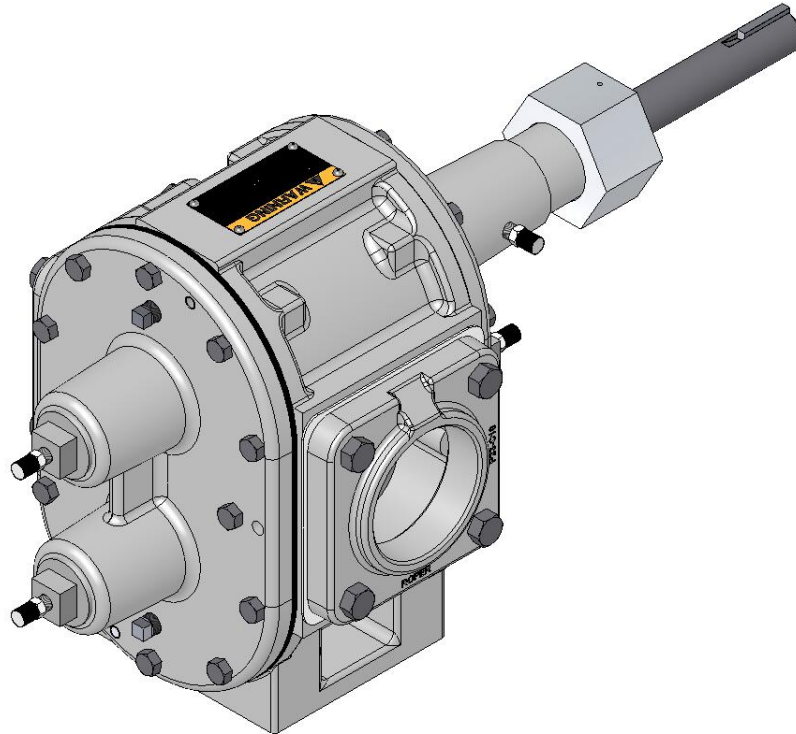




5600 SERIES OWNERS MANUAL

G12-405

08/05/08



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 who 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.

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Good Practice

NOTE: These are general guidelines and do not cover all possible situations.

It is the responsibility of the system integrator to apply this product properly.

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.

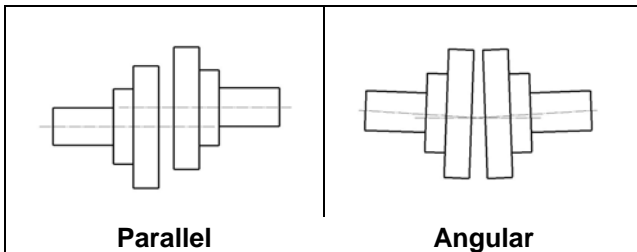
Separate Pump and Drive Assemblies

Driveline Guards

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.



Mounting Base

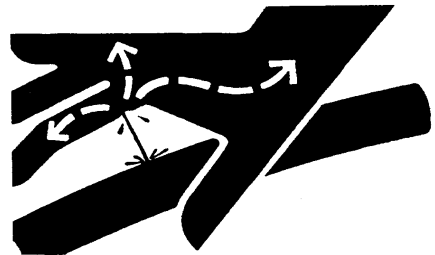
1. Mount the unit on a rigid, heavy base to provide support and absorb shock. Bases should be designed for high rigidity, not just strength.
2. The pump feet were not designed for mounting to concrete and do not have enough contact area to prevent concrete from failing. When mounting to cement or concrete,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

! 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 running.

! WARNING



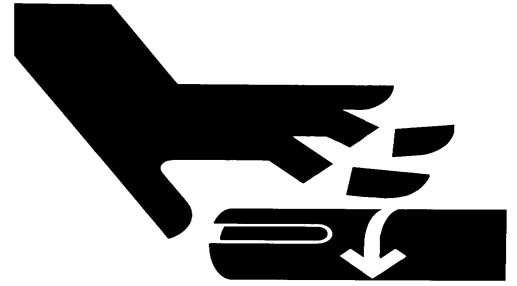
Injection Hazard: Do not try to stop a leak with your hand! Avoid any close contact with hydraulic fluid jets. Escaping fluid can penetrate skin, causing serious injury. In case of accident, see a doctor immediately for removal of fluid.

