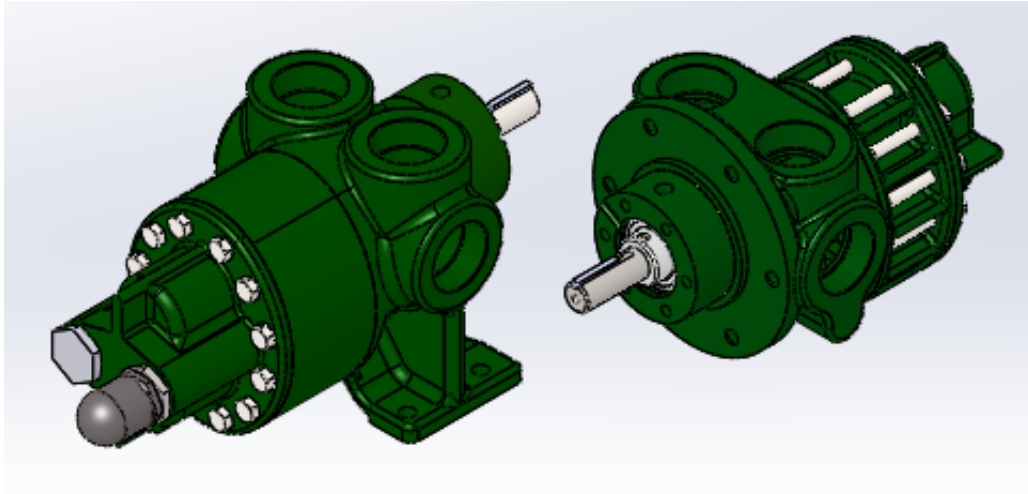




F SERIES TYPE 27 OWNERS MANUAL

G12-208

06/13/16



SAFETY INSTRUCTIONS

This is an industrial component. Only a qualified systems integrator should be allowed to design it into a system. The integrator must determine proper plumbing, mounting, driveline and guard components.

Improper installation or use could lead to a serious, even fatal, accident. The system integrator must communicate all safe operation procedures to the end user(s).

Before operation, fully understand and follow the instructions shown in this manual and any instructions communicated by the system integrator. No one should be allowed to operate or maintain this pump that has not been fully trained to work safely according to the configuration of the pump system and in accordance with all applicable government and industry regulations.

DO NOT paint over nameplates, ID tags or warning tags.

Confidential & Proprietary: This document contains confidential and proprietary information which is the exclusive property of Roper Pump Company, Commerce, GA. U.S.A. and shall not be reproduced, communicated, disclosed, or disseminated in any manner to third parties or used for any purpose other than its intended purpose without prior written consent of the management of Roper Pump Company.

Roper Pump Company
P.O. Box 269
Commerce, GA 30529 USA

Telephone: (706) 335-5551
TeleFAX: (706) 335-5490
Email: sales@roperpumps.com
www.roperpumps.com

TABLE OF CONTENTS


WARNINGS & GENERAL GUIDELINES	3
• System Pressure & Hazardous Fluids	4
• Plumbing	4
• Mounting Base	4
• Pump and Drive Assemblies	4
• Check Alignment of Pump to Driveline	4
• Roper Pumps' Close Coupled Drives.....	5
• Guarding PTO Drive Shafts	5
NAMEPLATE DATA	6
A. Figure (Model Number)	6
B. Spec	6
C. Type	6
D. Serial Number	7
MAXIMUM PUMP RATINGS	7
PRE-OPERATIONS CHECK	8
RECOMMENDED TOOL LIST	8
DIRECTION OF ROTATIONS	9
1 & 2 F1-F100 "W" (CW) ROTATIONS	9
1 & 2 F1-F100 "X" (CCW) ROTATIONS.....	10
17 & 18 F10-F100 "W" (CW) ROTATIONS	11
17 & 18 F10-F100 "X" (CCW) ROTATIONS.....	12
17 & 18 F1-F5 "W" (CW) & "X" (CCW) ROTATIONS.....	13
1 & 2 F75-F300 "W" (CW) & "X" (CCW) ROTATIONS.....	14
LUBRICATION	15
RELIEF VALVE	15
RELIEF VALVE	16
TO ADJUST RELIEF VALVE	17
TO REPLACE SPRING/PISTON OR CHANGE DIRECTION OF PUMP	18
MECHANICAL SEAL.....	19
PACKING	21
PARTS LIST & CROSS SECTIONALS	23
1 & 2 F1 – F5 SPEC 0	24
1 & 2 F1 – F5 SPEC 5	24
1 & 2 F10 – F20 SPEC 0	25
1 & 2 F10 – F20 SPEC 5	25
1 & 2 F35 – F50 SPEC 0	26
1 & 2 F35 – F50 SPEC 5	26
1 & 2 F75 – F100 SPEC 0 & SPEC 17.....	27
1 & 2 F75 – F100 SPEC 5 & SPEC 174.....	27
1 & 2 F150 – F300 SPEC 17	28
1 & 2 F150 – F300 SPEC 174.....	28
17 & 18 F1 – F5 SPEC 0.....	29
17 & 18 F10 – F20 SPEC 0.....	29
17 & 18 F35 – F50 SPEC 0.....	30
17 & 18 F75 – F100 SPEC 0.....	30

WARNINGS & GENERAL GUIDELINES



! WARNING

Over-pressure may burst pump or system components. Always include a relief valve in installation. Do not over pressurize pump or block discharge line while operating.



! WARNING

Injection Hazard: Do not try to stop a leak with your hand! Avoid any close contact with hydraulic fluid jets. Escaping fluid can penetrate skin, causing serious injury. In case of accident, seek medical attention immediately for removal of fluid.



! WARNING

Hazardous or Toxic fluids can cause serious injury.



! WARNING

Operating without guards could result in serious injury or death. Machinery in operation can grab, crush, cut, mangle, and dismember. Do not operate without adequate guards in place.

WARNING: DO NOT paint over any nameplates, ID tags, or warning tags attached to the pump.

NOTICE: These are general guidelines and do not cover all possible situations. It is the responsibility of the system integrator to apply this product properly.

- **System Pressure & Hazardous Fluids**

1. Disconnecting fluid or pressure containment components during pump operation can cause property damage, serious personal injury, or death.
2. Failure to relieve system pressure prior to performing pump service or maintenance can cause property damage, serious personal injury or death.
3. If pumping hazardous or toxic fluids, system must be flushed and decontaminated, inside and out, prior to performing service or maintenance.

- **Plumbing**

1. The inlet pipe should be as short and straight as possible to minimize suction pressure losses. Excessive restrictions at the inlet can cause cavitation resulting in poor performance, noise, vibration, or pump damage.
2. Slope the inlet plumbing appropriately to avoid air pockets.
3. Plumbing weight, misalignment with the ports or thermal expansion can exert excessive force on the pump. Plumbing must be properly supported and aligned with expansion joints, if required, to minimize these forces.
4. To prevent over pressure situations, install a relief valve as close to the pump outlet as possible. Install the relief valve before any shut-off valves.

DO NOT use Thread Seal (Teflon®) tape on pump port threads.

- **Mounting Base**

1. Mount the unit on a rigid, heavy base to provide support and absorb shock. Bases should be designed for high rigidity; not just strength.
2. The pump feet were not designed for mounting to concrete and do not have enough contact area to prevent concrete from failing. When mounting to cement or concrete, use a steel baseplate to distribute the mounting stress over an area large enough to prevent the cement from failing. Grout it in place.

- **Pump and Drive Assemblies**

1. Assure adequate guards have been installed to prevent personnel contacting moving components.
2. Follow all OSHA, Federal, State, and local codes.

- **Check Alignment of Pump to Driveline**

Excessive misalignment can overload the pump input shaft and cause premature failure. The figures below show parallel and angular misalignments.

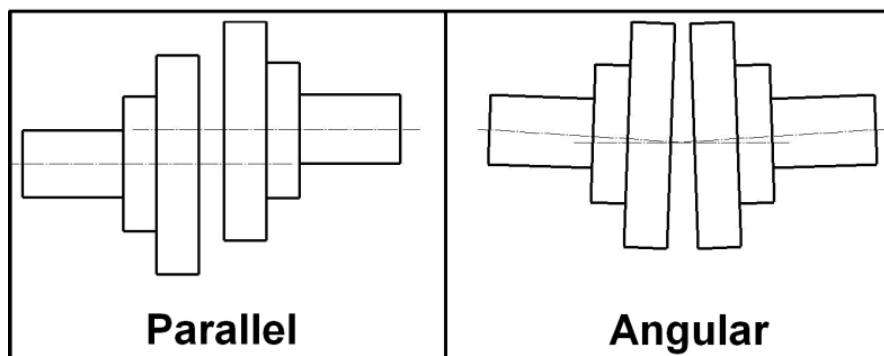


Figure 1-1: Coupling Alignment

- **Roper Pumps' Close Coupled Drives**

The hydraulic or gearmotor units mount directly to the pump.

- Alignment between pump and driveline is maintained by the assembly.

Because the assembly absorbs reaction forces of the driveline, the mounting base does not need to be as robust. The level of rigidity and strength is determined by the piping stresses from the system

- **Guarding PTO Drive Shafts**

PTO drive systems can be dangerous and when used, additional safety precautions, including guarding, is required and must be provided by the drive system installer. Roper Pump Company has no responsibility for recommending or providing proper guarding or other safety measures in any particular application.

NOTICE: The installation of proper guards for the power take-off and its associated equipment is the responsibility of the drive system designer and the installer who know the particular product application and the user's exposure to danger. *The ultimate responsibility for the safe application and installation is the users.*

WARNING: Failure to stop the pump before adjusting the shaft packing can cause serious injury or death.

NAMEPLATE DATA

Roper Pump Company identifies each pump manufactured by a metal nameplate attached to the pump. This nameplate describes the pump as built at the factory. Copy the nameplate data from your pump in the area provided below. Use this for ready reference when ordering repair parts or when consulting with a Roper distributor or Roper Pump Company about this pump.

PUMP NOMENCLATURE EXAMPLE:

FIGURE 1F15-0-27

SPEC 00000 **TYPE** 27

SERIAL NO. 000000

PUMP NOMENCLATURE (from your nameplate):

FIGURE: _____

SPEC: _____ **TYPE:** _____

SERIAL NO. _____

A. Figure (Model Number)

The figure number consists of a five, six, or seven digit number.

- The first and, in some instances, the second digits indicates the mounting arrangement and relief valve (RV).

1 = Foot mounted, No RV
2 = Foot mounted with RV
17 = Flange mounted, No RV
18 = Flange mounted with RV

25 = Baseplate mounted, No RV
26 = Baseplate mounted with RV
33 = Close Coupled, No RV
34 = Close Coupled with RV

- The next digit indicates F series: F
- The next two or three digits indicate the approximate theoretical displacement in US gallons per 100 revolutions [Liters/100 rev].

F1 = .00086 (3.2 CC/REV)
F3 = .002 (7.6 CC/REV)
F5 = .003 (11.4 CC/REV)
F10 = .007 (26.5 CC/REV)

F15 = .0103 (39.0 CC/REV)
F20 = .0124 (46.9 CC/REV)
F35 = .034 (128.7 CC/REV)
F50 = .050 (189.3 CC/REV)

F75 = .075 (283.9 CC/REV)
F100 = .107 (405.0 CC/REV)
F150 = .186 (704.1 CC/REV)
F200 = .232 (878.2 CC/REV)

- The next letter indicates the direction of rotation and shaft position. All rotations are facing the drive shaft end. Not all rotations are available for all sizes. See pages 9 thru 14 for illustrations and further explanation of directions of rotations. CW = clockwise rotation; CCW = counterclockwise rotation.

High Drive:

No letter or W = CW (standard rotation for most sizes)
X = CCW

B. Spec

Occasionally, special pumps or configurations are required which are unique for a particular application. These modifications are clarified by a **SPEC** ie: specification number. Identification of any items different than a standard pump can be made by consulting Roper Pump Company or an authorized distributor.

Spec 0 – Mechanical Seal, Tapped Ports
Spec 5 – Packed Box, Tapped Ports

Spec 17 – Mechanical Seal, Flanged Ports
Spec 174 – Packed Box, Flanged Ports

C. Type

The TYPE number is a number used by Roper Pump Company for in-house identification of construction and hydraulics. Always include the type number in any references to the pump.

D. Serial Number

The SERIAL number is a unique number assigned to each pump built by Roper Pump Company.

In any communication concerning this pump, always be sure to include the Model, Spec, Type, and Serial number so proper identification of the pump can be assured.

As stated in the explanation of the pump nomenclature, all characters may not appear on every pump nameplate. The preceding description of the figure number is to assist in identifying your Roper F Series pump only. **DO NOT** attempt to derive any ratings or performance from the figure number. **DO NOT** use the explanation of the figure number to construct your own pump. Not all combinations are possible. For assistance in pump selection, it is recommended that you consult Roper Pump Company or an authorized distributor.

MAXIMUM PUMP RATINGS

Maximum Ratings				
Pump Size	Flow Rate GPM	Pressure PSI	*Temperature °F	Input Speed RPM
F1	3.5	300	212	3600
F3	7.3	300	212	3600
F5	12.2	300	212	3600
F10	22.6	300	212	3600
F15	39.3	300	212	3600
F20	46.0	300	212	3600
F35	61.2	300	212	1800
F50	63.6	300	212	1200
F75	87.6	300	212	1200
F100	129.6	300	212	1200
F150	234.6	300	212	1200
F200	213.7	300	212	900

*Temperatures up to 250°F may be achieved using material options available. Consult factory for details.

