

OPERATING AND INSTALLATION INSTRUCTIONS FOR ROPER 7X219, AND 7X228 PUMPS

WARNINGS

WARNING! DANGER! READ BELOW BEFORE STARTING PUMP! FAILURE TO HEED THESE WARNINGS MAY RESULT IN AN ACCIDENT CAUSING PHYSICAL DAMAGE, SERIOUS PERSONAL INJURY OR DEATH!

1. Read and understand tags and installation and operating instructions.
2. Know operating conditions.
3. Open all lines before starting pump.
4. Install and properly set relief valve in discharge line. Pump not provided with a relief valve.
5. Install proper guard(s). Never operate pump without guard(s) in place.
6. Always use caution near rotating parts.
7. Do not operate this equipment in excess of its rated capacity, pressure, speed and temperature or other than in accordance with instructions contained in the installation and operating instructions.
8. Do not run pump dry. Do not start pump until its filled with liquid to be pumped.
9. See safety precautions.

PRE-START UP CHECKS

1. Make sure the pump and the driver are in proper alignment. For a detailed discussion on the causes of misalignment study the following sections in the inside flap.
 - A. Preparation of foundation for base mounted pumps.
 - B. Aligning driver and pump.
 - C. Installation of pipes.
2. Make sure that the driver will rotate the pump in the direction of the arrow shown on the pump.
3. Fill the pump with the liquid to be pumped. Rotate the drive shaft of the pump four or five rotations
4. Make sure the inlet and discharge lines are open.
5. Start the unit.
6. Check to see if the pump is delivering liquid. If it is not, refer to the section on checking pump performance.
7. Check for any vibration, excessive heat generation or excessive packing leakage.

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 FOR BASE MOUNTED PUMPS

A concrete foundation is best for base mounted units. It supports the units rigidly and absorbs any strain or shock created during operation. The base mounted units must be leveled with shims or integral jacks and securely bolted in that position. Bolting a unit that has not been properly leveled may result in misalignment between pump and driver. This in turn may impose excessive stresses on the pump and accelerate the wear of pump parts.

ALIGNING DRIVER AND PUMP

All base mounted units built at Roper Pump Co. are properly aligned before shipment. However, it is necessary to check the alignment after the unit is mounted on its foundation.

On direct driven units with a coupling between the driver and the pump, check the alignment of coupling halves with a straight edge. Alignment should be checked at least at four points at 90° around the O.D. of the coupling. Do not depend on the flexible coupling to compensate for misalignment.

On belt driven units, make sure, with the help of a straight edge, that the driven and the driver pulleys are in the same plane. Check the belts for proper tension.

INSTALLATION OF PIPES

Piping to the pump should be generally equal in size to the pump inlet and discharge port openings. (When pumping viscous, volatile or high temperature materials the size may change). Gaskets should be used between all flange connections. Be sure that flanges fit without having to be forced.

Use expansion joints to allow for expansion and contraction in the piping. Use pipe supports to prevent the weight of the piping system from causing strain on the pump. Any strain on the pump may cause misalignment resulting in acceleration of wear on pump parts.

GENERAL RECOMMENDATIONS

1. It is good practice to install pressure and/or vacuum gages at both inlet and outlet of the pump to make sure that it conforms to operating specifications.
2. It is recommended that a relief valve be used in the discharge line to protect the system.
3. If there is no relief valve in the system never close 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.

