

# OPERATOR'S MANUAL

# 650949-X

INCLUDING: SPECIFICATIONS, SERVICE KITS, GENERAL INFORMATION, TROUBLESHOOTING.

INCLUDE MANUALS: 6720X-X Lower Pump End (pn 97999-788), 67147-B Hydraulic Motor (pn 97999-1219) & S-632 General Information Manual (pn 97999-624)

RELEASED: 8-28-98

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(REV. E)

**2.062 SQ." HYDRAULIC MOTOR**  
**0.3:1 RATIO**  
**5.75" STROKE**

## 650949-X4X FOUR BALL PUMP SERIES 300 SERIES STAINLESS STEEL



**READ THIS MANUAL CAREFULLY BEFORE INSTALLING,  
OPERATING OR SERVICING THIS EQUIPMENT.**

It is the responsibility of the employer to place this information in the hands of the operator. Keep for future reference.

### SERVICE KITS

- Use only genuine ARO® replacement parts to assure compatible pressure rating and longest service life.
- **637449** for repair of hydraulic motor section.
- **637317-X4B** for repair of lower pump section. Refer to the chart on page 2 for description of -X4X options.

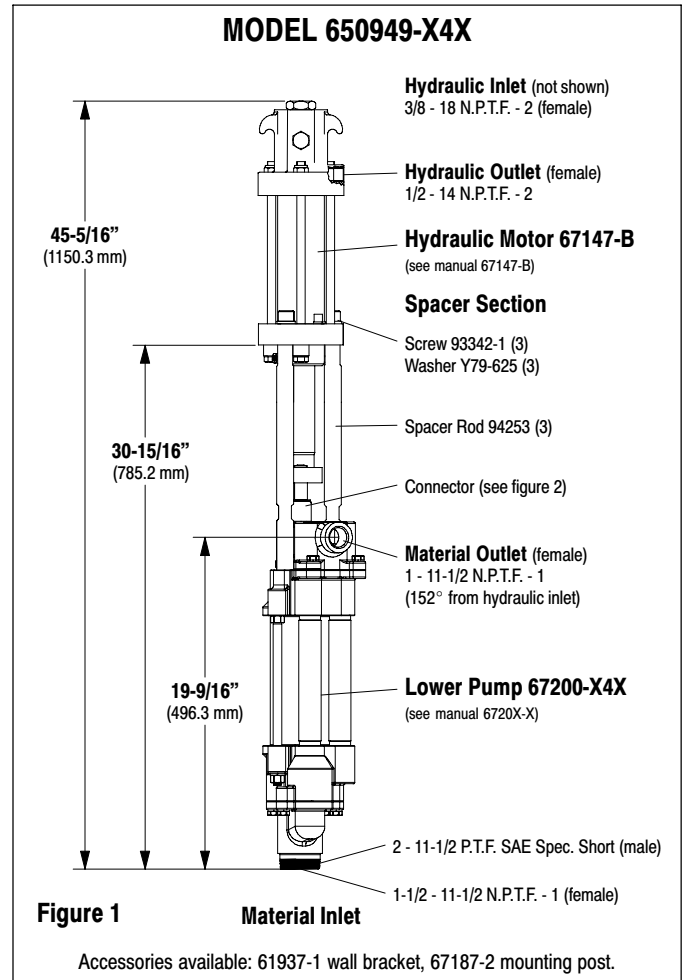
### SPECIFICATIONS

<b>Model Series</b> (refer to option chart)	650949-X4X
<b>Type</b>	Hydraulically Operated, Four Ball
<b>Ratio</b>	0.3:1
<b>Hydraulic Motor</b>	67147-B
<b>Motor Repair Kit</b>	637449
<b>Motor Size</b>	2.062 sq." (13.3 sq. cm)
<b>Stroke</b>	5.75" (14.6 cm)
<b>Hydraulic Inlet (female)</b>	3/8 - 18 N.P.T.F. - 2
<b>Hydraulic Return (female)</b>	1/2 - 14 N.P.T.F. - 2
<b>Lower Pump End Series</b>	67200-X4X
<b>Lower Pump Repair Kit</b>	637317-X4B
<b>Material Inlet (female)</b>	1-1/2 - 11-1/2 N.P.T.F. - 1
(male)	2 - 11-1/2 P.T.F. SAE Spec Short
<b>Material Outlet (female)</b>	1 - 11-1/2 N.P.T.F. - 1
<b>Weight</b>	70 lbs (31.8 kgs)

### PERFORMANCE

<b>Hydraulic Inlet Pressure Range</b>	50 - 1200 p.s.i. (3.4 - 82.8 bar)
<b>Fluid Pressure Range</b>	15 - 386 p.s.i. (1.0 - 26.6 bar)
<b>Required H-power @ 50 c.p.m.</b>	3.2 @ 1200 (82.8 bar)
<b>Hydraulic flow required @ 50 c.p.m.</b>	4.9 g.p.m. (18.5 l.p.m.)
<b>Maximum rec'd Cycles / Minute</b>	50
<b>Displacement In<sup>3</sup> Per Cycle</b>	78.6
<b>Volume / Cycle</b>	43.5 oz. (1287.6 ml)
<b>Cycles Per Gallon</b>	2.9
<b>Flow @ 50 Cycles / Minute</b>	17.0 g.p.m. (64.4 l.p.m.)
<b>Noise Level</b>	N/A
<b>Maximum Temperature Limit</b>	130° F (54° C)

### PUMP DATA

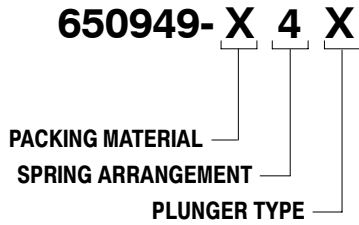


### IMPORTANT

This is one of the four documents which support the pump. Replacement copies of these forms are available upon request.