Guarding PTO Drive Shafts

PTO drive systems can be dangerous and when used, additional safety precautions, including guarding, may be 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.

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 user's.*

! 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.

1. 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.

MODEL NUMBER: _____
SPEC NUMBER: _____
TYPE: _____
SERIAL NUMBER: _____

PUMP NOMENCLATURE

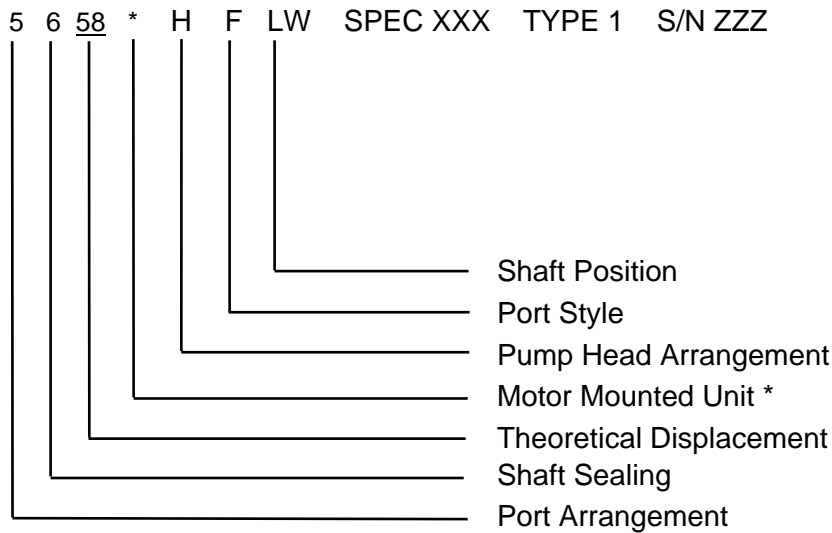
MODEL 5658HFLW

SPEC XXX **TYPE** 1

SERIAL NO. ZZZ

1. The Model Number consists of a seven digit number.
 - The first digit (5) indicates the series.
 - The second digit (6) indicates shaft sealing (packing).
 - The third and fourth digits (58) indicate the approximate theoretical displacement in U.S. gallons per 100 revolutions.
Gallons/100 Rev. [Liters/100 Rev.]
58 [219.6]
 - The letter (H) indicates the pump head arrangement.
H – Pump with inboard bushing
 - The letter (F) indicates port style.
No letter – Pump with threaded ports
F – Pump with Roper standard flange ports
 - The letter (LW) indicates shaft position.
No letter (W) – High drive, Clockwise Rotation
LW – Low drive, Clockwise Rotation
Z – High Drive, Counter Clockwise Rotation
LZ – Low Drive, Counter Clockwise Rotation

Example:



- * **The letter (M) may be used in this space indicating the pump is mounted with motor. The letter (E) may be used in this space indicating the pump is mounted on a base with or without engine.**

As stated in the explanation of the pump nomenclature, all characters may not appear on every pump nameplate.

NOTE: The preceding description of the figure number is to assist in identifying your Roper 5600 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.

2. Occasionally, special pumps or configurations are required which are unique for a particular application. These modifications are clarified by a SPECification number. Identification of any items different than a standard pump can be made by consulting Roper Pump Company or an authorized distributor.
3. 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.
4. 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 Figure, Spec, Type, and Serial numbers so proper identification of the pump can be assured.

2. MAXIMUM PUMP RATINGS

The maximum pressure, speed, and temperature limits for this pump SERIES are shown below.

The maximum rating of a pump with a SPEC number may be different depending on the materials of construction.