SAFETY PRECAUTIONS

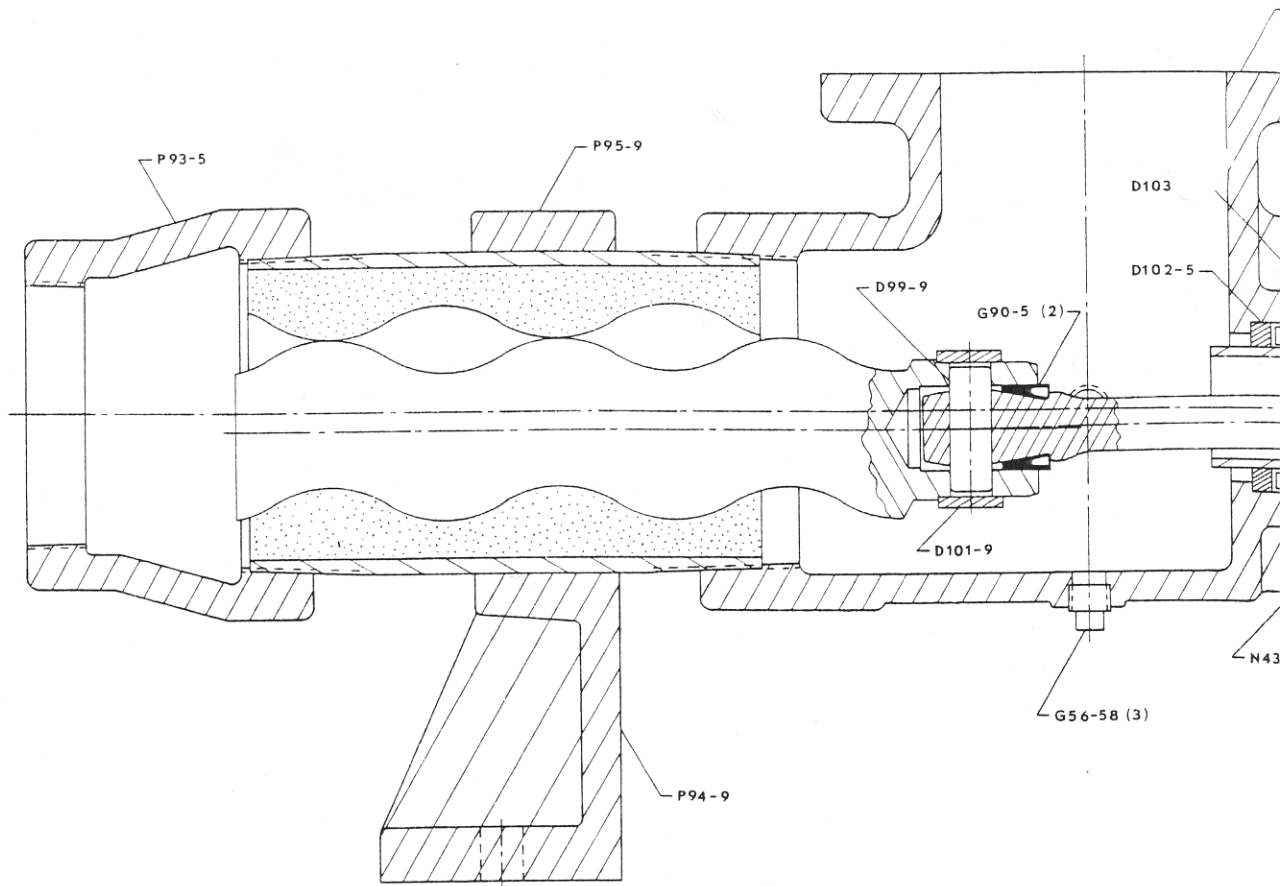
Safe installation, operation and maintenance must be performed by qualified personnel. Do not work on or adjust a pump while it is running except for minor necessary adjustments such as packing. Be careful when working on or near a running pump. Contacting or being caught in rotating parts could cause serious or fatal injury. Guards should be provided for all exposed rotating parts to prevent possible personal injury.

Where the liquid being handled is hazardous or volatile, full precautions should be taken at all times, including the run-in period and during assembly and disassembly of the pump.

