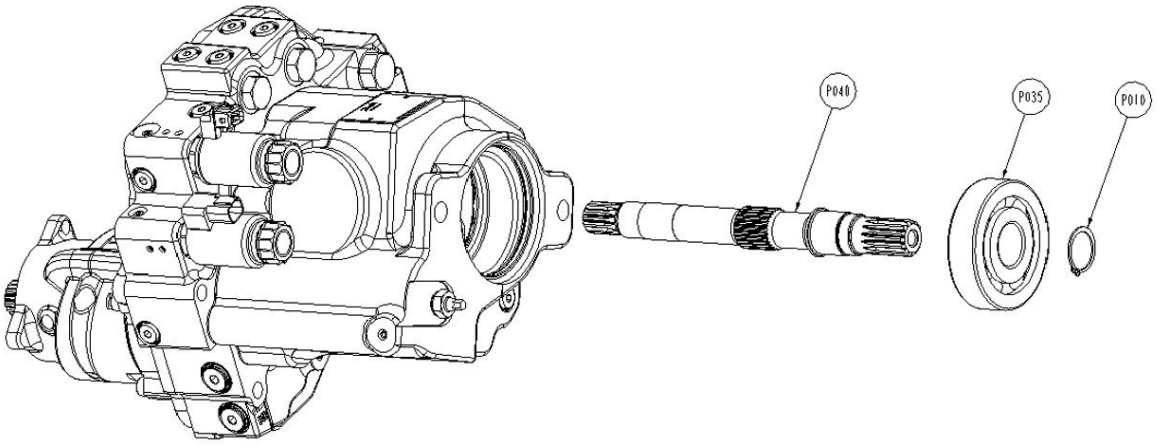
   If necessary, clean the sealing area with a nonabrasive material. Lubricate the shaft with a light coating of hydraulic fluid.
3. Inspect the shaft bearing (P035) for damage and rotate to ensure smoothness. If you suspect contamination or damage, clean with solvent and lubricate with hydraulic fluid. Replace if necessary.

Note

If you are not replacing the shaft or bearing, proceed with reassembly.

Shaft bearing replacement

1. Remove the retaining ring (P030) using snap ring pliers.
2. Observe the orientation of the chamfer on the bearing. Press the bearing off the shaft.
3. Verify the chamfer on the bearing facing toward the pump section. Press the new bearing onto the shaft. Press only on the inner race of the roller bearing.
4. Using snap-ring pliers, install the retaining ring (P030).



Reassembly

1. Ensure that the cylinder kit and rear bearing are aligned. Insert the shaft assembly into the pump. It may be necessary to grip the splined end of the shaft and twist to align it with the block splines and properly seat it into the rear bearing.
2. Lubricate a new O-ring (P015) with petroleum jelly and seat it into the housing, on top of the bearing.
3. Cover the end of the shaft with an assembly sleeve. Lubricate shaft seal with petroleum jelly.
4. Slide the seal carrier assembly over the shaft and into the housing. Press the seal carrier against the O-ring. It may be necessary to use a large socket to press the seal carrier down completely.
5. Wind the spiral retaining ring (P010) into the groove in the housing.