Maximum limits for this SERIES:

Pressure

- 100 psi [689 kPa] Maximum Inlet
- 100 psi [689 kPa] Maximum Discharge
- 99 psi [683 kPa] Maximum Differential

Speed

- 420 rpm Maximum

Temperature

- 160°F [71°C] Maximum

3. PREOPERATION CHECKS

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. Rotation is shown on the pump faceplate if the pump has an integral relief valve. When an integral relief valve is used, make sure it is positioned and adjusted as discussed in Section 5, **DIRECTION OF ROTATION**. 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, and 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.

4. RECOMMENDED TOOL LIST

NOTE: Tools not furnished with pump.

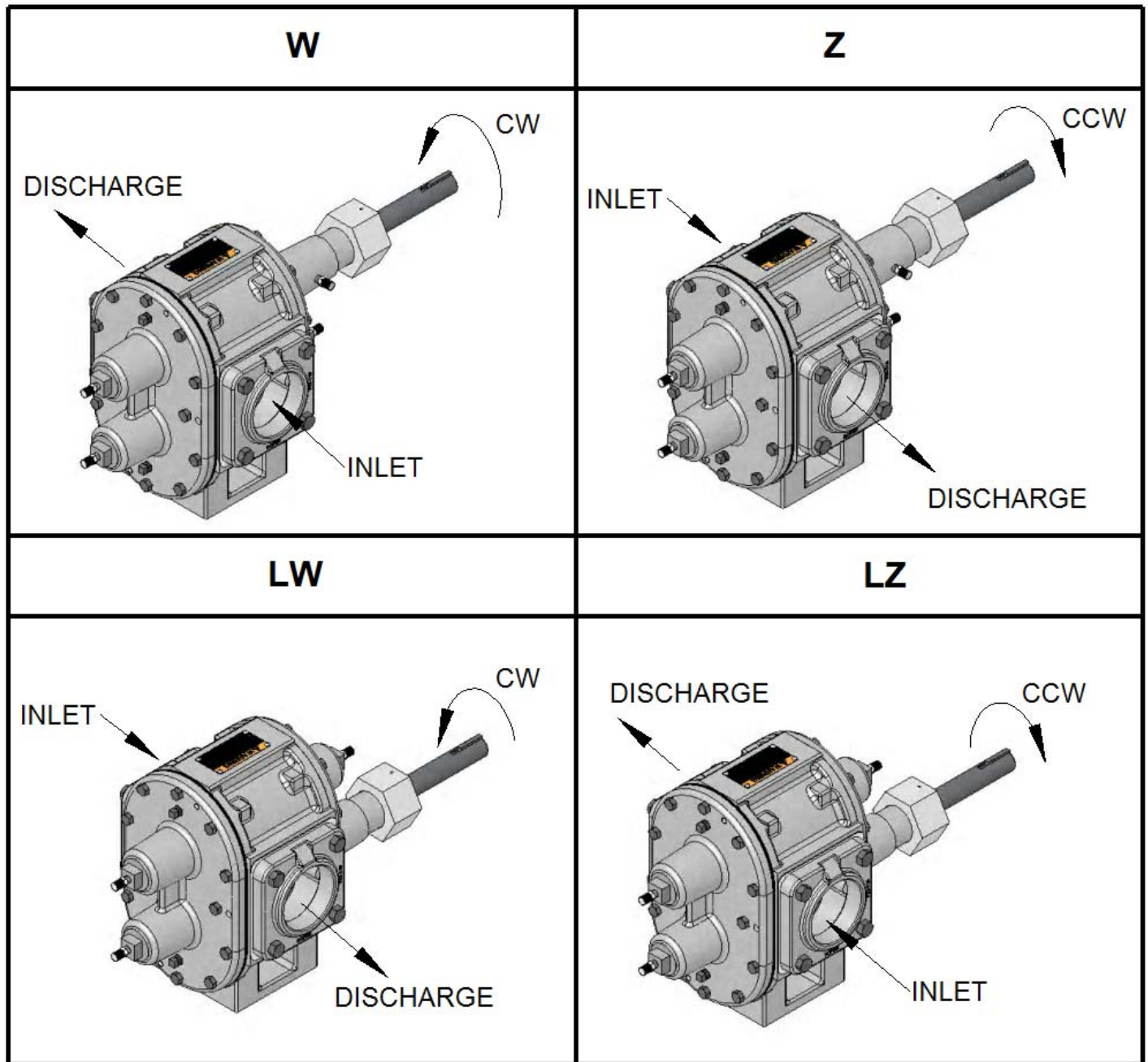
Tools for all Pumps:

- (1) Safety Glasses
- (1) 7/16" Combination Wrench
- (1) 3/4" Combination Wrench
- (1) 18" Pipe Wrench
- (1) Pliers

Additional Tools for Pumps with Flanges:

- (1) 5/8" Combination Wrench

5. DIRECTION OF ROTATION



DIRECTION OF ROTATION FOR HIGH DRIVE & LOW DRIVE PUMP CONFIGURATIONS

Figure 5.1

6. HIGH DRIVE TO LOW DRIVE

Prior to operating pump, make sure that the shaft rotation and pipe connections are in accordance with the appropriate illustrations shown in Figure 5.1. In order to change the rotation and/or piping orientation, it may be necessary to remove the piping from the pump or the pump from the mounting. [Fittings (3) and flange gaskets (2), when provided, can be removed from pump.]

Whenever changing rotation, inspect all parts before reassembly. Replace all worn parts and install new gaskets in appropriate numbers as removed.

1. Remove coupling or universal joint and drive key (70) from drive shaft (72). Remove all burrs and sharp edges from drive shaft and keyway.
2. A.) To reverse pump rotation and keep piping arrangement the same, drive shaft (72) position must be changed. Follow steps 3 – 8.
B.) To reverse pump rotation and leave drive shaft (72) in same position; liquid flow through pump will be reversed. Follow step 9.
C.) To change port and drive shaft location, but keep the same rotation follow steps 10-13.

REVERSE ROTATION, SAME PIPING ARRANGEMENT

3. To reverse pump rotation and keep piping arrangement the same, it is necessary to change from high drive to low drive or low drive to high drive.
4. Remove twelve hex head cap screws (22) securing backplate (20) to case (1) and separate backplate assembly from case assembly. The drive gear and shaft assembly (71) will pull out with backplate assembly.
5. Switch drive gear and shaft assembly (71) and idler gear/shaft (73) positions in case (1).
6. Position appropriate number of case gaskets (5) on case (1). Oil or grease may be used to hold gaskets in place.
7. Rotate backplate (20) assembly 180°.
8. Slide backplate (20) assembly with drive gear/shaft (72) assembly into position and secure.

REVERSE ROTATION, SAME DRIVE SHAFT AND CASE ARRANGEMENT

9. To reverse flow of liquid through pump ports, reverse rotation of drive gear and shaft (72), maintain the original positions of the drive gear/shaft and case (1).

CHANGE PORT AND DRIVE SHAFT LOCATION, SAME ROTATION

10. To change the port to the opposite side and maintain same pump rotation, change drive gear and shaft (72) from high drive to low drive or vice versa.
11. Remove twelve hex head cap screws (22) securing backplate (20) to case (1) and separate backplate assembly from case assembly. The drive gear and shaft (72) will pull out with backplate assembly.
12. Switch drive gear and shaft (72) and idler gear/shaft (73) positions in case (1).
13. Rotate backplate (20) assembly 180° and remount on case (1).

7. INSTRUCTIONS FOR DRAINING PUMP

Refer to Section 12, **PARTS LIST**.

The extent to which a pump can be drained is dependent upon the product being pumped. Low viscosity products such as solvents will drain quickly and easily. High viscosity products such as molasses and tar will drain very slowly. Also, the draining of high viscosity products will be less complete.