INSTRUCTIONS FOR REPLACEMENT OF: 7X219 & 7X228

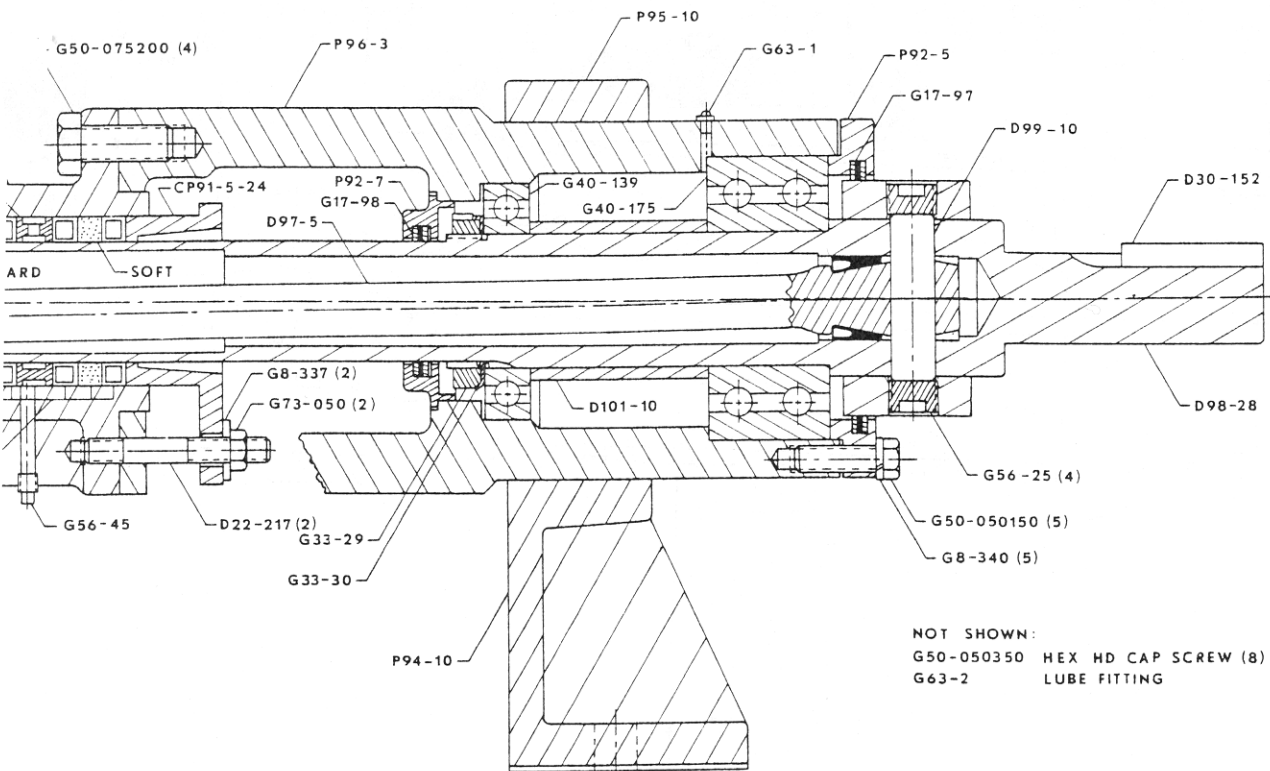
1. **STATOR:**
 - A. Follow steps 1 through 8 in pump disassembly.
 - B. Follow steps 2, 18, 19, 21 through 25 in pump assembly.
2. **ROTOR:**
 - A. Follow steps 1 through 10 in pump disassembly.
 - B. Follow steps 14 through 19, 21, through 25 in pump assembly.
3. **DRIVE SHAFT:**
 - A. Follow steps 1 through 5, 11, 13, through 16 in pump disassembly.
 - B. Follow steps 2, 4 through 10, 13, 22 through 24 and 27 in pump assembly.
4. **PACKING:**
 - A. Follow steps 1, 2, 11 and 17, (do not remove packing gland washer D102-5) in pump disassembly.
 - B. Follow steps 1 and 2 (packing gland washer D102-5 is already in place) and 13 pump assembly.

WHILE REPLACING PARTS ALWAYS INSPECT DISASSEMBLED PARTS AND ADJACENT PARTS, TO SEE IF FURTHER DISASSEMBLY IS NEEDED. REPLACE WORN OR DAMAGED PARTS AS REQUIRED.



