

# OPERATOR'S MANUAL

# 650933-X

SPECIFICATIONS, SERVICE KITS, GENERAL INFORMATION, TROUBLESHOOTING

INCLUDE MANUALS: 6690X-X LOWER PUMP END (PN 97999-031) &  
FORM 3638-2 GENERAL INFORMATION MANUAL (PN 97999-353)

RELEASED: 8-30-96

REVISED: 6-4-10  
(REV. 02)

**2.062 SQ." HYDRAULIC MOTOR**  
**3.3:1 RATIO**  
**6" STROKE**

## 650933-X TWO-BALL PUMP SERIES STAINLESS STEEL



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

### SERVICE KITS

- Use only genuine ARO® replacement parts to assure compatible pressure rating and longest service life.
- 637164 for repair of Hydraulic Motor section.**  
Service Note: The Hydraulic Motor Service/Parts Manual is not shipped with the pump but it is included with each Service Kit. If this Service/Parts Information is needed, request the Hydraulic Motor Operator's Manual from ARO. (Manual 61588-100, PN 97999-063).
- 637191-X43 for repair of Lower Pump section.**  
Refer to the chart on page 2 for description of -XXX options.

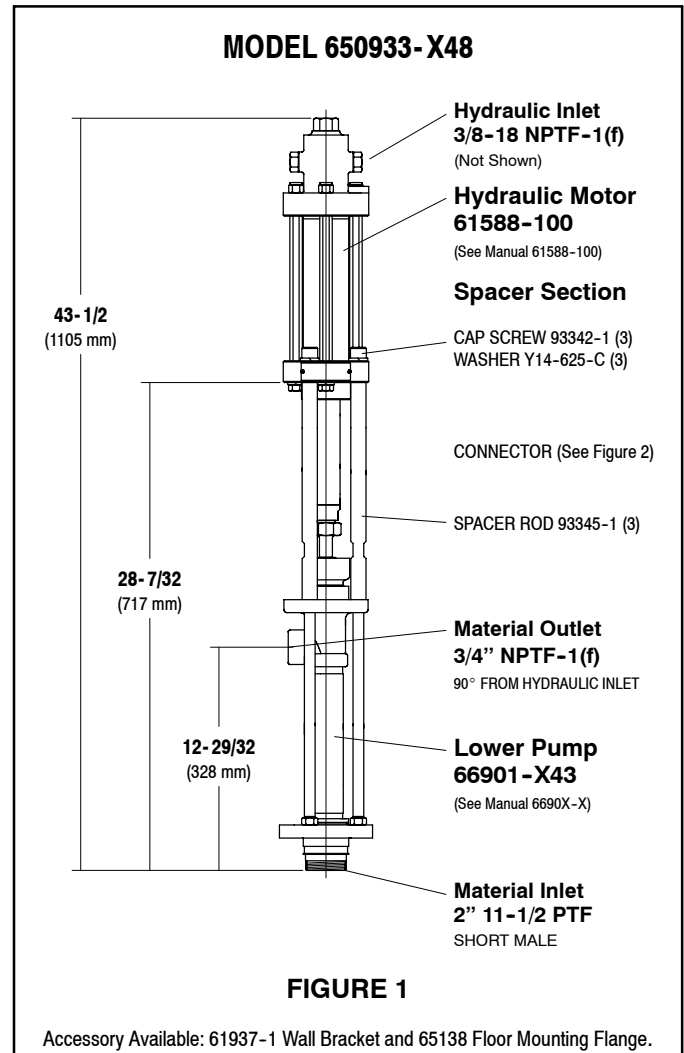
### SPECIFICATIONS

<b>Model Series</b> (Refer to option chart)	650933-X48
<b>Type</b>	Hydraulically Operated, Two-Ball
<b>Ratio</b>	3.3:1
<b>Hydraulic Motor</b>	61588-100
<b>Motor Repair Kit</b>	637164
<b>Motor Size</b>	2.062 sq." (13.3 sq. cm)
<b>Stroke</b>	6"
<b>Hydraulic Inlet</b>	3/8" - 18 NPTF-1(f)
<b>Hydraulic Return</b>	1/2" - 14 NPTF-1(f)
<b>Lower Pump End Series</b>	66901-X43
<b>Lower Pump Repair Kit</b>	637191-X43
<b>Material Inlet</b>	2" 11-1/2 PTF(m)
<b>Material Outlet</b>	3/4" NPTF-1(f)

