

# OPERATOR'S MANUAL

# 650409-X

## SPECIFICATIONS, SERVICE KITS, GENERAL INFORMATION, TROUBLESHOOTING

INCLUDE MANUALS: 65106-X Lower Pump End (pn 97999-578), 6544X-X Air Motor (pn 97999-64) & S-632 General Information Manual (pn 97999-624).

RELEASED: 5-28-93

REVISED: 10-23-15

(REV. D)

**4-1/4" AIR MOTOR**

**9:1 RATIO**

**4" STROKE**

## 650409-X

## TWO-BALL PUMP 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.
- **61268** for repair of air motor section.
- **637010** for repair of 65106 lower pump ends.  
**637010-4** for repair of 65106-4 lower pump ends.  
**637011** for replacement of lower ball check.

### SPECIFICATIONS

<b>Model Series</b> (refer to option chart)	650409-X
<b>Type</b>	Air Operated, Two-ball
<b>Ratio</b>	9:1
<b>Air Motor</b>	
650409	65444-B
650409-1	65444-2-B
650409-4	65444-B
650409-10	65444-B
650409-11	65444-B
650409-12	65444-B
<b>Motor Repair Kit</b>	61268
<b>Motor Diameter</b>	4-1/4" (10.795 cm)
<b>Stroke (Double Acting)</b>	4" (10.16 cm)
<b>Air Inlet (female)</b>	1/2 - 14 NPTF - 1
<b>Air Exhaust (female)</b>	1-1/4 - 11-1/2 NPTF - 1
<b>Lower Pump End Series</b>	
650409	65106
650409-1	65106-4
650409-4	65106-4
650409-10	65106-10
650409-11	65106-11
650409-12	65106-12
<b>Lower Pump Repair Kit</b>	637010-X
<b>Material Inlet (female)</b>	1-1/4 - 11-1/2 NPSM
<b>Material Outlet (female)</b>	3/4 - 14 NPTF - 1
<b>Weight</b>	45 lbs (20.4 kgs)

### PERFORMANCE

<b>Air Inlet Pressure Range</b>	0 - 150 psig (0 - 10.3 bar)
<b>Fluid Pressure Range</b>	0 - 1350 psig (0 - 93.1 bar)
<b>Maximum Rec'd Cycles / Minute</b>	60
<b>Displacement In<sup>3</sup> Per Cycle</b>	11.0
<b>Volume / Cycle</b>	6.1 oz. (180.2 ml)
<b>Cycles Per Gallon</b>	21
<b>Flow @ 60 Cycles / Minute</b>	2.9 gpm (10.8 lpm)
<b>Noise Level @ 60 psig - 40 cpm</b>	80.0 dB(A) <sup>①</sup>

① Tested with 91790 muffler installed. The pump sound pressure level has been updated to an Equivalent Continuous Sound Level (L<sub>Aeq</sub>) to meet the intent of ANSI S1.13-1971, CAGI-PNEUROP S5.1 using four microphone locations.