PRE-OPERATIONS CHECK

Read and understand the instructions and recommendations contained in this manual.

Disconnect the coupling between the driver and pump.

Test the rotation of the driver to make sure it will operate the pump in the desired direction of rotation. When an integral relief valve is used, make sure it is positioned and adjusted as discussed on page 17 "TO ADJUST RELIEF VALVE". After the unit is mounted and the piping is connected, the pump should be checked to be sure it operates freely without binding. After operation is proved satisfactory, both pump and driver should be tightly secured and the alignment rechecked before operation.

Before starting, make sure all guards are in place and the inlet and discharge valves are opened.

After starting the unit, check to see that the pump is delivering liquid. If not, stop the driver immediately and correct the problem. After the pump is delivering liquid, check the unit for: excessive vibration, localized heating, or excessive shaft seal leakage. Check the pressure or vacuum by installing gauges at both the inlet and discharge sides of the pump to make sure the pressure or vacuum conforms to specifications.

RECOMMENDED TOOL LIST

NOTE: Tools are not furnished with the pump.

- **Tools for all Pumps:**

- (1) Safety Glasses
- (1) 7/16" Combination Wrench
- (1) 1/2" Combination Wrench
- (1) 9/16" Combination Wrench
- (1) 8oz. Ball-Peen Hammer

- **Additional Tools for Pumps with an RV Type Relief Valve:**

- (1) 18" Pipe Wrench

- **Additional Tools for Pumps with Shaft Packing:**

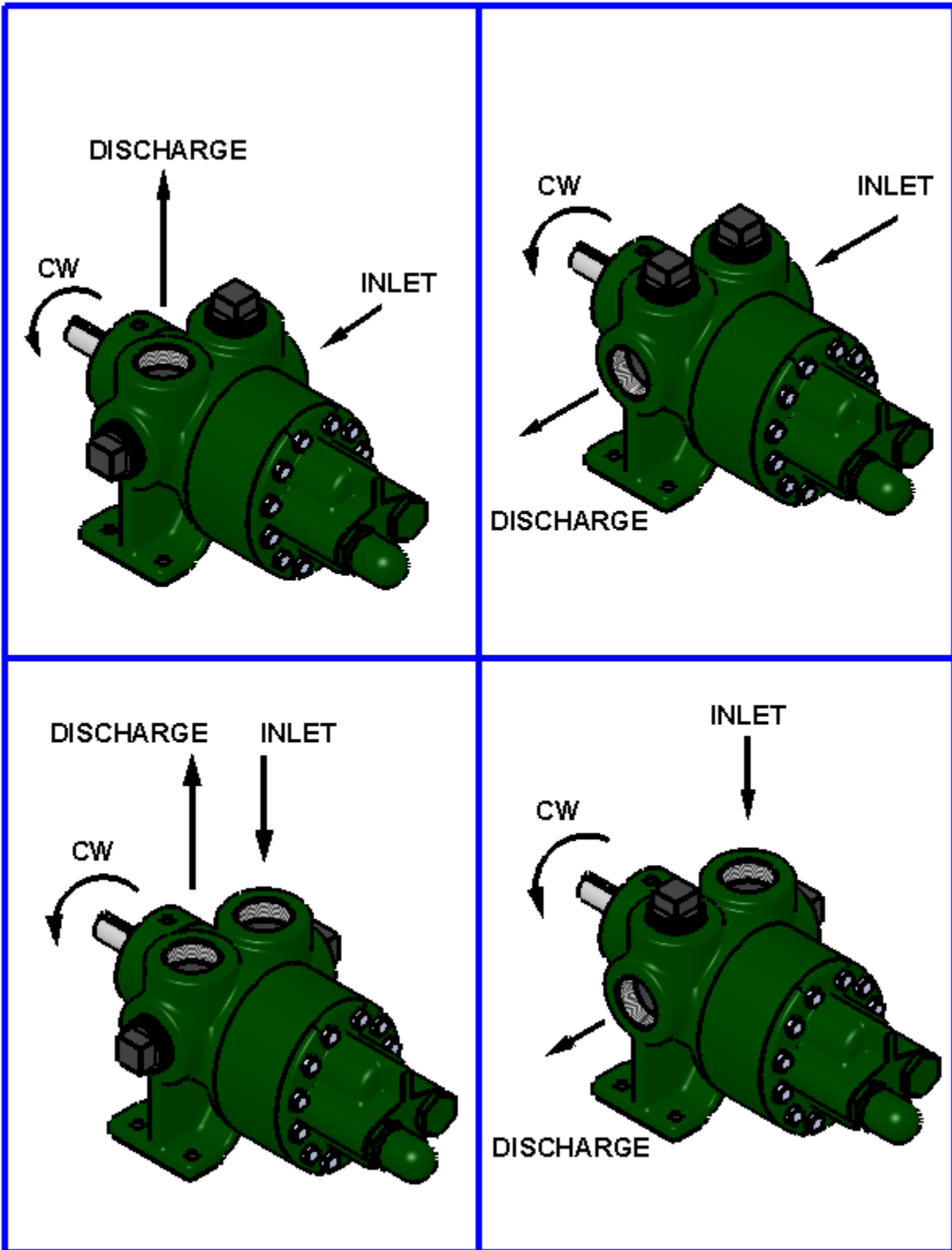
- Packing Hook for .25" or .38" square packing rings

- **Additional Tools for Pumps with Mechanical Seals:**

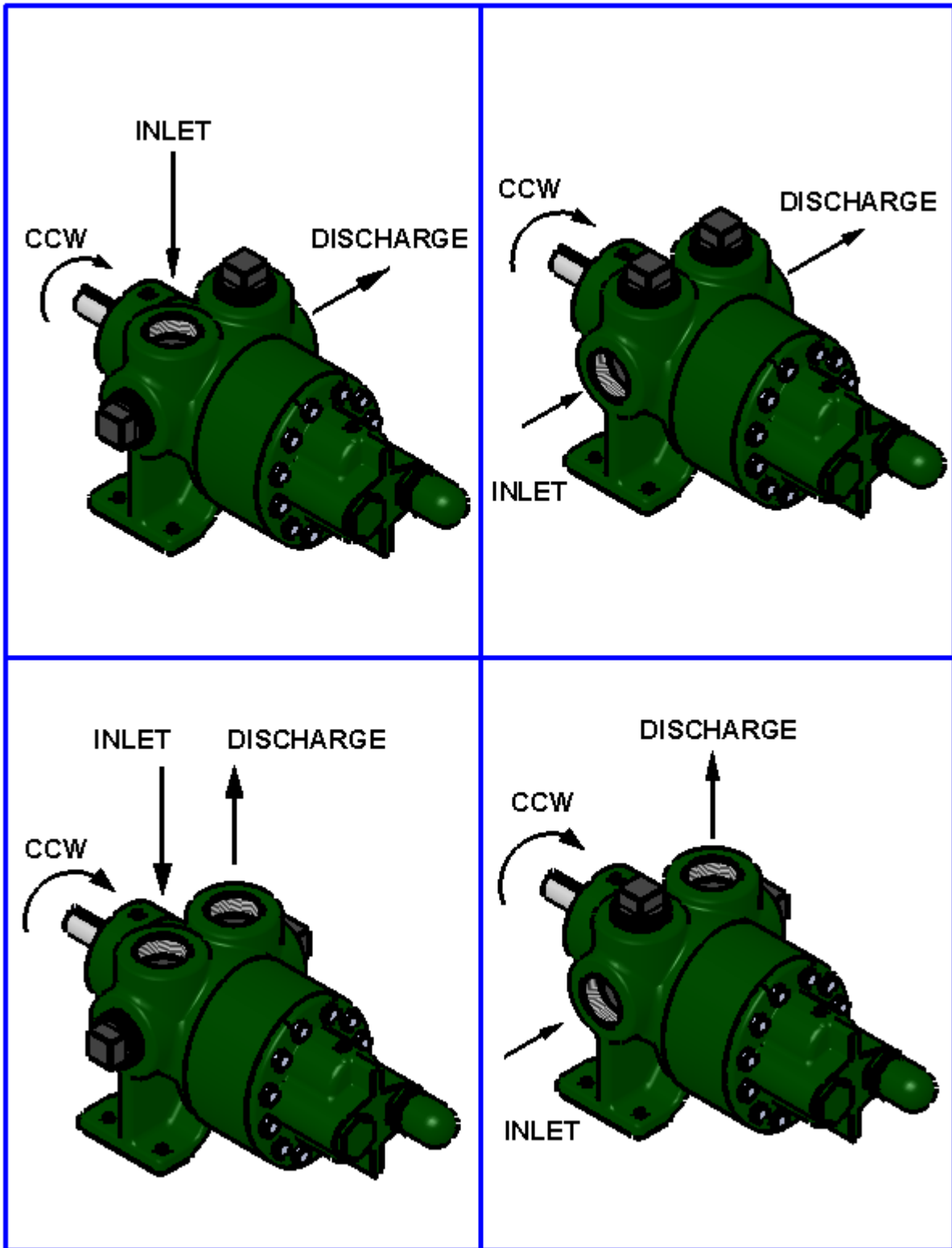
- (1) 0200 External Retaining Ring Pliers