INSTRUCTIONS FOR PUMP DISASSEMBLY

1. Before disassembly, drain inlet and discharge lines. Disconnect lines from inlet body and reducing coupling.
2. Remove pipe plug G56-58 from bottom of inlet body P90-5 and drain pump.
3. Using a pipe wrench, remove reducing coupling P93-5.
4. Remove two (2) drive pin retaining screws G56-25 with an Allen wrench.
5. Remove drive shaft pin D99-10 by pushing pin through the drive shaft collar D98-28.
6. Remove two (2) hex head cap screws securing stator support cap P95-9 to stator support P94-9. Remove stator support cap. Place temporary support under inlet body P90-5 and remove stator support.
7. Remove stator, rotor, and attached parts (connecting rod D97-5 and washers G90-5) by unscrewing stator from inlet body P90-5. (Make a mark on the driving end of rotor to correspond with the face of stator. This will be useful for reassembly.)
8. Lubricate inside of stator with soapy water if stator is very dry. Unscrew stator from rotor.
9. Knock-off rotor band D101-9. Remove rotor pin D99-9 by pushing out of rotor, and remove connecting rod D97-5.
10. Inspect connecting rod washers G90-5 and remove if damaged.



11. Remove two (2) G73-050 nuts, and two (2) G8-337 washers from packing gland studs D22-217.
12. Remove four (4) bolts G50-075200 from inlet body P90-5. Place temporary support under bearing housing P96-3. Separate inlet body P90-5 from bearing housing P96-3.
13. Remove five (5) hex head cap screws and bearing coverplate P92-5. Pull G17-97 lip seal out.
14. Pull drive shaft D98-28 and attached parts (bearings G40-175 and G40-139, spacer D101-10, lockwasher G33-30, locknut G33-29) out of bearing housing P96-3. Remove packing gland CP91-5-24 through the opening in the bearing housing.
15. Remove locknut G33-29 and lockwasher G33-30.
16. Press outer bearing G40-175, bearing spacer D101-10, and inner bearing G40-139 from drive shaft. (Be careful not to damage bearings or threads on drive shaft.)
17. Remove packing rings N43-60, lantern ring D103-5, and packing gland washer D102-5. (Packing hooks are commercially available to assist in removing packing.)
18. Remove four (4) hex head cap screws securing body support cap P95-10, to body support P94-10. Remove support cap P95-10 and bearing housing P96-3 from body support.
19. Remove retainer P92-7 and seal G17-98. Separate only if damaged.
20. Visually inspect all parts, replace all worn or damaged parts before reassembling pump.