Regardless of the product pumped, the areas at the blind end of the bearing bores and the mechanical seal chamber will not drain.

1. Read and understand all safety instructions and warnings before starting draining procedure.
2. There are two pipe plugs (8A) in the faceplate (45). Remove one that is in lowest position.
3. Rotate drive shaft very slowly by hand. Each time that flow from drain increases, stop turning shaft until flow stops; then resume until flow increases again. Be sure to rotate shaft several complete revolutions in each direction until all flow from drain has stopped.
4. Reinstall and tighten pipe plug (8A).

8. INSTRUCTIONS FOR PUMP DISASSEMBLY

Refer to Section 12, **PARTS LIST**.

1. Read and understand all safety instructions and warnings before starting to disassemble pump. While disassembling pump, always inspect disassembled parts and adjacent parts to see if further disassembly is needed. Replace worn or damaged parts as required.
2. If you do not know which pump arrangement you have, collect nameplate data and refer to Section 1, **NAMEPLATE DATA**, to determine what you have. Consult a Roper distributor or Roper Pump Company if you have any questions.
3. When cleaning or lubricating, use only cleaning solutions and lubricants that are compatible with products being pumped and with sealing elastomers. **DO NOT** use petroleum base products with seals with EPR elastomers. Use a nonpetroleum base lubricant with EPR elastomers.
4. Turn off pump and lock out energy source to driver. **DO NOT** proceed further with disassembly of pump if there is the slightest possibility that driver may be started.
5. Close inlet and discharge valves.
6. Remove guard and disconnect coupling between driver and pump.
7. Drain inlet and discharge lines. Disconnect lines from pump inlet and discharge.
8. Follow the procedure in Section 7, **INSTRUCTIONS FOR DRAINING PUMP**.
9. Remove twelve hex head cap screws (22) securing faceplate (20) to case (1).
10. By screwing two long 3/8 – 16 thread bolts in jack holes, remove faceplate (45).
11. Remove case gaskets (5).
12. Remove idler gear/shaft (73).
13. Remove packing nut (87) from end of backplate (20).
14. Remove drive gear/shaft (72).
15. Remove twelve hex head cap screws (22) securing backplate (20) to case (1).
16. By screwing two long 3/8 – 16 thread bolts in jack holes, remove backplate (20).

17. Remove case gaskets (5) from opposite side of case (1).
18. Remove four dowel pins (4) from case (1), backplate (20), and faceplate (45).
19. Visually inspect all parts. Replace all worn or damaged parts before reassembling pump. It is recommended that new gaskets (2, 5, if applicable) be installed each time pump is disassembled and reassembled.

9. BEARING REMOVAL AND INSTALLATION

BEARING REMOVAL

1. Remove NPT plugs (8B) from ends of bearing areas in faceplate (45) and backplate (20).
2. Place backplate or faceplate face down on press.
3. Using proper size arbor, press bearings out.

BEARING INSTALLATION

1. Remove all burrs and raised edges from bores for bearings.
2. Place faceplate or backplate on a press base with machined face upward. Support endplate so that milled face is perpendicular (square) with press ram.
3. Position endplate so that one bearing bore is located directly under press ram.
4. Lubricate endplate bores with a light oil that is compatible with product to be pumped.
5. Place end of new bearing at entrance of bore in endplate.
6. Press bearing into endplate bore. It is best to use a stepped arbor with a few thousandths of an inch clearance between arbor and bore of bearing. Be sure to press bearings in until they are flush to .005 of an inch [.127 mm] below milled face of endplate.
7. Repeat procedure for second bearing.

10. INSTRUCTIONS FOR PUMP ASSEMBLY

Refer to Section 11, **PARTS LIST**.

Refer to Section 5, **DIRECTION OF ROTATION**, to assure proper configuration for pump rotation and port location prior to assembling pump.