DIRECTION OF ROTATIONS

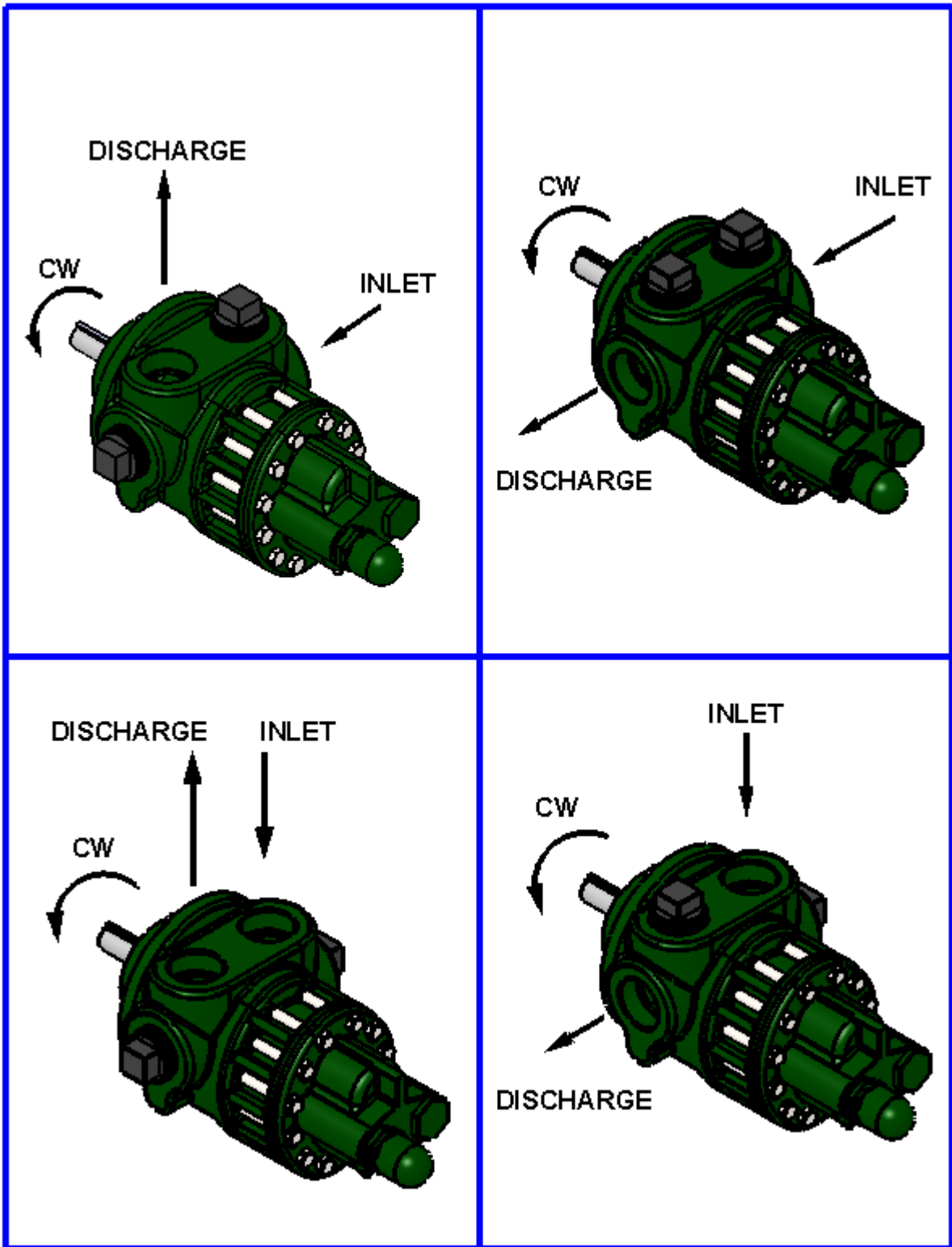
1 & 2 F1-F100 "W" (CW) ROTATIONS



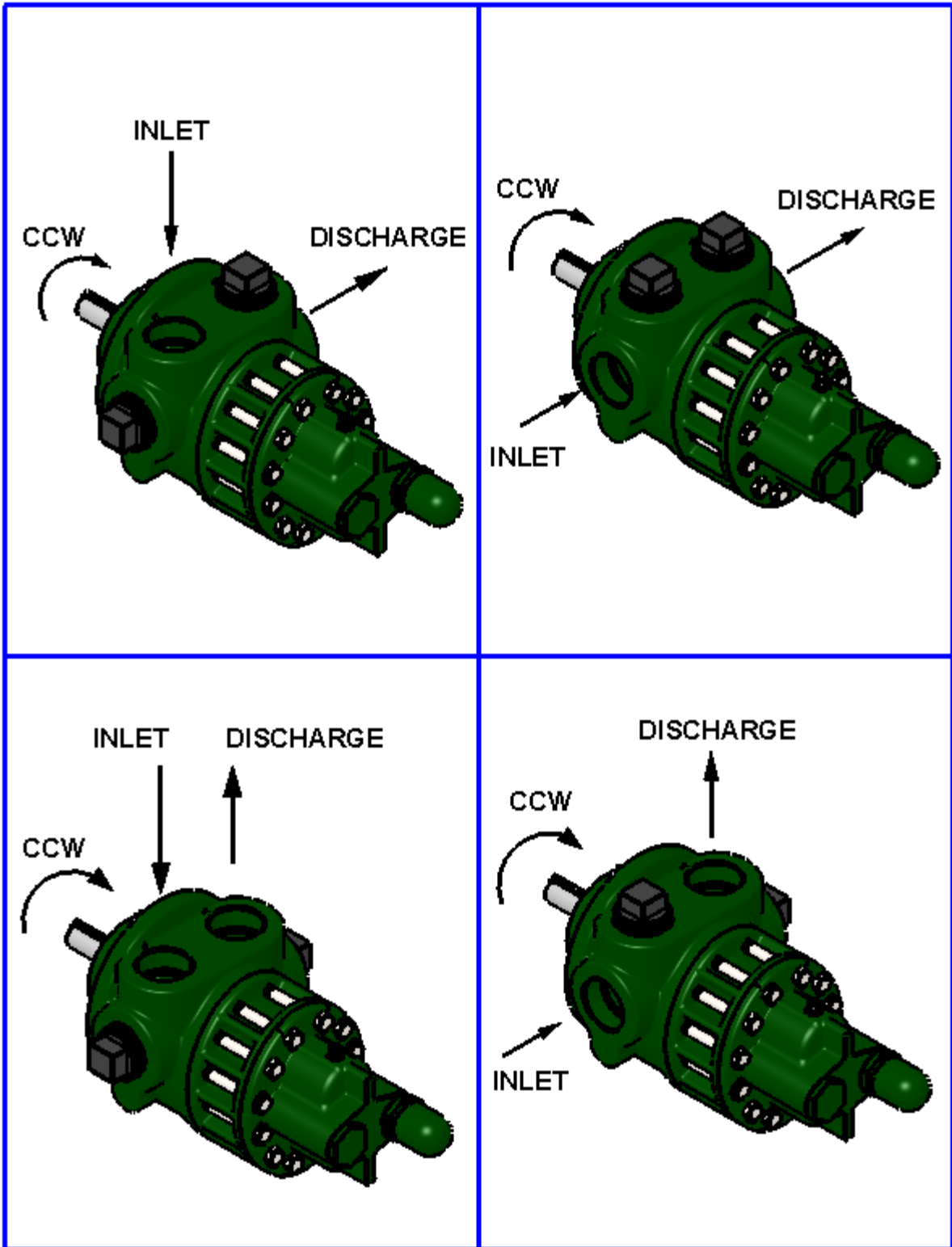
1 & 2 F1-F100 "X" (CCW) ROTATIONS



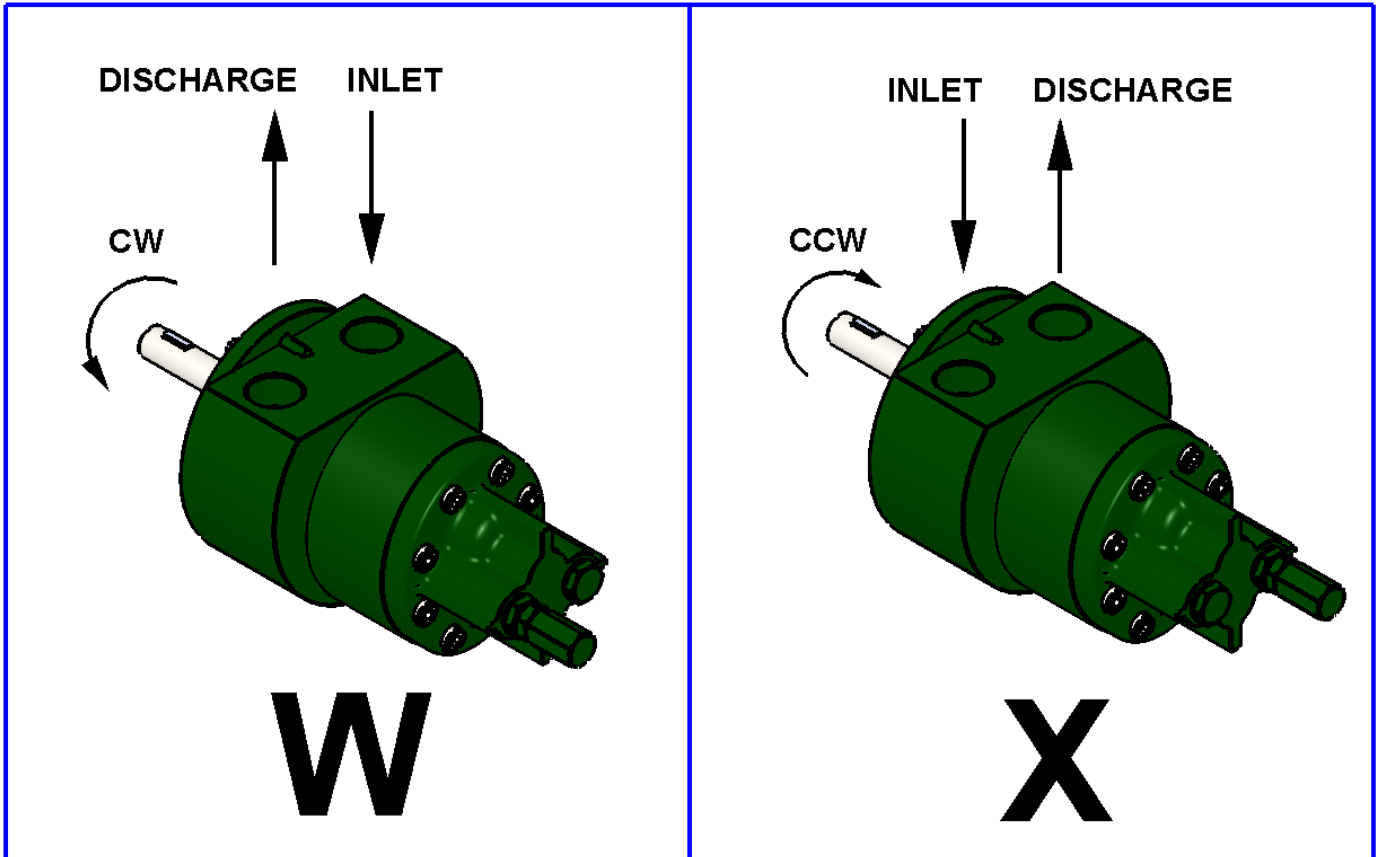
17 & 18 F10-F100 "W" (CW) ROTATIONS



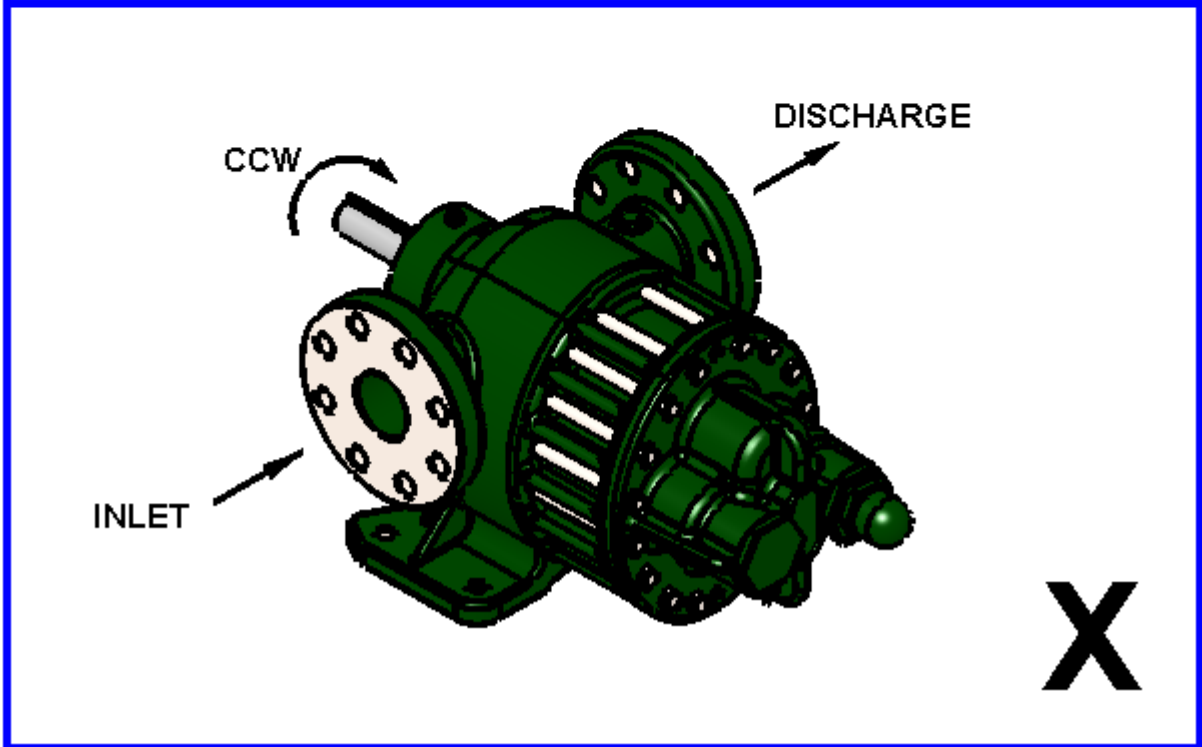
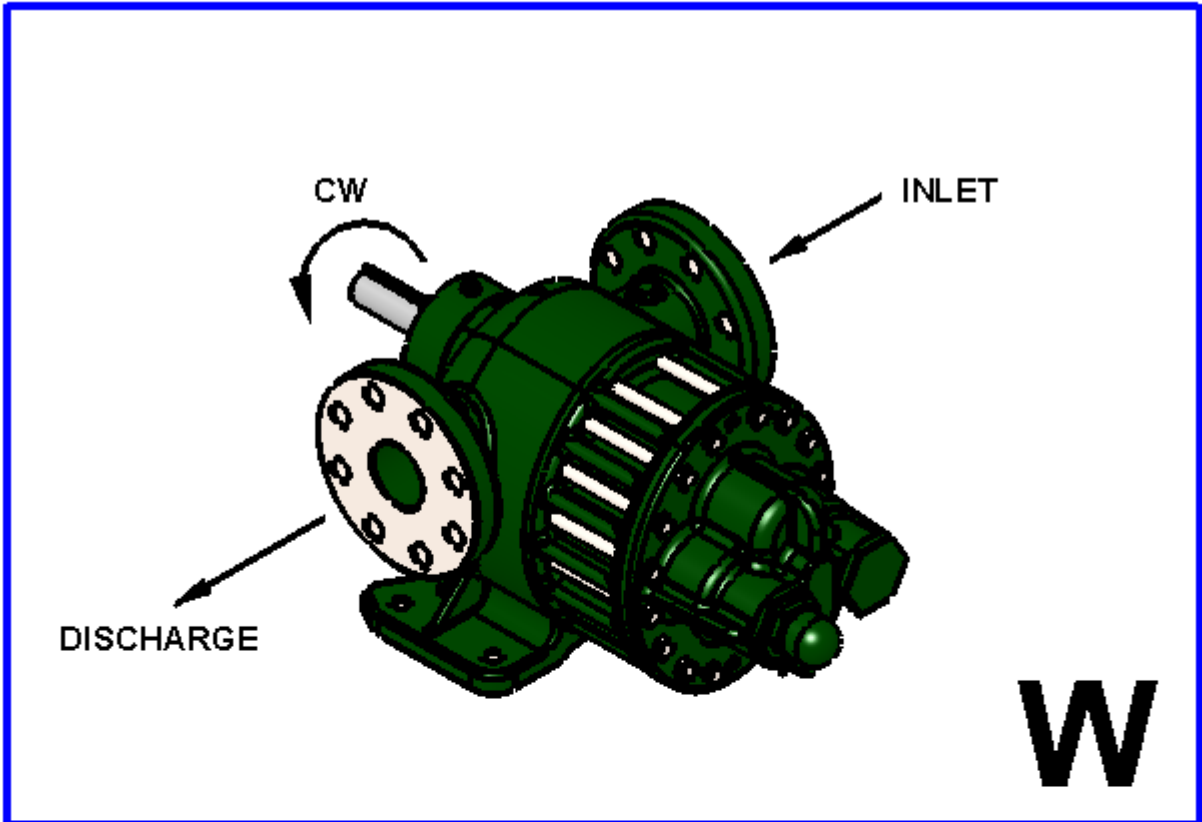
17 & 18 F10-F100 "X" (CCW) ROTATIONS



17 & 18 F1-F5 "W" (CW) & "X" (CCW) ROTATIONS



1 & 2 F75-F300 "W" (CW) & "X" (CCW) ROTATIONS



PRIOR TO OPERATING THE PUMP, MAKE SURE THAT THE SHAFT ROTATION, PIPE CONNECTIONS, AND THE RELIEF VALVE POSITION IS IN ACCORDANCE WITH THE ILLUSTRATIONS SHOWN.

