

**SERIES 3600 RF*****Installation and  
Operating Instructions***

**WARNING:** Do not operate this equipment in excess of its rated capacity, pressure, speed, and temperature, or other than in accordance with instructions contained in this manual.

Every Roper pump is performance tested before being shipped from our factory. Correctly installed, operated and maintained, it will give long, dependable service. Remember . . . faulty selection and installation form the basis of more pump troubles than all other causes combined . . . no amount of maintenance can compensate for selection and installation mistakes. Read these instructions carefully before installing and operating this pump.

This pump is satisfactory for the conditions for which it is rated, but its operation in excess of these conditions may subject it to stresses and strains which it is not designed to withstand.

On all pumps it is recommended that a relief valve (either a built in valve or an external valve in the line) be used to protect the equipment and personnel from accident due to overpressure. **FOR A PUMP EQUIPPED WITH A BUILT IN RELIEF VALVE, SEE SECTION(S) ON RELIEF VALVES BEFORE OPERATING PUMP. READ SECTION ON PRE-OPERATION CHECKS, ESPECIALLY FOR A PUMP WITH NO BUILT IN RELIEF VALVE.**

It is also recommended that appropriate coupling or belt guards be installed for the protection of personnel.

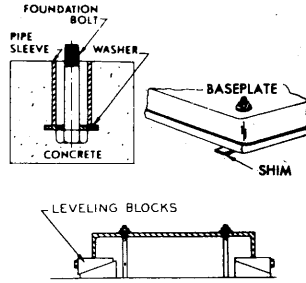
Failure to heed these warnings may result in an accident causing physical damage or personal injury.

If there is any question concerning the ratings or instructions, please consult a distributor, district representative, or the home office of the:

**ROPER PUMP COMPANY**  
COMMERCE, GEORGIA 30529

# PREPARATION OF FOUNDATION-BASEPLATE MOUNTED PUMPS

A good foundation is of major importance. Concrete is best, since it is heavy enough to support the baseplate rigidly and absorb strain and shock. Baseplate units must be securely bolted in position, with shims or leveling wedges to correct any angular and/or parallel misalignment. Such misalignment will cause the pump or driver to be out of alignment, thus resulting in heavy stresses on the pump. Accelerated wear or vibration can be caused by a very slight misalignment.



PLACE STRAIGHT EDGE AT TOP, BOTTOM, AND BOTH SIDES TO CHECK ALIGNMENT OF COUPLING MEMBERS	
Correct	STRAIGHT EDGE
Parallel Misalignment	STRAIGHT EDGE
Angular Misalignment	GAUGE FINDER

## ALIGNING DRIVER AND PUMP

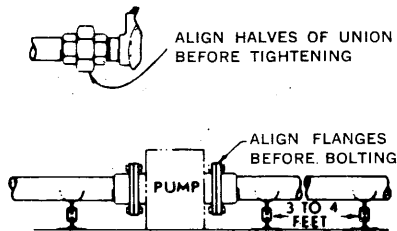
Driver and pump units are factory aligned before shipment, but they must be accurately realigned during and after installation.

To align coupling, use a straight edge and feeler gauges to check for parallel and angular alignment as shown in illustration at left.

Check the alignment at every step during installation: after the unit is mounted on foundation, after piping has been secured, and after pump has run with the liquid at operating temperature. **DO NOT DEPEND ON FLEXIBLE COUPLINGS TO COMPENSATE FOR MISALIGNMENT.**

## INSTALLATION OF PIPES

Use of teflon tape for installing pipes may cause damage to pump. PIPING MUST BE CHECKED CAREFULLY, ALLOWING FOR EXPANSION OR CONTRACTION. Pipe strain can distort the pump components, thus increasing wear, causing bearing misalignment, or breaking parts. Pipe supports and expansion joints should be used to avoid weight and stresses on the pump. See that flanges or unions fit without forcing.