1. Read and understand all safety instructions and warnings before assembling pump. Visually inspect all parts during assembly. Replace all worn or damaged parts. Although they may appear reusable, it is recommended that new gaskets (5) and packing rings (91) be installed when pump is being reassembled.
 - **WARNING!** Only use genuine Roper gaskets. Gasket thickness determines proper clearances. Always check quantity of gaskets removed and replace with exact quantity. Proper material must be used based on application.
2. When cleaning or lubricating, only use products that are compatible with product being pumped and elastomers within pump. **DO NOT** use petroleum base products with seals with EPR elastomers. Clean and lubricate parts with light oil unless EPR elastomers are used. Use a nonpetroleum base lubricant with EPR elastomers.
3. Place appropriate number of case gaskets (5) on faceplate side of case. Align faceplate on case, with two finger tight hex head cap screws (22) at top and bottom of faceplate. Drive in two dowels (4). Secure faceplate to case with twelve hex head cap screws (22).
4. Place drive gear/shaft (72) and idler gear/shaft (73) into case bore.
5. Place appropriate number of case gaskets (5) on backplate side of case. Slide backplate over shafts and up to case. Drive in two dowels (4). Secure backplate to case with twelve hex head cap screws (22).
6. Install three packing rings (91) in packing nut (87) bore. Stagger joints on each packing ring 180° apart. Rings must not be tamped or seated.
7. Slide packing nut (87) with rings over end of drive shaft.
8. Screw packing nut (87) on backplate (20) finger tight. Tighten $\frac{1}{2}$ to $\frac{3}{4}$ of one round then loosen to finger tight.
9. Attach lockwire (9) to packing nut and lube fitting (25). Be sure to wrap lockwire in a clockwise direction facing drive shaft end.

11. PARTS LIST

1. Case Assembly
2. Flange Gasket
3. Flange
4. Dowel Pin
5. Case Gasket
6. Hex Head Cap Screw
- 8A. Pipe Plug (Small)
- 8B. Pipe Plug (Large)
9. Lockwire
20. Backplate Assembly
22. Hex Head Cap Screw
25. Lube Fitting
45. Faceplate Assembly
70. Drive Key
72. Drive Gear, Shaft, & Key
73. Idler Gear & Shaft
87. Packing Nut
91. Packing Rings