To reverse rotation, the relief valve must be positioned as shown for desired direction of rotation. See appropriate instructions to change relief valve position if required.

For inlet pressures over 25 PSIG (1.7 BAR), consult a distributor, district representative or the home office of the ROPER PUMP COMPANY, COMMERCE, GEORGIA.

LUBRICATION

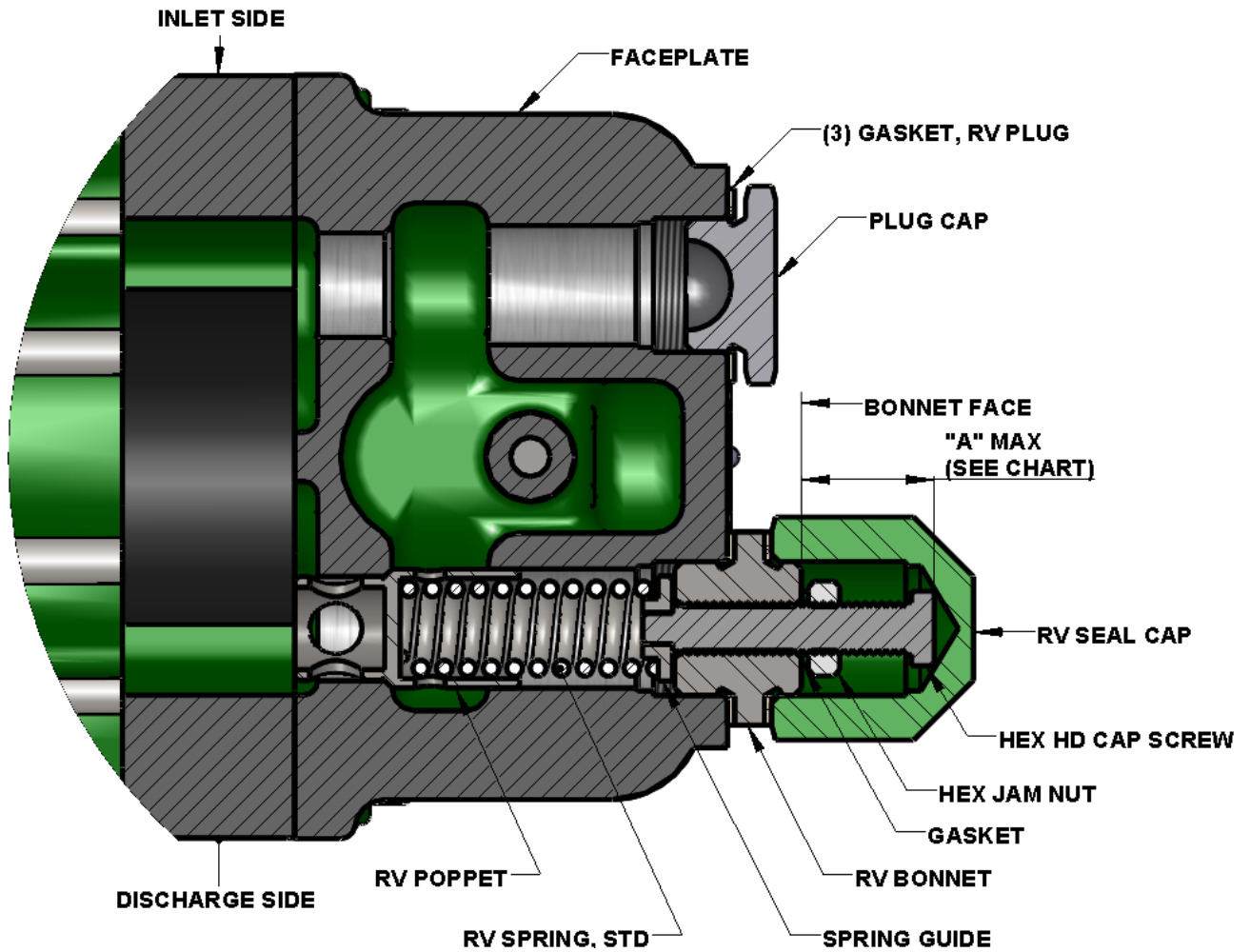
All lubrication fittings have been greased at the factory. The internal parts of the pump are lubricated by the liquid being pumped. Outboard bearing or bearing cage should be greased with ball bearing grease once a month in daily service or equivalent in intermediate service.

RELIEF VALVE

The relief valve must be positioned as shown in instructions for direction of rotation—otherwise the valve is inoperable and will not give protection.

It is mandatory that the relief valve be set BY THE USER since the maximum relief valve pressure depends upon the viscosity and specific gravity of the liquid, the flow rate (pump RPM), and also the initial relief valve setting. If not specified otherwise, the relief valve on this pump is factory set for full by-pass at a differential pressure of 300 PSIG (20.7 BAR), at a pump speed of 900 to 1800 RPM on liquid with a viscosity of approximately 150 to 300 SSU (28 to 62 centistokes). This setting would only apply if all these conditions are duplicated. Built-in relief valves sense differential pressure only (difference between inlet and outlet pressures.)

RELIEF VALVE



PUMP SIZE	"A"	
	INCH	MILLIMETER
MAX EXTENSION		
F1, F3	0.65	16.5
F5, F10	1	25.4
F15, F20	1.24	31.5
F35	1.13	28.7
F50, F75	1.06	26.9
F100	1.68	42.7
F150, F200	2.64	67.1

TO ADJUST RELIEF VALVE

Warning: Take precautions necessary to prevent personal injury or physical damage That could be caused by any loss of the product being pumped while Adjusting relief valve.

Relief valve must be adjusted under conditions identical to the operating conditions.
(Viscosity, RPM, etc.)

1. Connect a pressure gauge near the pump in the discharge line between the pump and the point where the discharge line will be closed. (Most pumps have tapped and plugged holes in the case near the outlet or in the discharge flange which may be used for this connection.
2. Remove seal cap and gasket.
3. Loosen the locknut on the adjusting screw.
4. Back the adjusting screw out to the point where the end of the adjusting screw will be at the max dimension "A" when measured from the relief valve bonnet. See the chart under the relief valve drawing for the proper dimension.
5. Start pump and close the discharge line slowly. Do not exceed pressure rating of pump or other equipment between pump and discharge line valve. If this pressure is reached while closing the discharge valve, do not close any further. (This might occur with very high viscosity liquids) it would then be necessary to install a separate relief valve in the system for protection. Do not run pump with closed discharge line for more than two minutes at a time.
6. With discharge valve closed, turn adjusting screw clockwise in ½ turn increments until the pressure gauge shows the desired pressure setting.
7. Tighten locknut.
8. Replace the gasket and seal cap.
9. Open discharge line, and turn pump off.

Relief valve is now set.

TO REPLACE SPRING/PISTON OR CHANGE DIRECTION OF PUMP

To replace spring and/or piston or to change direction of rotation, shut pump off, remove seal cap and gasket. Loosen locknut and adjust relief valve pressure to minimum. Remove bonnet and gasket making sure that the spring pressure does not force bonnet out too rapidly. Remove plug cap and gasket from faceplate. Check all parts and internal passages to make sure that they are clean and free from rust or damage. To assemble, determine direction of rotation and replace plug cap and gasket as shown in direction of rotation. Place poppet and spring in correct position according to direction of rotation.

Turn adjusting screw to have shoulder flush with bonnet, place spring guide on adjusting screw; install gasket and assemble into faceplate making sure spring engages over spring guide. Tighten bonnet. Reinstall gasket and plug cap, if removed. Adjust relief valve pressure as described.

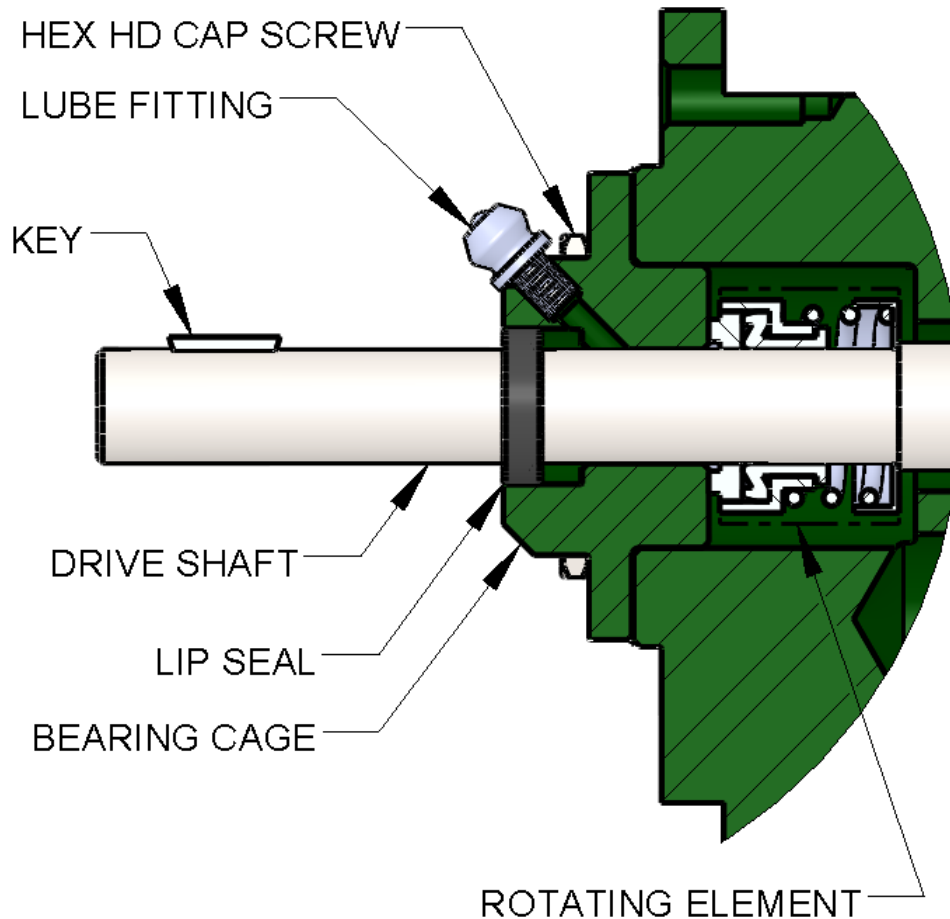
A built-in relief valve should not be used on applications where the discharge must be closed for more than a few minutes. Prolonged operation with the relief valve fully by-passing will cause heating of the liquid circulating thru the valve, thus resulting in possible damage.

CHECK POPPET PERIODICALLY TO MAKE SURE THAT IT WILL SLIDE FREELY IN PUMP FACEPLATE. FAILURE TO SLIDE DUE TO BINDING OR FOREIGN MATERIAL WILL CAUSE EXCESSIVE PRESSURE BUILDUP IN PUMP.

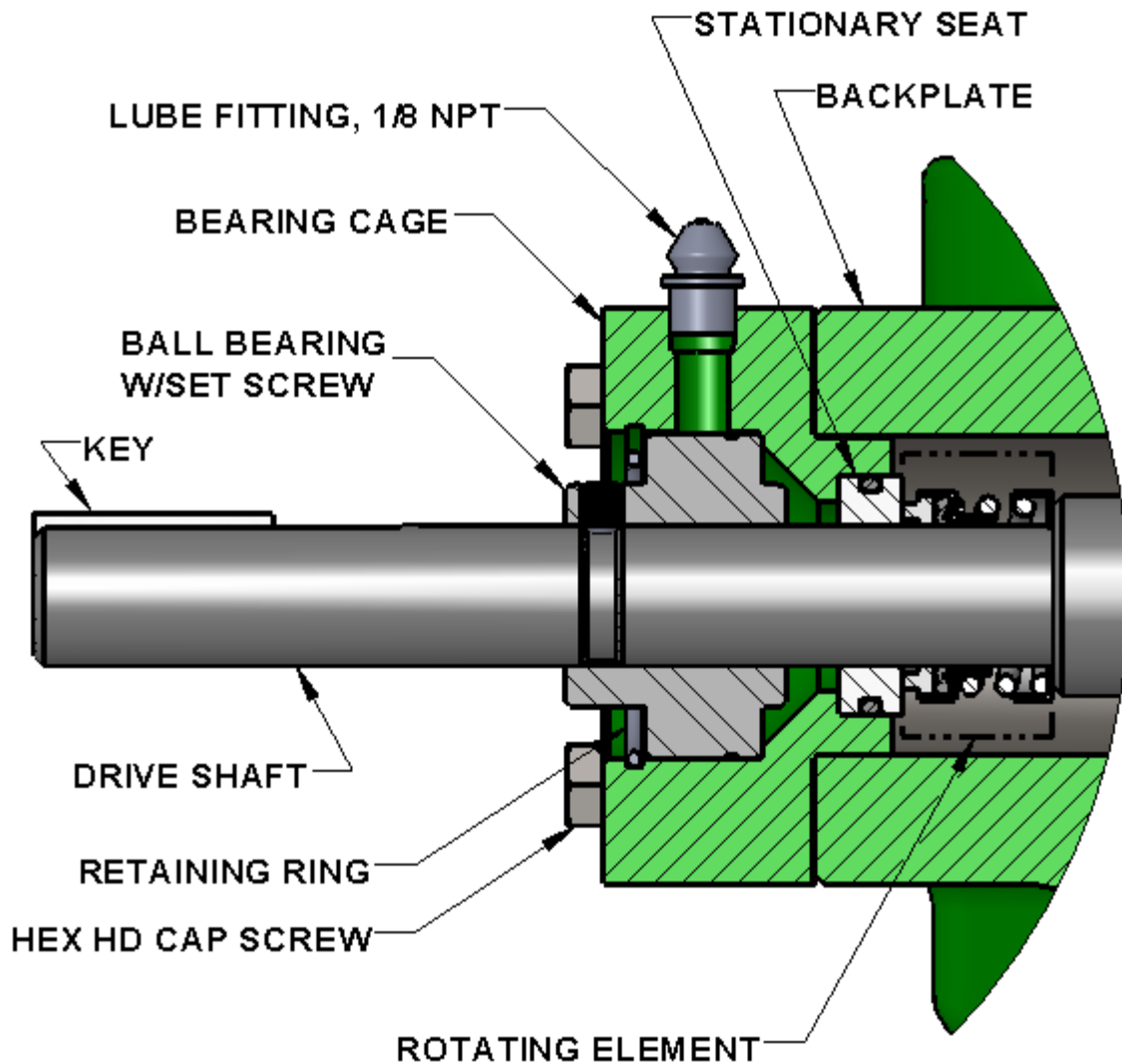
MECHANICAL SEAL

Mechanical seals do not require adjustments. Leakage developed at the seal may be due to one of the following conditions; worn, marred, or cracked rotating or stationary lapped seal faces, or bellows that has become hard, soft, cracked, expanded or extruded.