### PERFORMANCE

<b>Hydraulic Inlet Pressure Range</b>	50 - 1200 PSI (3.4 - 83 bar)
<b>Fluid Pressure Range</b>	165 - 3995 PSI (11.4 - 276 bar)
<b>Max. Rec'd Cycles / Minute</b>	50
<b>Displacement In<sup>3</sup> Per Cycle</b>	7.458
<b>Volume / Cycle</b>	4.1 oz. (122 ml)
<b>Cycles Per Gallon</b>	31.0
<b>Flow @ 50 Cycles / Minute</b>	1.6 GPM (6.1 lpm)
<b>Noise Level</b>	N/A

### PUMP DATA



### IMPORTANT

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

- ☒ 650933-X MODEL OPERATOR'S MANUAL
- ☐ GENERAL INFORMATION - INDUSTRIAL PISTON PUMPS
- ☐ 6690X-X LOWER PUMP END OPERATOR'S MANUAL
- ☐ 61588-100 HYDRAULIC MOTOR OPERATOR'S MANUAL

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# ARO

**IR** Ingersoll Rand  
Industrial Technologies

# PUMP OPTION DESCRIPTION CHART

**650933-X 4 8**

PACKING MATERIAL — PLUNGER TYPE  
— SPRING ARRANGEMENT

## PACKING MATERIAL (PACKINGS ARE UPPER AND LOWER UNLESS NOTED)

3 GLASS FILLED PTFE	P UHMW-PE/PTFE STAG'D (UPPER)
C UHMW-PE	UHMW-PE (LOWER)
G UHMW-PE/LEATHER STAG'D	R PTFE/UHMW-PE STAG'D (UPPER)
	PTFE (LOWER)

## SPRING ARRANGEMENT

4 MULTIPLE WAVE SPRING

## PLUNGER TYPE

8 PLUNGER W/ALTERNATE PISTON

## GENERAL DESCRIPTION

**⚠ WARNING** HAZARDOUS PRESSURE. Do not exceed maximum operating pressure of 3995 psi (276 bar) at 1200 psi (83 bar) inlet hydraulic pressure.

**PUMP RATIO X  
INLET PRESSURE TO PUMP MOTOR = MAXIMUM PUMP  
FLUID PRESSURE**

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. (52 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 Two-Ball pumps are primarily designed for the pumping of medium viscosity fluids compatible with stainless steel. 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.**

- Lay the pump assembly on a workbench.
- Remove the three screws and washers from the three spacer rods (see figure 1).
- 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.
- 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).

### PUMP CONNECTOR DETAIL

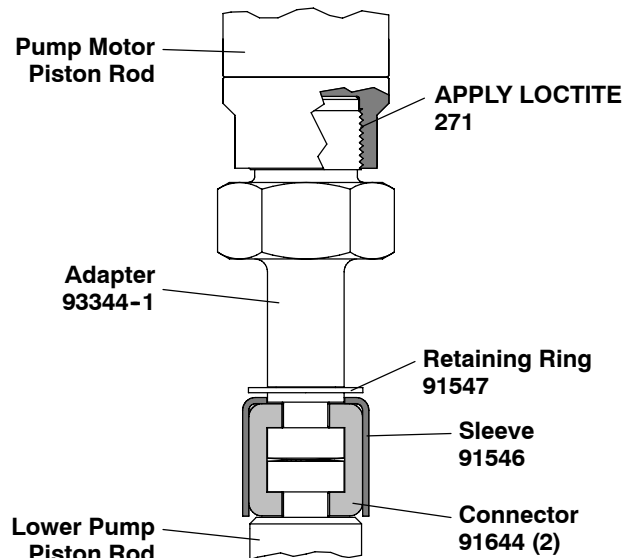


FIGURE 2

### REASSEMBLY

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