INSTRUCTIONS FOR PUMP ASSEMBLY

1. Drop packing gland washer D102-5 into inlet body P90-5. Install packing N43-60 and lantern ring D103-5 in pump as shown in drawing. Stagger joints 180 degrees apart. (Make sure packing gland studs D22-217 are installed prior to assembly.)
2. Install pipe plug G56-58 in bottom of inlet body P90-5.
3. Install retainer P92-7 and lip seal G17-98 in bearing housing P96-3. Lubricate bore of lip seal.
4. Press inner bearing G40-139, bearing spacer D101-10, and outer bearing G40-175 on to drive shaft. (Be careful not to damage bearings or threads on drive shaft.)
5. Install lockwasher G33-30 and locknut G33-29 on drive shaft D98-28. Tighten and lock in conventional way.
6. Place packing gland CP91-5-24 in the bearing housing opening.
7. Slide drive shaft D98-28 into bearing housing P96-3. (Make sure drive shaft passes through the packing gland) until outer bearing seats in bearing housing.
8. Grease pump bearings to about one-fourth capacity of bearing housing. (Use an approved grade such as GULFLEX "A" Multi-purpose grease).
9. Install lip seal G17-97 in coverplate P92-5. Lubricate bore of lip seal.
10. Slide coverplate P92-5 over drive shaft D98-28. Secure with five (5) hex head screws.
11. For ease of assembly, stand inlet body P90-5 on end with threaded pipe hole.
12. Assemble bearing housing P96-3 on to inlet body P90-5, allowing drive shaft D98-28 to pass through packing N43-60. Secure with four (4) G50-075200 bolts.
13. Position packing gland CP91-5-24 on two (2) studs D22-217. Assemble two (2) flat washers G8-337 and two (2) nuts G73-050 on studs D22-217. (Final tightening should be done when pump is installed and operating.)
14. Slide two (2) rubber washers G90-5 on connecting rod D97-5. (Lubricate washers before installation.)
15. Apply a generous amount of grease that is insoluble in water (for example Lubriplate 630-A) to one end of the connecting rod D97-5 and slide into rotor until pin holes line up.
16. Install rotor drive pin D99-9 through connecting rod D97-5.
17. Press or hammer rotor band D101-9 on to rotor.
18. Lubricate inside of stator and profile of rotor with soapy water. Slide rotor into stator until mark on rotor lines up with stator. (See step No. 7 in disassembly.)
19. Apply a generous amount of water resistant grease on the free end of the connecting rod D97-5.
20. At this point, re-position main body to a horizontal position. The pump should be secured in order to install the following parts.
21. Start threads of stator into inlet body P90-5. Position connecting rod D97-5 in the drive shaft D98-28 until pin holes line up.
22. Install drive shaft pin D99-10 through the connecting rod D97-5.
23. Install two (2) drive pin retaining screws G56-25 with an Allen wrench.
24. Tighten stator into inlet body P90-5.
25. Install reducing coupling P93-5.
26. Set pump on body support P94-10 and stator support P94-9. Place body support cap P95-10 and stator support cap P95-9 in position and secure in place with eight (8) hex head cap screws.
27. Grease packing thoroughly with a water resistant grease.

NOTE: Part numbers shown in instructions apply only to type GH — pumps. For all others substitute numbers shown on Parts List under appropriate type heading (GH — or NN —). Select stator number that corresponds to type designation on your pump (GHL, GHM, etc).

PARTS LIST FOR 7X219 & 7X228

COMMON PARTS

DESCRIPTION	QTY	PART NO.	DESCRIPTION	QTY	PART NO.
Body support	1	P94-10	Bolt	4	G50-075200
Body support cap	1	P95-10	Stud	2	D22-217
Stator support	1	P94-9	Retainer	1	P92-7
Stator support cap	1	P95-9	Retaining pin screws	2	G56-25
Hex head cap screws	8	G50-050350	Nut	2	G73-050
Pipe plug	3	G56-58	Lip seal	1	G17-98
Pipe plug	1	G56-45	Key	1	D30-152
Lube fitting	1	G63-1	Ball bearing (inner)	1	G40-139
Lube fitting	1	G63-2	Ball bearing (outer)	1	G40-175
Rotor band	1	D101-9	Bearing spacer	1	D101-10
Lantern ring	1	D103-5	Lockwasher (bearing)	1	G33-30
Flat washer	2	G8-337	Locknut (bearing)	1	G33-29
Bearing coverplate	1	P92-5	Lip seal	1	G17-97
Hex head cap screws	5	G50-050150	Lockwasher	5	G8-340

PARTS DEPENDING ON CONSTRUCTION

DESCRIPTION	QTY	PART NO.	
		GH —	NN —
Connecting rod	1	D97-5	D97-11
Rotor drive pin	1	D99-9	D99-21
Drive shaft pin	1	D99-10	D99-22
Drive shaft	1	D98-28	D98-33
Packing gland	1	CP91-5-24	CP91-5-25
Packing gland washer	1	D102-5	D102-11
Inlet body	1	P90-5	CP90-5
Bearing housing	1	P96-3	P96-3
Packing set	1	N43-60	N43-92
Reducing coupling	1	P93-5	CP93-5
Connecting rod washer	2	G90-5 (for L,M,C)	G90-5 (for L,M,C)
Connecting rod washer	2	G90-11 (for V)	G90-11 (for V)

DESCRIPTION

QTY.