When replacing or servicing a mechanical seal, take particular care not to mar or scratch the sealing surfaces or damage the bellows. If the seal has been used, do not put it back into service unless both sealing surfaces are perfectly flat and smooth or else replaced.

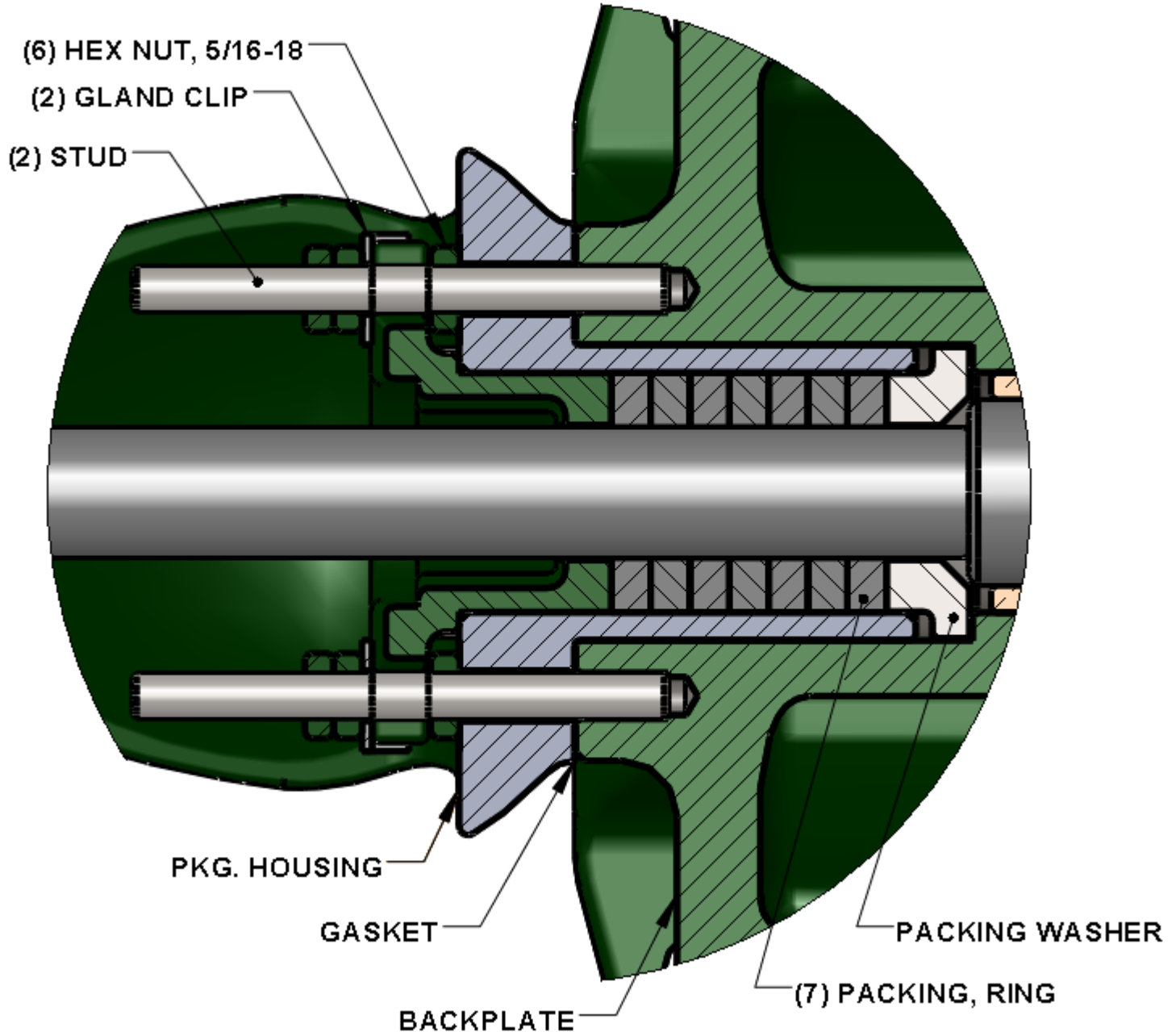


To replace the mechanical seal on pump size **F1 thru F5**, remove the key, cap screws, bearing cage, and gasket. Remove burrs and sharp edges from the end of shaft and keyway and clean the shaft. Next the seal parts may be removed from the shaft. To assemble, lubricate with a light machine oil the section of the shaft over which the seal is to be mounted. Slide the rotating element onto the shaft. Be sure it is properly centered on the shaft. After checking the bearing cage and lip seal and replacing if required, coat the sealing surfaces with light machine oil. Install bearing cage and gasket and secure with the cap screws.



To remove the mechanical seal on pump sizes **F10 thru F300**, remove the retaining ring on the shaft of the F10, or loosen the set screws in the bearing of F15 thru F300. Remove the retaining ring from the bearing cage. Remove the retaining ring from the bearing cage. Remove the cap screws and bearing cage. (Bearing and stationary seat will be removed along with the bearing cage.) Remove burrs and sharp edges from end of shaft and keyway and clean the shaft. Next the seal parts may be removed from the shaft. To assemble, lubricate with a light machine oil the section of the shaft over which the seal is to be mounted. Slide the rotating element onto the shaft. Be sure it is properly centered on the shaft. After checking the stationary seat and “O” ring and replacing if required, coat the sealing surfaces with light machine oil. Install gasket and bearing cage and secure with cap screws. Install retaining ring on shaft for F10, or tighten set screws in bearing for F15 thru F300.

PACKING



Operate the pump under normal conditions and, after a short run-in period, examine packing for leakage. If leakage is excessive, stop the pump and follow the procedure described below.

A slight leakage is a necessary and normal condition for packing and allows for expansion and proper seating.

To replace packing, remove the nuts, clips, packing gland and packing rings. (Packing hooks are commercially available to assist in removing the packing rings.) Clean the shaft and adjacent parts. Examine the shaft; if it is excessively worn or scored, replace the gear and shaft assembly.

Insert packing rings making sure the joints are staggered 180 degrees and that each ring is tamped firmly in place. When the packing box is sufficiently full to allow entry of the gland about $\frac{1}{4}$ inch, reassemble the packing gland, clip and nuts. Draw up evenly on the gland to assure proper seating of the packing. The gland nuts should then be backed off until finger-tight. After the pump is started, visually examine the stuffing box for excessive leakage. If the packing leakage exceeds ten drops per minute, stop the pump and adjust the gland nuts. The gland nuts should be adjusted evenly in $\frac{1}{6}$ to $\frac{1}{3}$ turn (1 to 2 flats on the nut) increments. Start the pump and allow it to operate for several minutes. Again, visually examine the stuffing box for excessive leakage. Repeat the above procedure until the stuffing box leakage is between five to ten drops per minute.

DO NOT overtighten the packing. Slight leakage is a necessary requirement for proper packing operation. Leakage of five to ten drops per minute when the pump is operating is desirable, as it will preserve the packing and avoid scoring of the shaft. Overtight packing may score shafts, increase torque requirements of the pump, damage couplings and drives, and generate excessive heat.

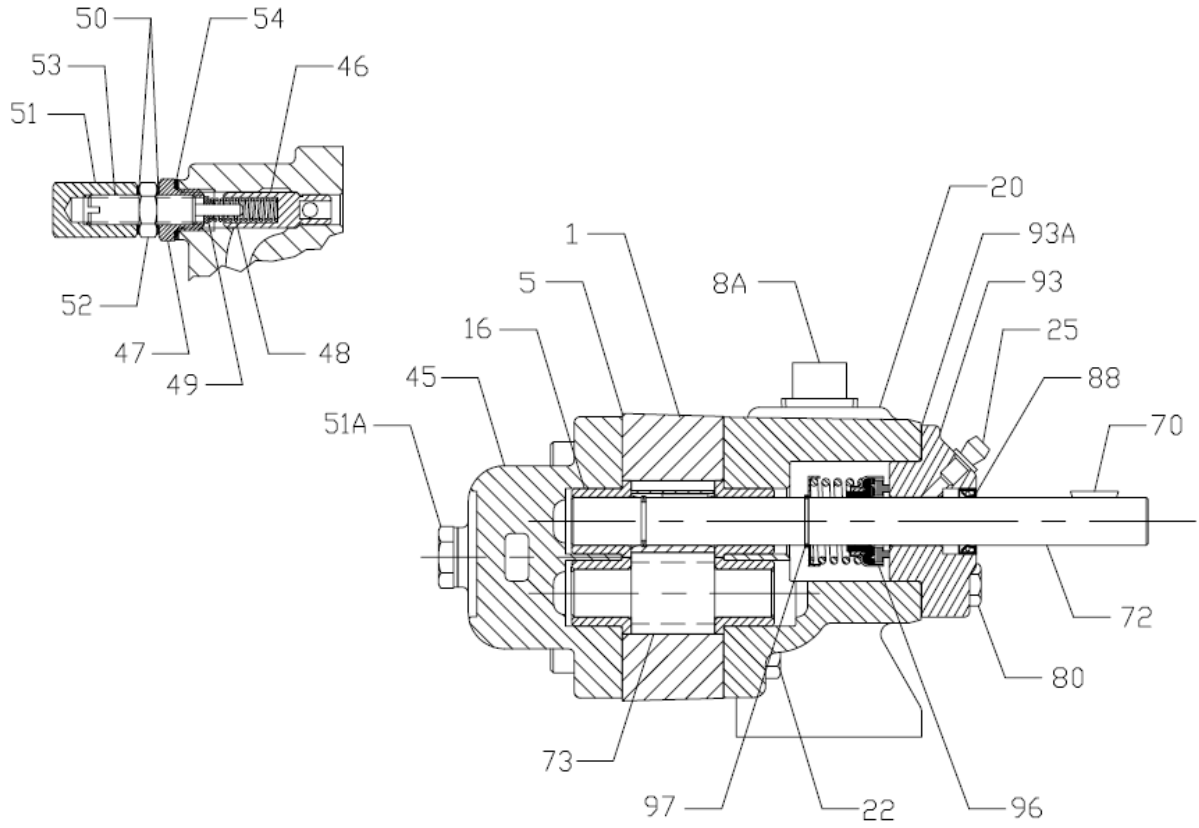
The packing gland should be adjusted whenever leakage exceeds ten drops per minute. The condition of the packing should be checked at regular intervals, the frequency depending on the type of service. Experience will dictate how frequently the inspections should be made.