- 650949-X Model Operator's Manual (pn 97999-794)
- S-632 General Information - Industrial Piston Pumps (pn 97999-624)
- 6720X-X Lower Pump End Operator's Manual (pn 97999-788)
- 67147-B Hydraulic Motor Operator's Manual (pn 97999-1219)

# PUMP OPTION DESCRIPTION CHART



**PACKING MATERIAL** (packings are upper and lower unless noted)

- 7 Glass filled Teflon (upper) / Virgin Teflon (lower)
- C UHMW-PE
- F UHMW-PE / Leather staggered (upper) / UHMW-PE (lower)
- P UHMW-PE / Teflon staggered (upper) / UHMW-PE (lower)
- R Teflon / UHMW-PE staggered (upper) / Virgin Teflon (lower)

**SPRING ARRANGEMENT**

- 4 Multiple wave spring

**PLUNGER TYPE**

- 3 Hardened stainless steel with hard chrome plating
- B Hardened stainless steel with ceramic coating

## GENERAL DESCRIPTION

**⚠ WARNING** HAZARDOUS PRESSURE. Do not exceed maximum operating pressure of 386 p.s.i. (26.6 bar) at 1200 p.s.i. (82.8 bar) inlet hydraulic pressure.

$$\text{PUMP RATIO X} = \frac{\text{MAXIMUM PUMP FLUID PRESSURE}}{\text{INLET PRESSURE TO PUMP MOTOR}}$$

Pump ratio is an expression of the relationship between the pump motor area and the lower pump end area. EXAMPLE: When 150 p.s.i. (10.3 bar) inlet pressure is supplied to the motor of a 5:1 ratio pump, it will develop a maximum of 750 p.s.i. (51.7 bar) fluid pressure (at no flow) – as the fluid control is opened, the flow rate will increase as the motor cycle rate increases to keep up with the demand.

**⚠ WARNING** Refer to general information sheet for additional safety precautions and important information.

- The four-ball pumps are primarily designed for the high volume transfer of light and medium viscosity fluids. Stainless steel construction offers compatibility with a wide range of fluids. The lower pump is designed for easy priming and the double acting feature is standard in all ARO industrial pumps. Material is delivered to the pump discharge outlet on both the up and down stroke.
- The motor is connected to the lower pump end by a spacer section. This allows for lubrication of the upper packing gland and prevents motor contamination because of normal wear and eventual leakage through the material packing gland. Be sure the solvent cup is adequately filled with lubricant to protect the upper packings and insure longest service life.

## TROUBLE SHOOTING

Pump problems can occur in either the hydraulic motor section or the lower pump end section. Use these basic guidelines to help determine which section is affected.

**If the pump will not cycle.**

- Be certain to first check for non-pump problems including kinked, restrictive or plugged inlet / outlet hose or dispensing device. Depressurize the pump system and clean out any obstructions in the inlet / outlet material lines.
- Refer to the motor manual for trouble shooting if the pump does not cycle and / or hydraulic fluid leaks from the hydraulic motor.

**If the pump cycles but does not deliver material.**

- Refer to the lower pump end manual for further trouble shooting.

## PUMP CONNECTION - UPPER / LOWER

**NOTE: All threads are right hand.**

1. Lay the pump assembly on a workbench.
2. Remove the three screws and washers from the three spacer rods (see figure 1).
3. Pull the hydraulic motor from the lower pump end until motor piston rod is in the “down” position and lower pump end rod is in “up” position.
4. Using e-ring pliers, slide the retaining ring up far enough to allow the sleeve to move upward and release the two connectors (see figure 2).

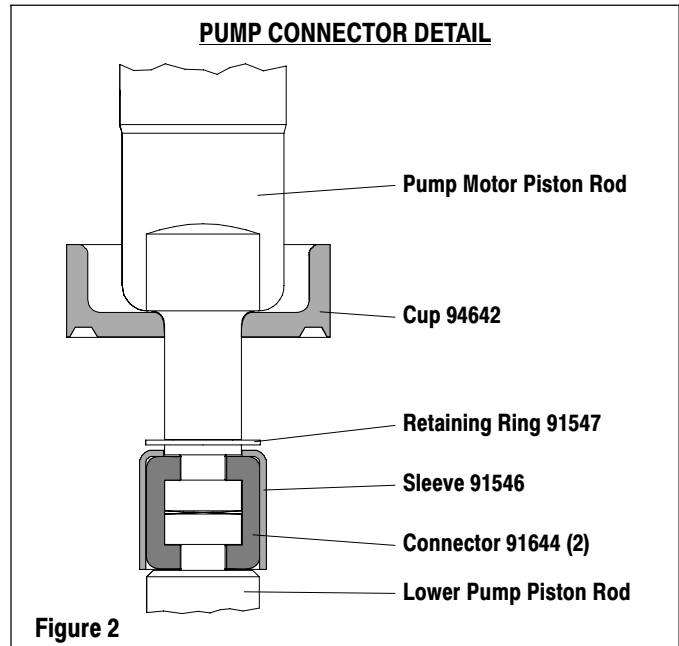


Figure 2

**REASSEMBLY**

1. Align the pump motor with the lower pump end.
2. Install the two connectors and retain with the sleeve, slide the retaining ring back into position.
3. Reinstall the spacer rods to the pump motor.
4. Bring the motor and lower pump together and retain with the three screws and washers.