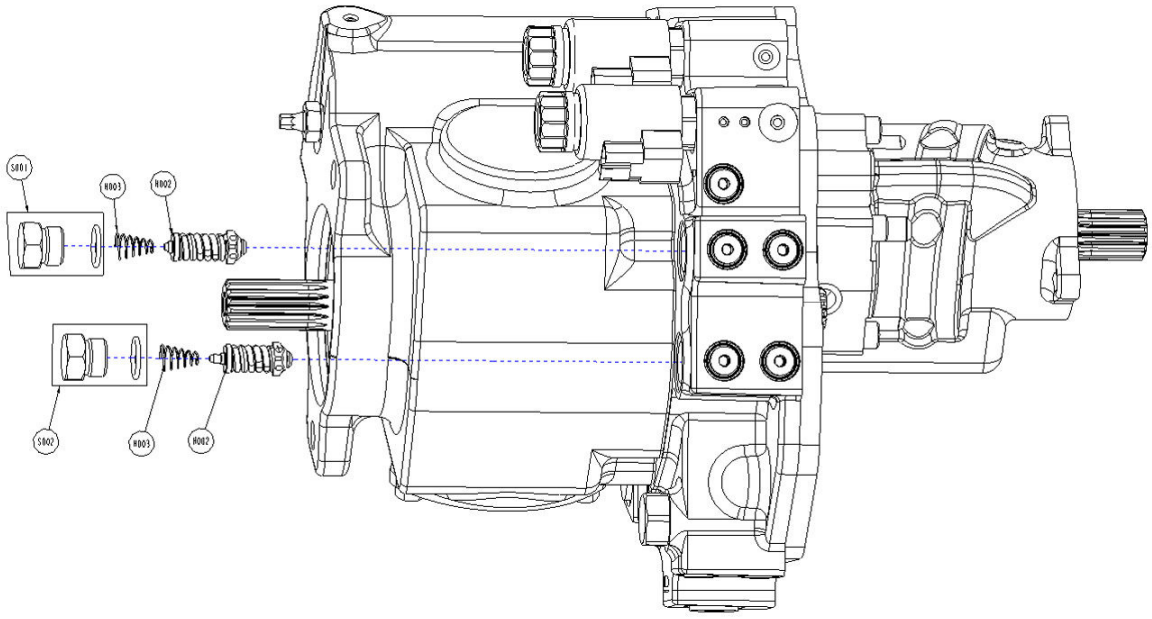
Charge check / HPRV

The high-pressure relief and charge check valve assembly may be removed for cleaning and replacement of the O-rings. These valves are factory set and are not field adjustable. Refer to the transmission model code for the factory setting when ordering replacements.

Removal and reassembly

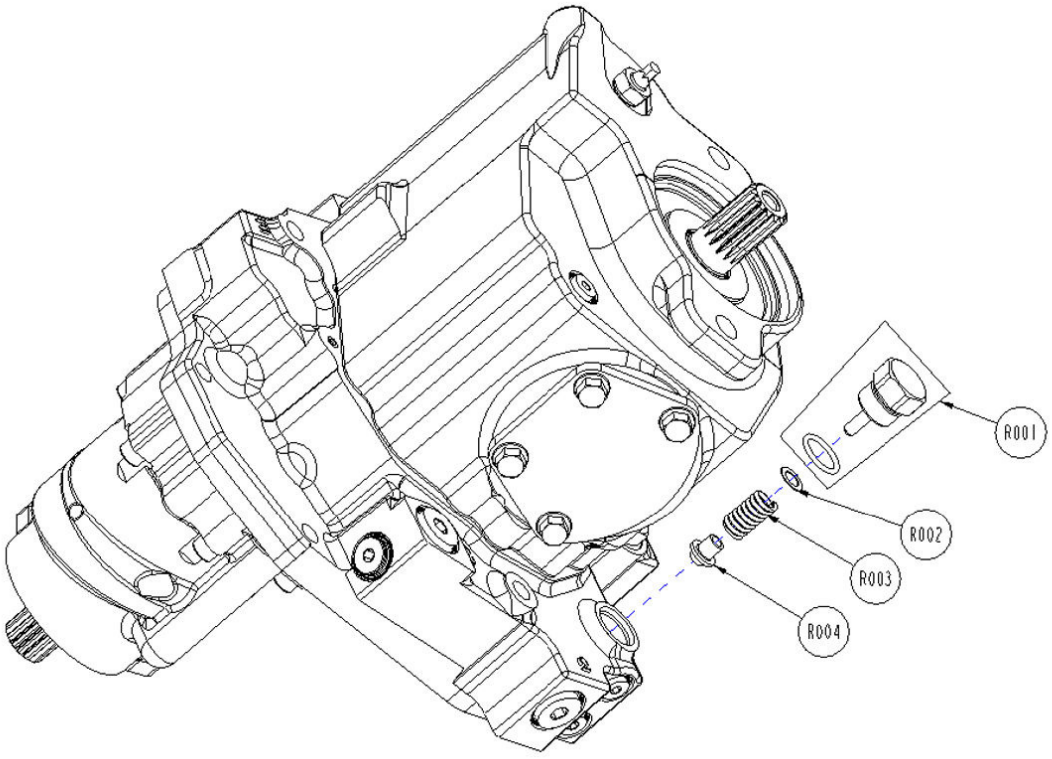
1. Remove the valve seat plugs sub assembly (S001, S002).
2. Carefully lift the valve (H002) and spring (H003) assemblies from the center section using a magnet.
3. Inspect the valves and mating seats in the valve seat plugs for damage or foreign material.
4. Lubricate and install new O-rings (QM310, QN310) on valve seat plug (M300, N300).
5. Verify that the conical springs (M200, N200) are properly retained on the check relief valves (M100, N100). Install the valve assemblies into the center section. Ensure each valve assembly moves freely in its bore.
6. Install the valve seat plugs into the center section and torque to 81.5 N•m [60 lbf•ft].
7. Operate vehicle/machine through full range of controls to ensure proper operation. Check for leaks.