PUMP

			71219	71228	72219	72228	73219
Stator	GHL	1	D95-97	D95-121	D95-101	D95-125	D95-105
	GHM	1	D95-98	D95-122	D95-102	D95-126	D95-106
	GHC	1	D95-99	D95-123	D95-103	D95-127	D95-107
	GHV	1	D95-100	D95-124	D95-104	D95-128	D95-108
	NNL	1	D95-109	D95-129	D95-113	D95-133	D95-117
	NNM	1	D95-110	D95-130	D95-114	D95-134	D95-118
	NNC	1	D95-111	D95-131	D95-115	D95-135	D95-119
	NNV	1	D95-112	D95-132	D95-116	D95-136	D95-120
Rotor	GH	1	D96-13	D96-16	D96-14	D96-17	D96-15
	NN	1	D96-30	D96-33	D96-31	D96-34	D96-32

NOTE: Rotor part numbers are for standard size, chrome plated varieties only. For non-plated, undersize, or other variations consult factory.

PROPER CARE OF PACKING

1. The packing gland should be pulled down snugly so as to prevent excessive leakage through the packing; but not so tight that it would cause overheating. Always adjust packing gland evenly. Do not cock gland.
2. Roper pumps are equipped with a lantern ring in the midsection of the packing with access to a lube fitting on the external surface. Lubricating the packing often with small amounts of grease which is insoluble in the liquid pumped will increase life of the packing.
3. A scored drive shaft reduces the life of packing. The shaft should be replaced.
4. When replacing worn packing use standard formed packing (do not use one piece spiral wrap packing). While installing, tamp packing in place staggering joints 180° apart.
5. After new packing is installed pull packing gland down snugly and evenly. During run-in period of pump it may be necessary to backoff nuts to prevent overheating of packing area.
6. A small amount of leakage through the packing is normal and is necessary for proper operation.

Note: Where liquid being handled is hazardous or volatile, full precaution should be taken.

LUBRICATION OF PUMPS

Pump bearings are ball bearings and are grease lubricated.

1. Do not lubricate bearings very often because more bearings are ruined due to over attention than lack of attention.
2. Do not lubricate with any grease except approve bearing grease such as Gulflex 'A' multi-purpos grease.
3. Under normal operating conditions bearings should not need lubrication for the first 12 months.
4. The bearing-shaft assembly should be removed from the pump approximately every 12 months and washed clean with benzene.
5. Remove any old grease left in bearing housing and refill bearings with new grease.
6. Add a few drops of oil to bearing seals before reassembling.
7. While replacing pins, connecting rod, drive shaft or rotor lubricate the drive area generously with a grease that is resistant to the liquid being pumped.

In a new pump or relubricated pump the bearings may run hot for a few days before temperature levels off.

CHECKING PUMP PERFORMANCE

A SUMMARY OF THE CAUSES OF COMMON MALFUNCTIONS OF PROGRESSING CAVITY PUMPS.

NO LIQUID DELIVERED

1. Pump rotating in wrong direction.
2. Inlet lift too high. Check this with gauge at pump inlet.
3. Clogged inlet line.
4. Air pockets or vapor lock.
5. Air leaks in inlet line.
6. Faulty relief valve in system.

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, tight packing gland, or misalignment of piping.
6. Relief valve in system not operating properly.

INSUFFICIENT LIQUID DELIVERED

1. Air leaks in inlet line.
2. Air leaks through packing.
3. Speed too low.
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 misalignment.
10. Excessive clearance in pump caused by wear or corrosion.
11. Faulty relief valve in system.

EXCESSIVE NOISE

1. Starved pump.
2. Air leaks in inlet line.
3. Air or gases in liquid.
4. Pump speed too high.
5. Improper mounting. Check alignment thoroughly.



Dependable pumps for over 120 years!