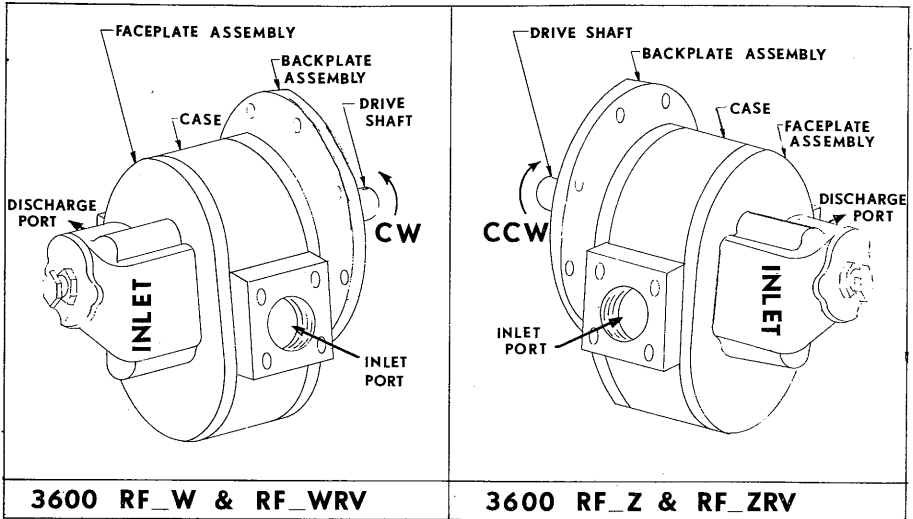


Pump opening size does not necessarily establish correct pipe size. If in doubt as to pipe size to use, check with a Roper Distributor or District Representative. It is recommended that the pump be installed below the liquid level, with a short, large diameter supply line to assure a flooded inlet. Roper pumps, however are self-priming, positive displacement pumps and will prime under the most difficult conditions. Roper pumps are recommended for clean liquid only. A strainer, of ample size and regularly cleaned, should be used in the inlet piping to prevent foreign material from entering the pump.

Prior To Starting The Pump See: **PRE-OPERATION CHECKS**

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## DIRECTION OF ROTATION



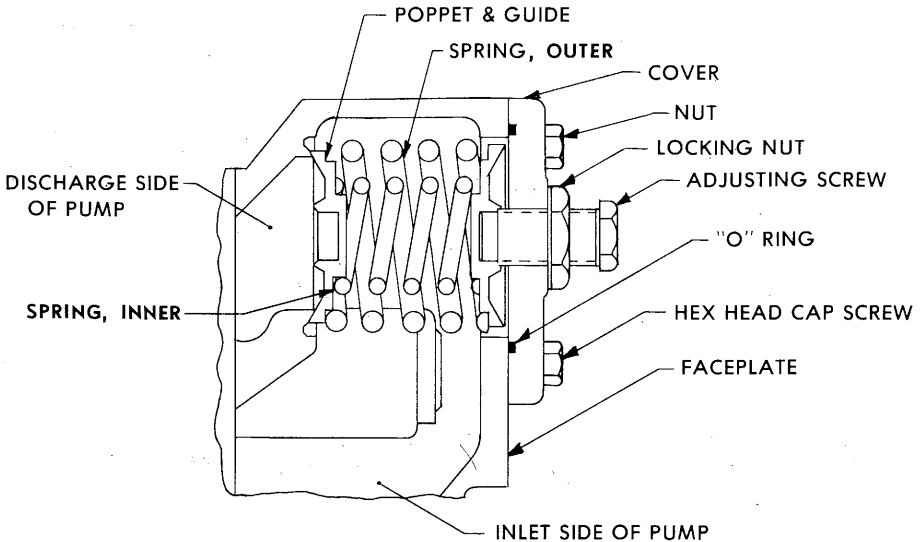
PRIOR TO OPERATING THE PUMP, MAKE SURE THAT THE SHAFT ROTATION, PIPE CONNECTIONS, AND THE RELIEF VALVE POSITION (WHEN USED) IS IN ACCORDANCE WITH THE ABOVE ILLUSTRATIONS.

To reverse the rotation on a pump with a built-in relief valve, remove the cap screws that secure faceplate to the case or backplate. Remove the faceplate and reposition as required, making sure that the gasket(s) is not damaged. Tighten the cap screws. Note: the dowel pins will align parts properly.

Pumps with plain faceplates will operate in both directions of rotation.

For inlet pressures over 10 PSIG, consult a distributor, district representative, or the home office of the ROPER PUMP COMPANY, COMMERCE, GEORGIA.