Charge check / HPRV



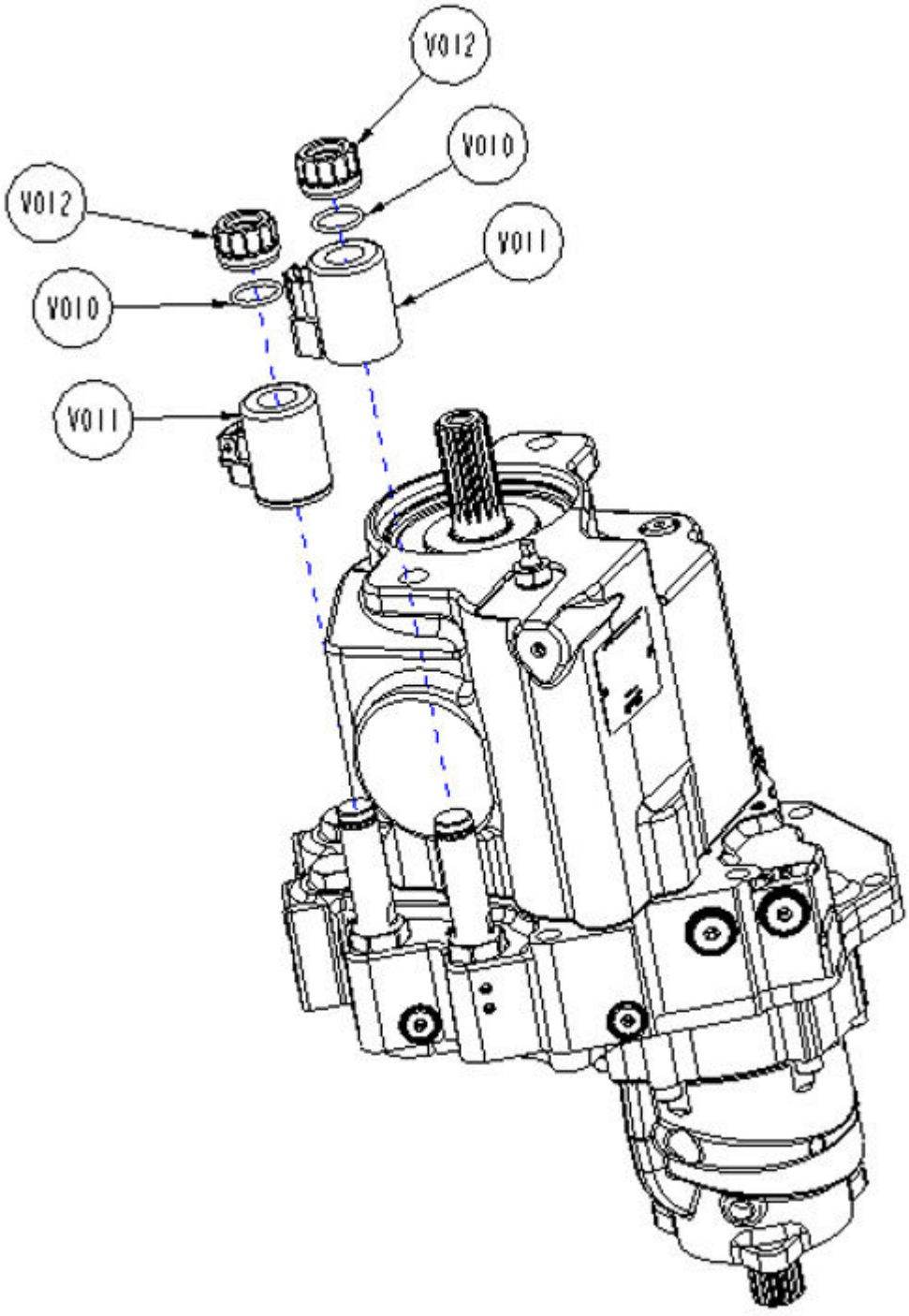
Charge pressure relief valve

1. Remove the shim adjustable charge relief valve plug (R001) from the pump housing. Remove and discard the O-ring from the plug.
2. Remove shims (R002), spring (R003), and poppet (R004) from Center section.
3. Inspect the poppet and mating seat in the housing for damage or foreign material.
4. Install a new O-ring on the charge relief valve plug (R001). Reinstall the poppet (R004), spring (R003), and shims (R002), into the Center section. To confirm the charge relief valve setting, measure the charge pressure at port M3. The charge pressure levels off when it reaches the relief setting.



Control valve coil

1. Remove the Plug (V012).
2. Remove the Oring (V010) and discard them.
3. Inspect the coil (V011) and mating seats in actuator.
4. Replace the appropriate coil if required. Do not un-torque the actuator.
5. Replace the O-ring(V010).
6. Reassemble the plug V012).