PARTS LIST & CROSS SECTIONALS

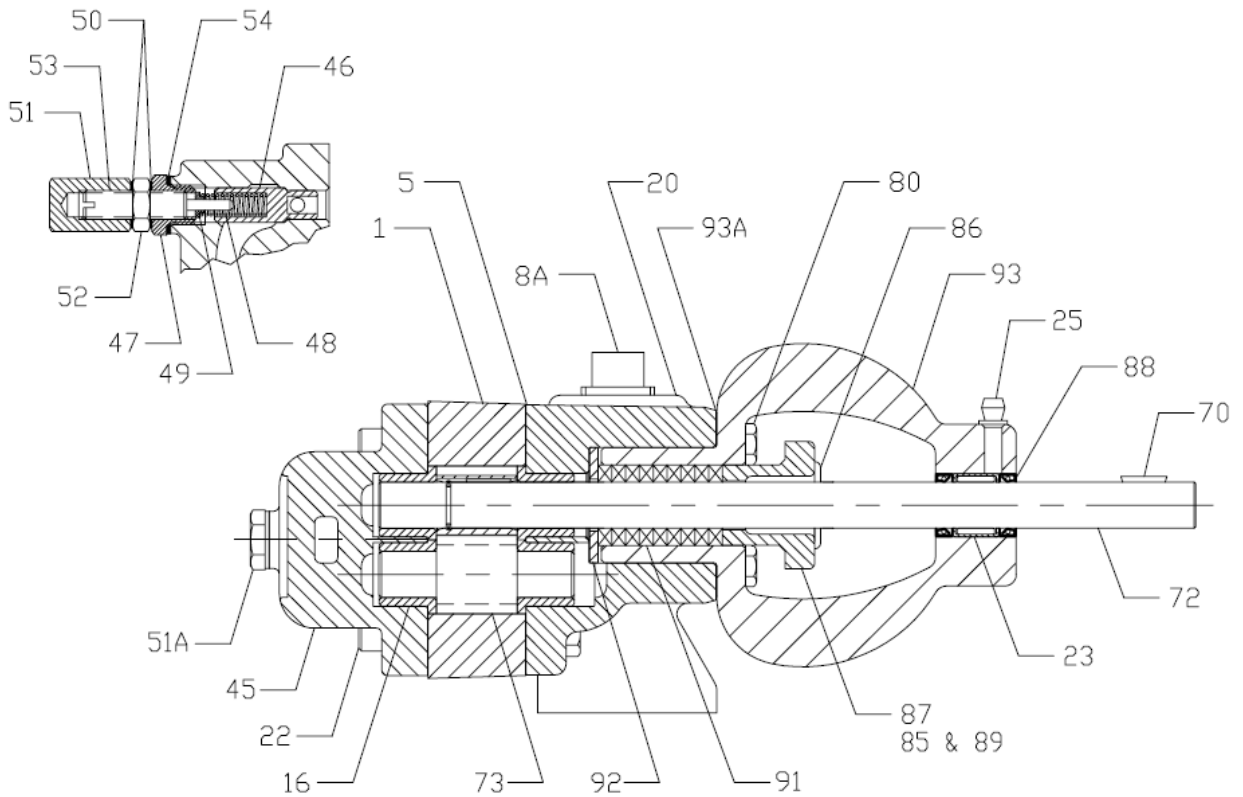
<u>KEY NO.'S</u>	<u>DESCRIPTIONS</u>
1	CASE
5	C ASE GASKET
8 (A,B,C,D)	PIPE PLUG
16	BEARING
20	BACKPLATE
22	CAP SCREW (HEX OR SOC HEAD)
23	BALL BEARING (MECH SEAL OR PACKING)
24	RETAINING RING (MECH SEAL OR PACKING)
25	LUBE FITTING
26	RETAINING RING
45	FACEPLATE
46	POPPET
47	BONNET
48	SPRING
49	SPRING GUIDE
50	GASKET, RELIEF VALVE CAP
51	RELIEF VALVE CAP
51A	PLUG CAP
52	NUT
53	ADJUSTING SCREW
54 (A)	GASLET. RELIEF VALVE
70	KEY, DRIVE
71	KEY, GEAR
72	DRIVE SHAFT (MECH SEAL OR PACKING)
73	IDLER SHAFT & GEAR
75	GEAR, RIGHT HAND
80	SOC OR HEX HD CAP SCREW (MECH SEAL OR PACKING)
85	NUT, PACKING
86	PACKING GLAND CLIP
87	PACKING GLAND
89	STUD, PACKING
91	PACKING SET
92	PACKING WASHER
93	BRG CAGE MECH SEAL OR PACKING HOUSING, PACKING
93A	GASKET
96	MECH SEAL

NOTE: NOT ALL KEY NUMBERS ARE USED IN EVERY PUMP. THIS LIST IS GENERIC TO ALL F-SERIES PUMPS.