# 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.

If the built-in relief valve is used it is mandatory that the relief valve be set **BY THE USER**, since 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 80 PSIG, at a pump speed of 330 RPM on liquid with a viscosity of approximately 35 SSU. This setting would only apply if all of these conditions are duplicated.

Built in relief valves sense differential pressures only (Difference between inlet and outlet pressures).

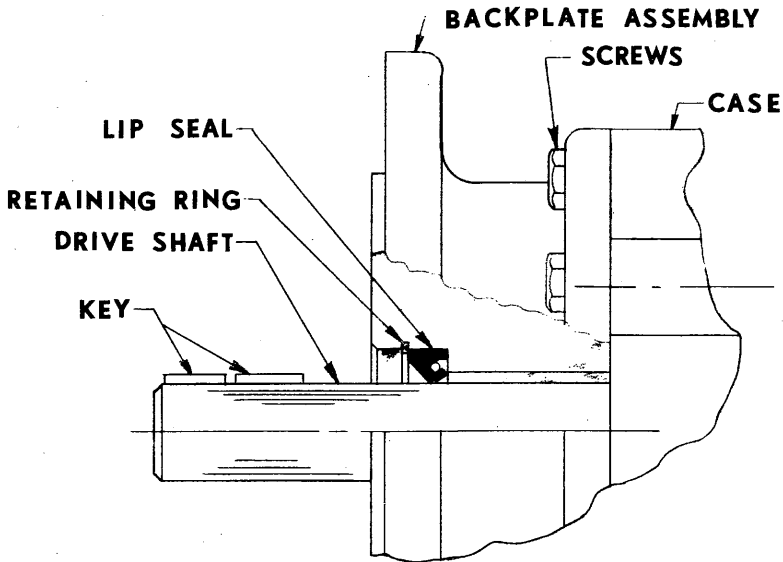
A built-in relief valve should not be used on applications where the discharge must be closed for more than a few minutes. Prolonged operation with the relief valve fully by-passing will cause heating of the liquid circulating thru the valve, thus resulting in possible damage.

To adjust, loosen the locking nut. Turn adjusting screw clockwise to increase the pressure and counter-clockwise to reduce the pressure. Make adjustments in  $\frac{1}{2}$  turn increments until desired pressure is obtained. Tighten locking nut.

To replace spring(s), poppet, or guide decrease the pressure on the spring(s) and remove the cover by loosening the cap screws and nut from the faceplate. After inspecting parts and replacing those required reassemble the parts in reverse order to which they were removed, making sure the spring(s) is centered on poppet and guide. Replace gasket. Replace cover with cap screws and nut and adjust spring to desired setting.

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## REPLACEMENT OF LIP SEAL



In order to replace the lip seal the complete pump must be removed from the engine to which it is mounted.

Remove all piping from the inlet and discharge ports and any interference piping. With the use of an appropriate sling and hoist secured in position to lift the pump, remove all screws and/or nuts which secure the pump to the engine and pull the pump away from its mounting surface. Remove the coupling and key(s) from end of drive shaft. Remove all burrs and sharp edges from shaft and keyway(s).

Remove the screws and/or nuts securing the backplate assembly to the case. Slide the backplate assembly, lip seal, and retaining ring off the drive shaft. Remove the retaining ring.

Pry lip seal out of bore making sure that bore is not scored or damaged.

While the pump is disassembled inspect the shafts, gears, bores of the case and bearings, and surfaces of the backplate and faceplate for worn or scored places. Replace parts as required.

Clean bore into which lip seal is to be pressed. Remount the gasket and backplate assembly to the case. Secure in place with screws and nuts.

Lightly oil drive shaft and bore into which lip seal is to be fitted. Slide lip seal onto shaft with open side toward pumping element and press into bore until it touches rear surfaces of bore and install retaining ring.

Replace key(s) and coupling on drive shaft and remount pump to the engine in reverse order to which it was removed.

# CHECKING PUMP PERFORMANCE

A summary of the causes of common malfunctions.