Torque table

Sequence number	Part description	Thread	Qty	Torque Nm (ft-lb)	Tolerance ± Nm (Ft-lb)
C015 to C025	Steel plug	M10 × 1	11	18.3 (13.5)	3.4 (2.5)
C026 to C028	Steel plug	M14 × 1.5	3	41 (30)	5 (4)
C029 to C030	Steel plug	M18 × 1.5	2	46 (34)	5 (4)
M050	Screws (motor housing to center)	M8 × 1.25	6	40.7 (30)	4.1 (3)
P120	Nut – tie bolt jam	0.375-24 UNF	1	30 (22)	5 (4)
P125	Seal nut	0.375-24 UNF	1	27 (20)	3 (2)
P135	Screws (pump housing to center section)	M10 × 1.5	6	78 (58)	8 (6)
P220	Screws (trunnion cover)	M8 × 1.25	4	36.6 (27.0)	2.7 (2.0)
P081	Servo piston assembly torque-to-turn	N/A	1	0.34 (0.25) min.	-
R001	Plug CPRV	0.875-14 UNF	1	78 (58)	18 (13)
S001 S003	SCR valve plug	0.75-16 UNF	2	81.5 (60)	13.5 (10)
V001	Solenoid pole tube	M14 × 1.5	2	16 (12)	3 (2)
V004	Solenoid nut (top)	M14 × 1.5	2	4 (3)	1.4 (1)
002 of assembly V001	Sleeve honed CP550- A15,	0.875-14 UNF	2	14.1 (10.4)	0.56 (0.42)

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