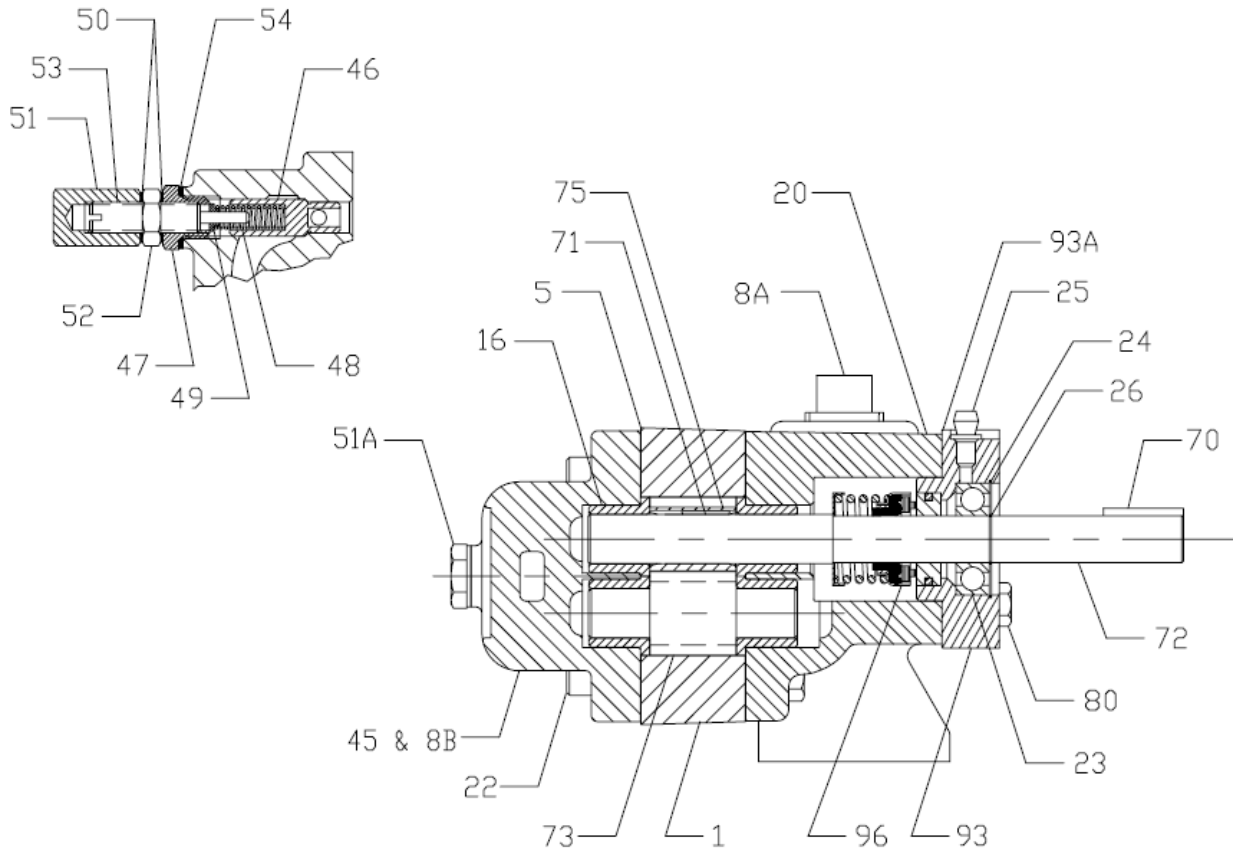
1 & 2 F1 – F5 SPEC 0



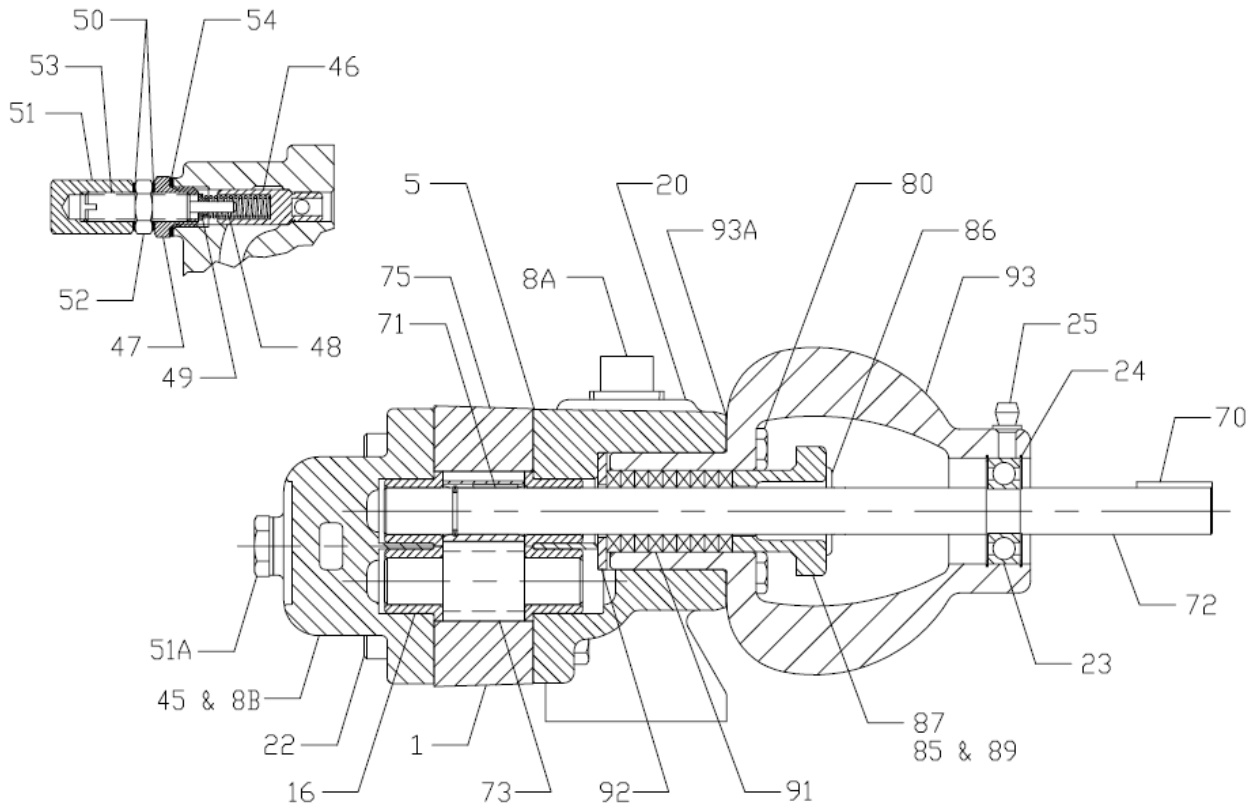
1 & 2 F1 – F5 SPEC 5



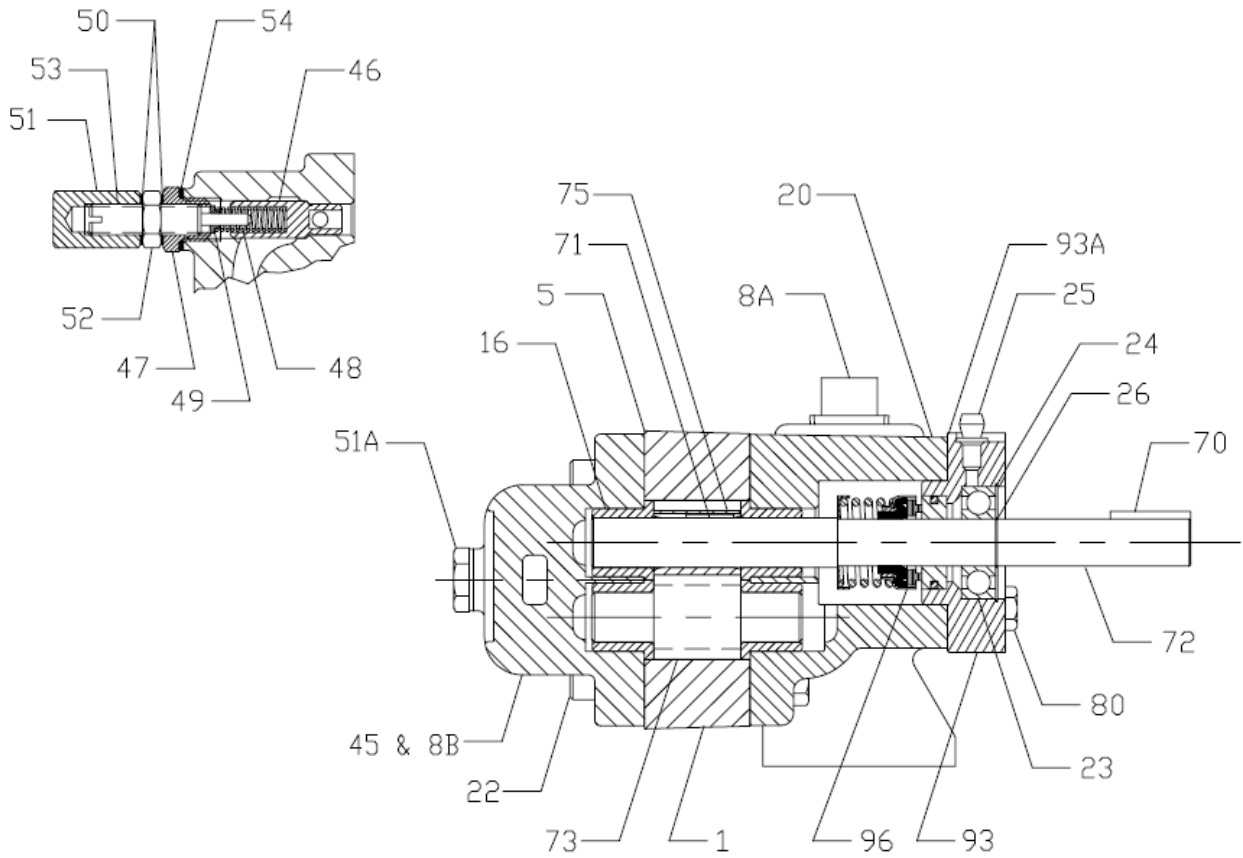
1 & 2 F10 – F20 SPEC 0



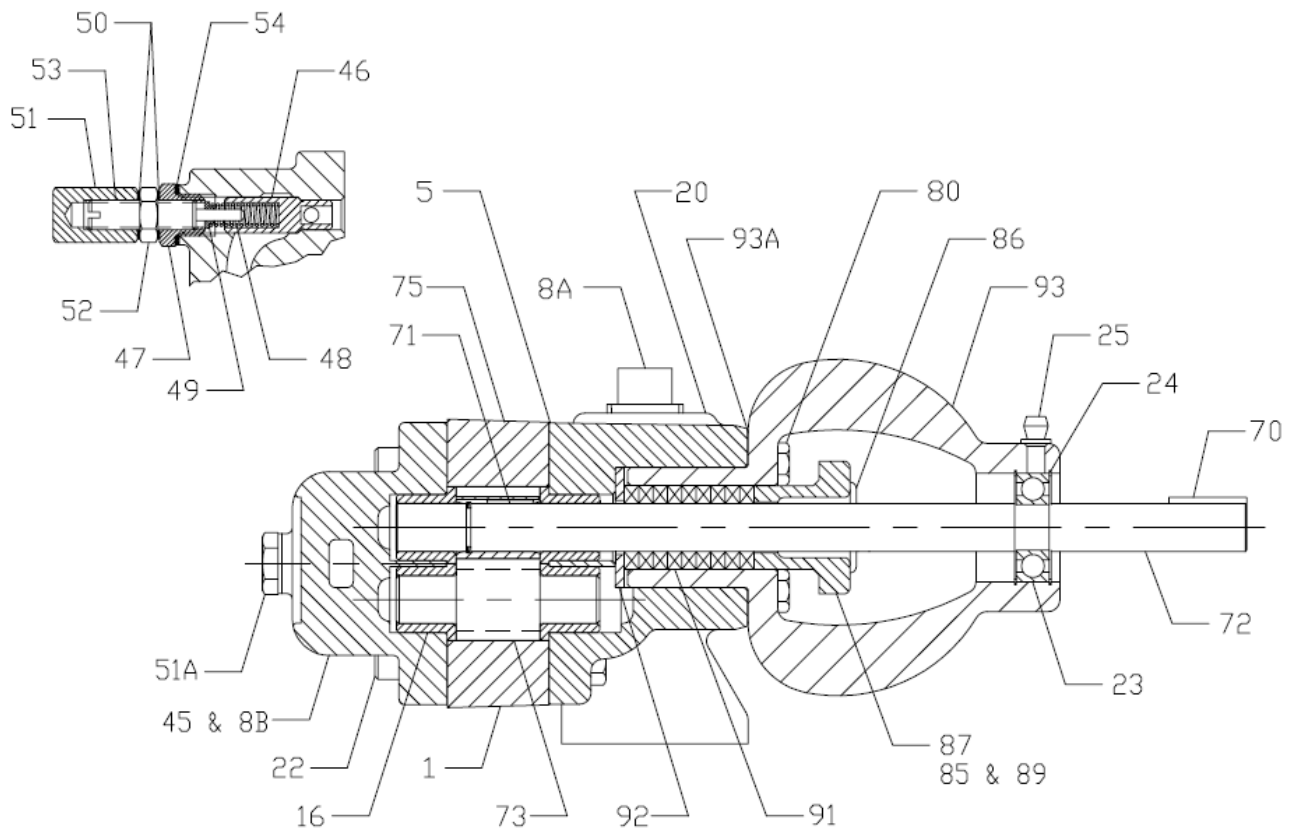
1 & 2 F10 – F20 SPEC 5



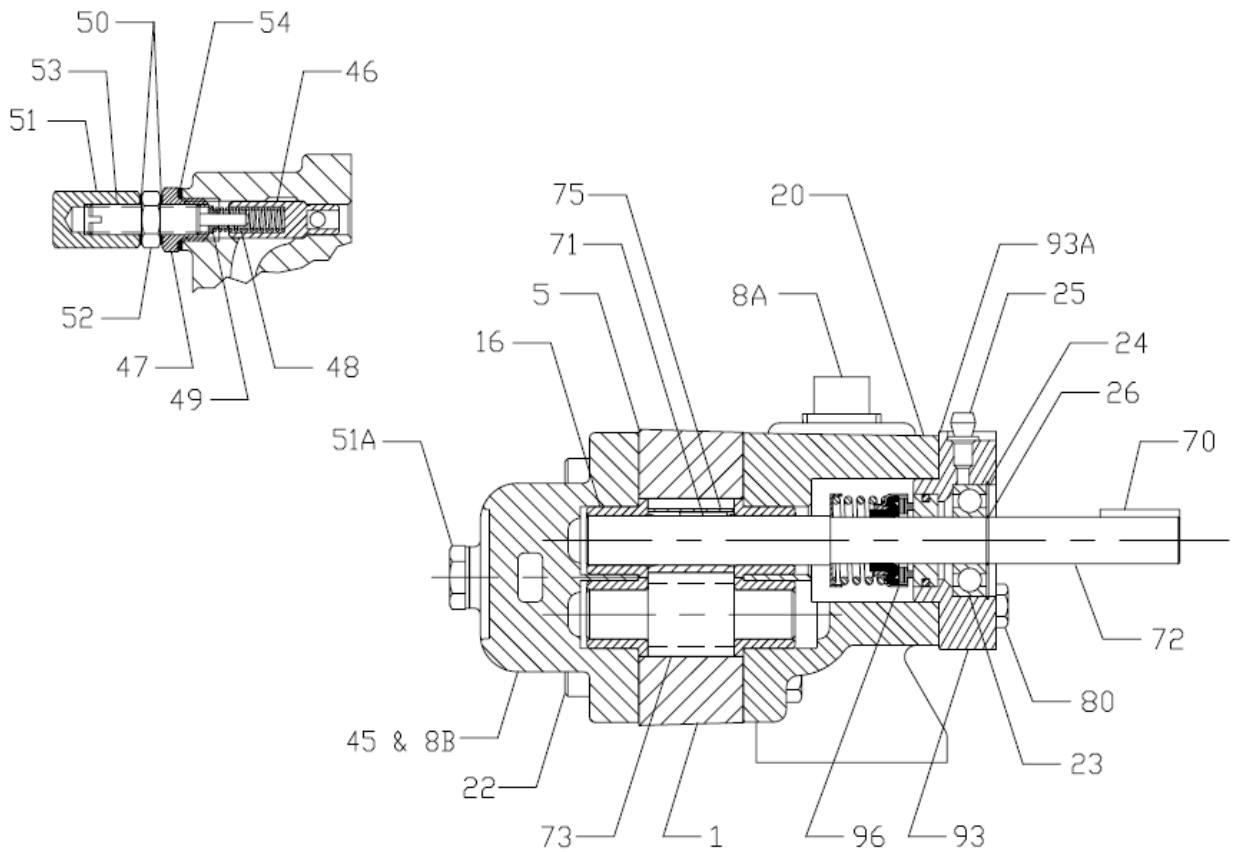
1 & 2 F35 – F50 SPEC 0



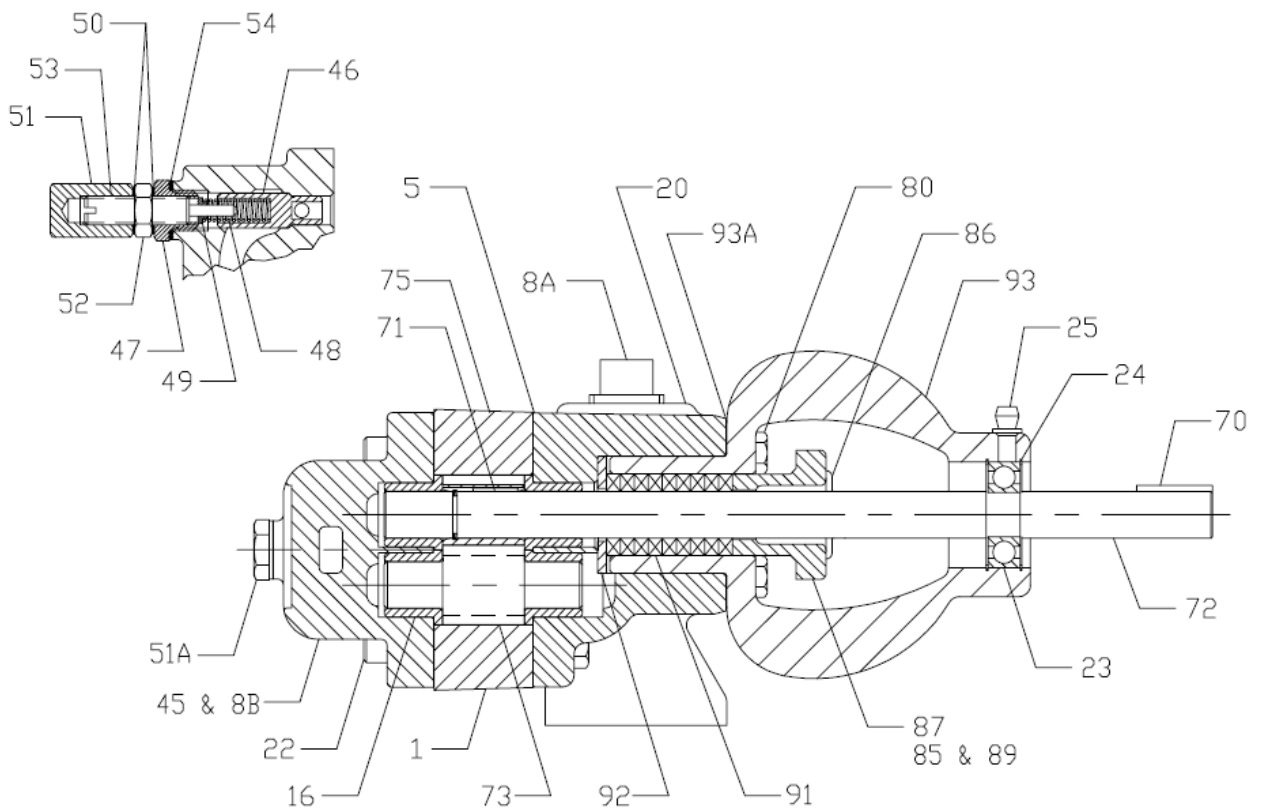
1 & 2 F35 – F50 SPEC 5



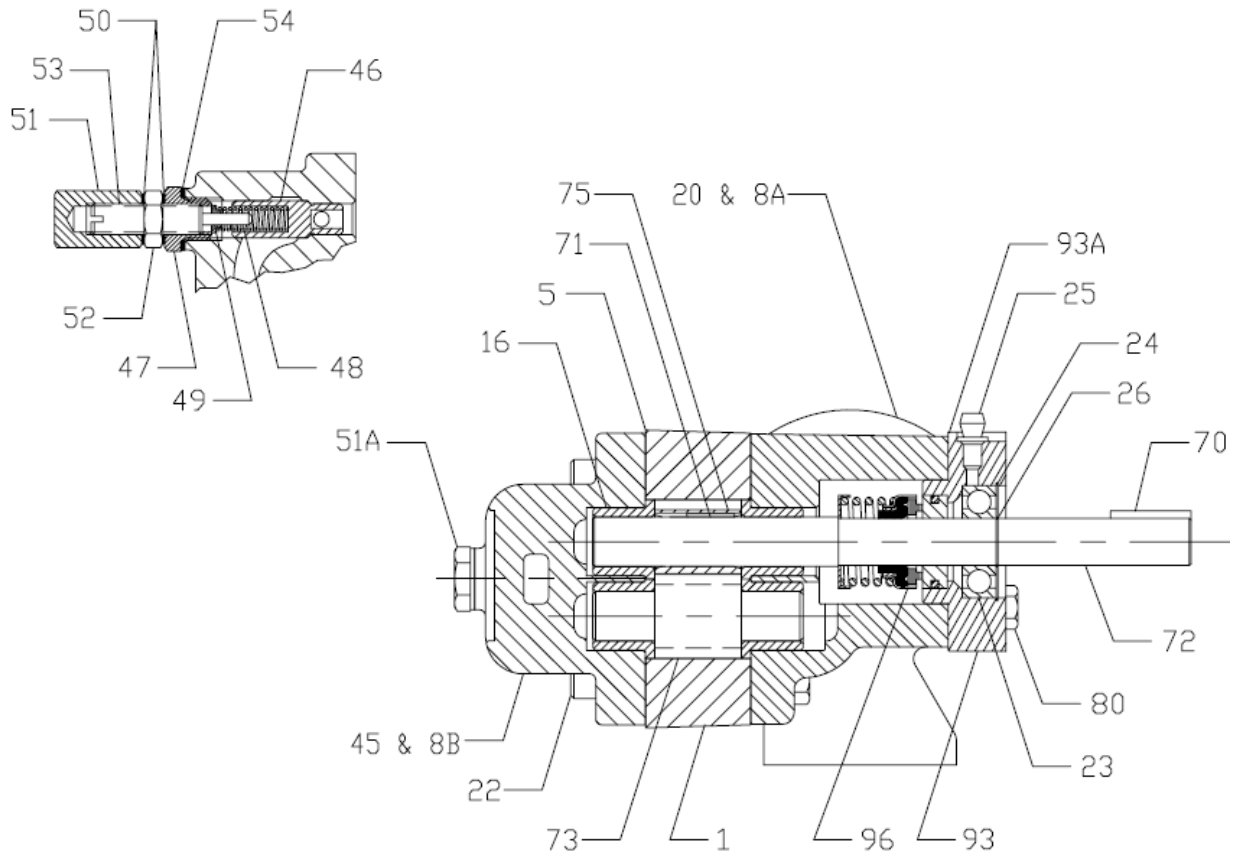