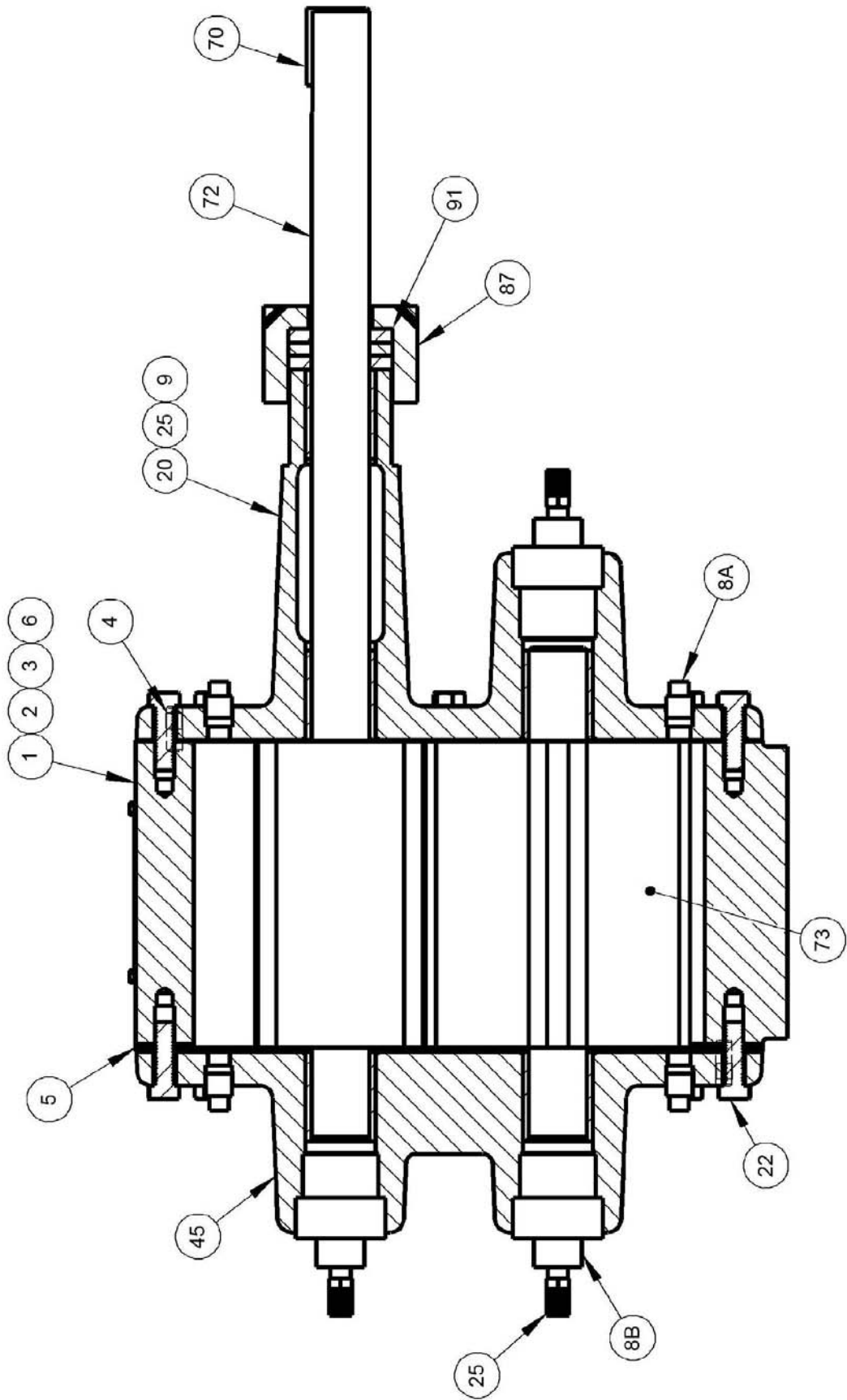


Figure 11.1

12. SHAFT SEALING

STANDARD COMPRESSION PACKING

The type of shaft sealing used in these pumps is formed ring packing with or without a lantern ring. When using a packed box pump, use formed packing rings. **DO NOT** use a one piece spiral wrap of packing. Packing rings are available in a wide selection of materials for various applications and temperatures. Previous experience with the pumped fluid is the best guide in selecting the proper packing ring material for your particular application.

CARE OF PACKING

Packing hooks are commercially available to help in removing packing rings from the stuffing box. It is generally not recommended to reuse old packing rings. When installing packing, use formed packing rings.

DO NOT use a one piece spiral wrap of packing. Before installing packing, carefully clean the stuffing box and shaft.

Packing rings should be installed one ring at a time, with the joints of adjacent rings staggered approximately 180°. Each ring should be seated firmly before the next ring is installed.

The packing gland nut should be tightened with a wrench to seat the packing firmly in the stuffing box and against the shaft. **DO NOT** over-tighten the packing. The gland nut should then be backed off until finger-tight. Connect the lockwire from the packing nut to the pipe plug (grease fitting) adjacent to the packing nut and twist ends together.

NOTE: The wire should be wrapped in a clockwise direction from the packing nut to the hex head cap screw.

After the pump is started, note the amount of leakage from the stuffing box. If the packing leakage exceeds ten drops per minute, stop the pump and adjust the gland nut. The gland nut should be adjusted evenly in 1/6 to 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 over-tighten 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. Over-tight packing may score shafts, increase torque requirements of the pump, damage couplings and drivers, and generate excessive heat.

The pump should be stopped and the packing gland 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.

13. LUBRICATION

Pumps are fitted with lube fittings to all four bearings. Lubricate the bearing on a regular basis with any good quality bearing grease that is compatible with the product being pumped.

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