## NO LIQUID DELIVERED

1. Pump not primed. If pump fails to deliver liquid after a minute, stop the pump and prime it by pouring some liquid into the discharge side of the pump.
2. Rotating in wrong direction.
3. Inlet lift too high. Check this with gauge at pump inlet.
4. Clogged inlet line.
5. Air pockets or vapor lock.
6. Air leaks in inlet line.
7. Foreign matter under valve seat or poppet. Remove and clean poppet and valve seat. Caution: if poppet or seat is damaged it must be re-machined or replaced.

## RAPID WEAR

1. Abrasives in liquid.
2. Compatibility of liquid and pump material.
3. Excessive pressure.
4. Non-lubricating liquid.

## EXCESSIVE NOISE

1. Starved pump.
2. Air leaks in inlet line.
3. Air or gases in liquid.
4. Pump speed too high.
5. Relief valve chatter. Check pressure setting.
6. Improper mounting. Check alignment thoroughly. See instructions for aligning driver and pump and preparation of foundation for base-plate mounted pumps.

## INSUFFICIENT LIQUID DELIVERED

1. Air leaks in inlet line.
2. Air leaks through packing or mechanical seal.
3. Speed too slow.
4. Excessive lift at inlet. Check this with gauge at the pump inlet.
5. Viscosity of liquid too high for size and length of inlet pipe.
6. Foot valve or end of inlet pipe not immersed deeply enough in liquid.
7. Foot valve, if used, too small, stuck, or not working properly.
8. Partial air pockets or vapor lock.
9. Pump damaged by foreign matter or misalignment.
10. Excessive clearance in pump caused by wear or corrosion.
11. Relief valve set too low, or stuck partially open.

## PUMP TAKES TOO MUCH POWER

1. Speed too high.
2. Liquid more viscous than previously anticipated.
3. Operating pressure higher than specified. Check this with gauge at the pump outlet.
4. Outlet line obstructed.
5. Mechanical defect, such as bent shaft, packing gland too tight, or misalignment of piping.
6. Relief valve not operating properly.

# SAFETY PRECAUTIONS

Safe installation, operation and maintenance must be performed by qualified personnel. Do not work on a pump while it is running, except for minor necessary adjustments such as packing and relief valve. Be careful when working on or near a running pump contacting or being caught in rotating parts could cause serious or fatal injury. Guards should be provided for all exposed rotating parts. WHEN LIQUID BEING PUMPED IS HAZARDOUS OR VOLATILE, PRECAUTIONS SHOULD BE TAKEN AT ALL TIMES INCLUDING THE RUN IN PERIOD AND DURING DISASSEMBLY AND ASSEMBLY OF PUMP.

## PRE-OPERATION CHECKS

See instructions on Preparation of Foundation for Base Mounted Pumps, Alignment Driver and Pump, and Pipe Installation.

Determine the proper direction of rotation by using the appropriate instructions and illustrations. When a relief valve is used, make sure it is positioned and adjusted properly. Check the rotation of the driver to make sure it will operate the pump in the desired 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 the inlet and discharge valves are open and there is liquid in the pump.

After starting the unit, check to see that the pump is delivering liquid. If not, stop the driver immediately and refer to the section on Checking Pump Performance. If the pump is delivering liquid, check the unit for quiet operation, vibration, localized heating, and excessive seal or packing leakage. It is recommended the pressure and-or vacuum be checked by installing gauges at both sides of the pump to make sure the pressure and-or vacuum conform to specifications.

**IF THERE IS NO RELIEF VALVE IN THE SYSTEM NEVER BLOCK THE OUTLET LINE. HIGH PRESSURE WILL OCCUR, RESULTING IN POSSIBLE DAMAGE OR BREAKAGE TO THE PUMP OR SYSTEM PARTS AND POSSIBLE INJURY TO PERSONNEL. EVEN WITH A RELIEF VALVE IN THE SYSTEM, DO NOT OPERATE THE PUMP FOR MORE THAN A FEW MINUTES WITH THE OUTLET LINE BLOCKED. RAPID HEATING AND POSSIBLE DAMAGE WILL OCCUR.**

## REPAIR PARTS

Use only Roper repair parts. Roper Pump Company takes no responsibility for the use of parts other than those manufactured and supplied by Roper Pump Company. The use of substitutes may result in poor pump performance or in an accident causing physical damage or injury to personnel.