1 & 2 F75 – F100 SPEC 0 & SPEC 17



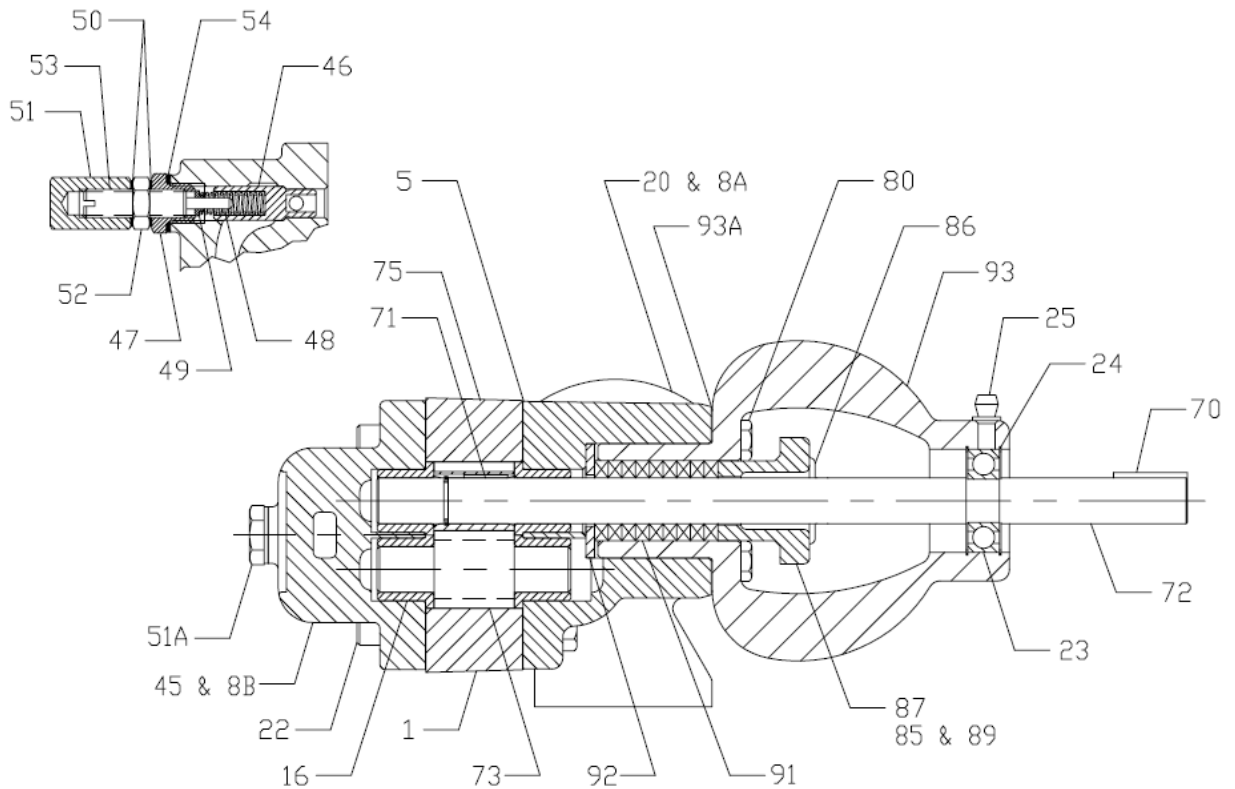
1 & 2 F75 – F100 SPEC 5 & SPEC 174



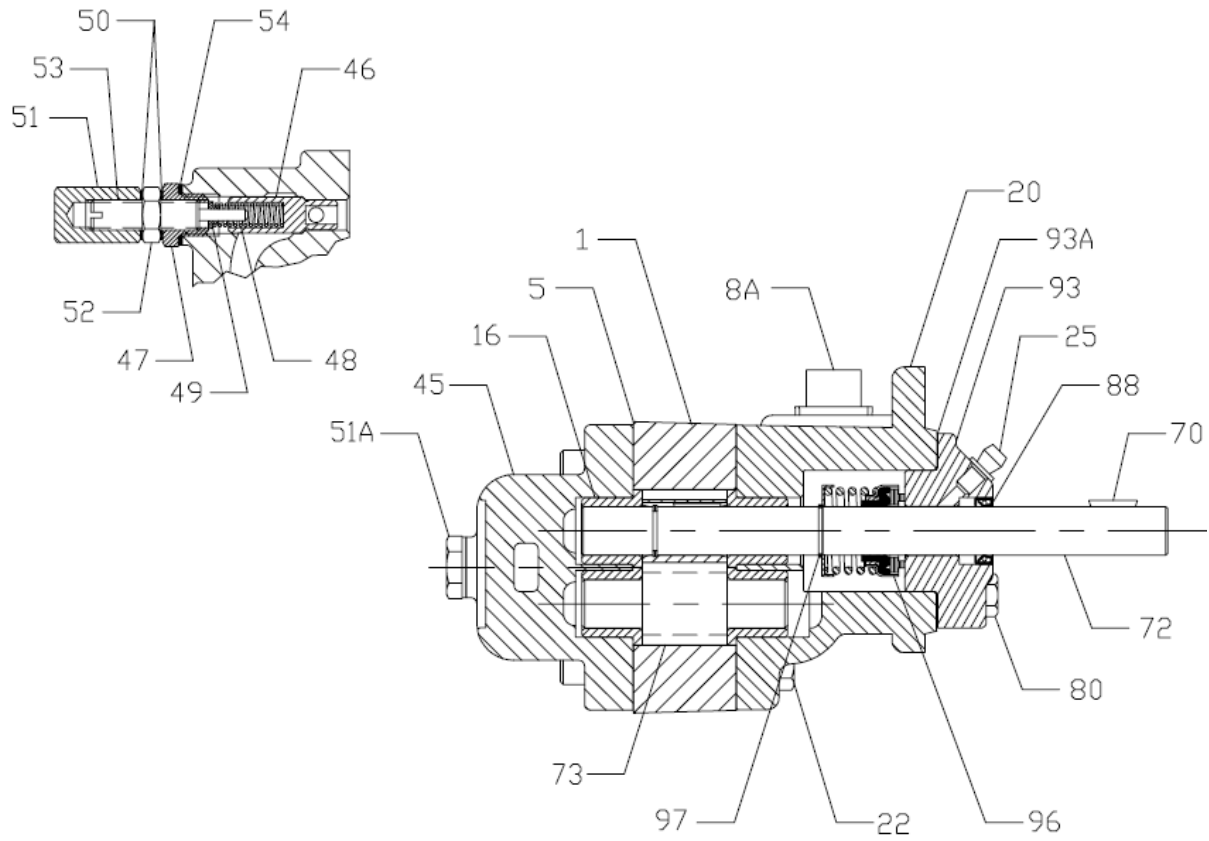
1 & 2 F150 – F300 SPEC 17



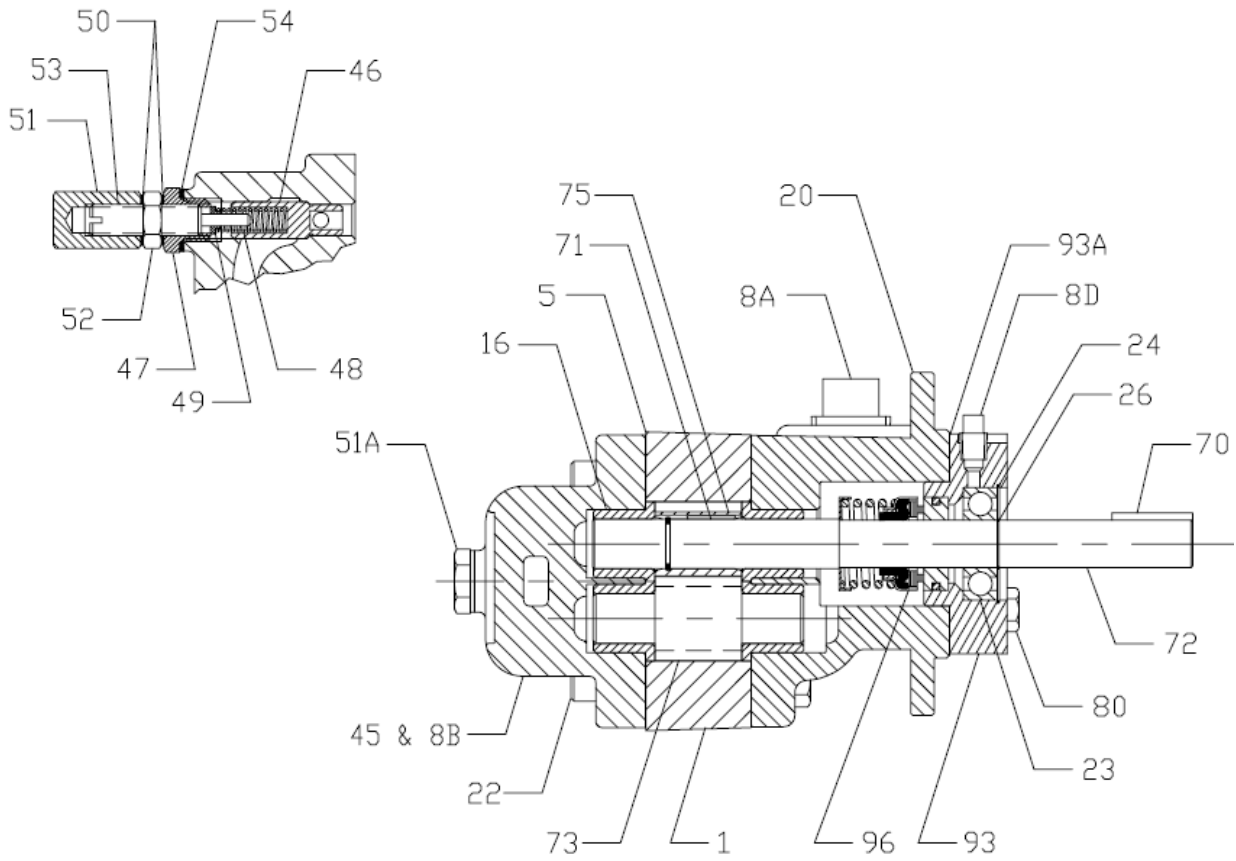
1 & 2 F150 – F300 SPEC 174



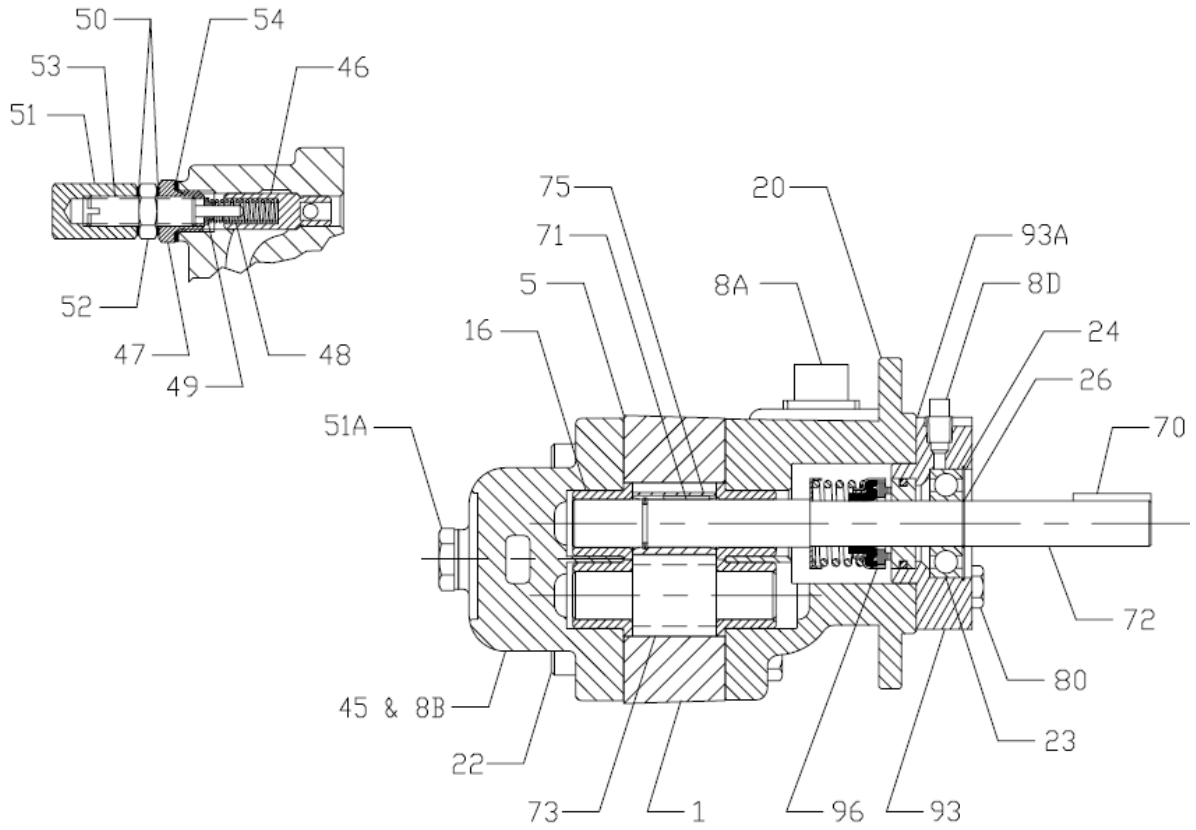
17 & 18 F1 – F5 SPEC 0



17 & 18 F10 – F20 SPEC 0



17 & 18 F35 – F50 SPEC 0



17 & 18 F75 – F100 SPEC 0