### PUMP DATA

#### MODEL 650409-X

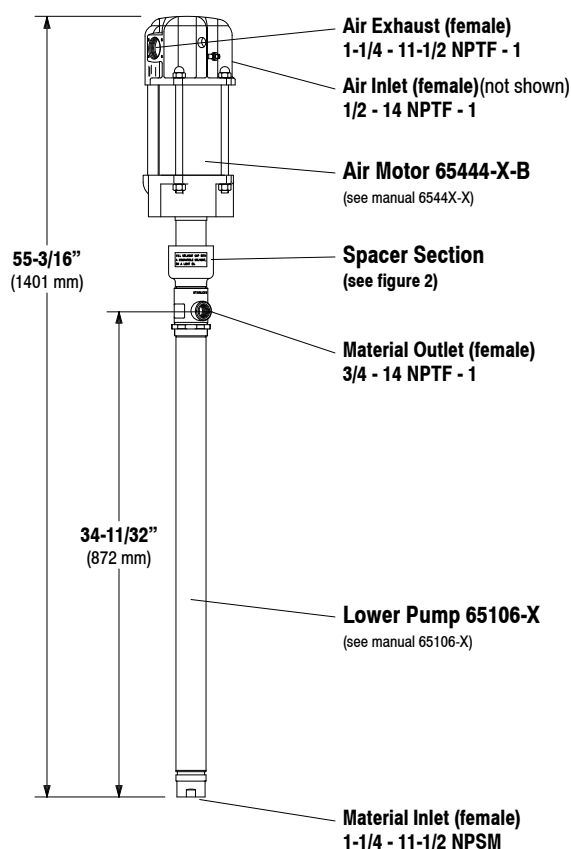


Figure 1

NOTE: Dimensions are shown in inches and (mm), supplied for reference only.  
Accessories: 66100 wall mount bracket, 91790 silencer.

### IMPORTANT

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

- ☒ 650409-X Model Operator's Manual (pn 97999-581)
- ☐ General Information - Industrial Piston Pumps (pn 97999-624)
- ☐ 65106-X Lower Pump End Operator's Manual (pn 97999-578)
- ☐ 6544X-X Air Motor Operator's Manual (pn 97999-64)

INGERSOLL RAND COMPANY LTD  
209 NORTH MAIN STREET - BRYAN, OHIO 43506

① (800) 495-0276 • FAX (800) 892-6276  
arozone.com

© 2015

CCN 81690570

# ARO

**IR** Ingersoll Rand

## PUMP OPTION DESCRIPTION CHART

650409 - X

DESCRIPTION

### DESCRIPTION

- PTFE Packing / Plain Rod & Tube, Standard Motor
- 1 UHMW-PE Packing / Plain Rod & Tube, Counter Motor
- 4 UHMW-PE Packing / Plain Rod & Tube, Standard Motor
- 10 UHMW-PE/Leather Staggered Upper/ UHMW-PE Lower
- 11 Leather Upper/ UHMW-PE Lower
- 12 PTFE/Leather Staggered Upper/ PTFE Lower

### GENERAL DESCRIPTION

**⚠ WARNING HAZARDOUS PRESSURE.** Do not exceed maximum operating pressure of 1,350 psig (93 bar) at 150 psig (10.3 bar) inlet air 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 psig (10.3 bar) inlet pressure is supplied to the motor of a 9:1 ratio pump it will develop a maximum of 1,350 psig (93 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 design provides for easy priming of the lower foot valve. 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 with a spacer tube and solvent cup. This allows for lubrication of the upper packing gland and to prevent air motor contamination because of normal wear and eventual leakage through the material packing gland.

### TROUBLE SHOOTING

Pump problems can occur in either the air motor section or the lower pump end section. Use these basic guidelines to help determine which section is affected. Be sure to eliminate any possible non-pump problems before suspecting pump malfunction.

#### Pump will not cycle.

- No pressure to the motor. See motor manual.
- Restricted return lines. Clean obstruction.
- Damaged motor. Service motor

#### No material at the outlet (pump continually cycles).

- Check the material supply, disconnect or shut off the air supply and replenish the material, reconnect.

#### Material on one stroke only (fast downstroke).

- The lower check may not be seating in the foot valve (see lower pump disassembly). Remove the check from the foot valve, clean and inspect the valve seat area. If check or foot valve are damaged, replace.

#### Material on one stroke only (fast upstroke).

- The middle packings may be worn (see lower pump disassembly). Replace the seals as necessary.

#### Material leakage out of the solvent cup or material appears on the pump plunger rod.

- Tighten the solvent cup until leakage discontinues. If this procedure does not aid in stopping the leakage problem, the upper packings may be worn (see lower pump disassembly). Replace the seals as necessary.

### PUMP CONNECTION - UPPER / LOWER

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

1. Loosen (90606) lock nut and unscrew entire pump from the air motor. This will expose (90609) retaining screw (see figure 2).
2. Unscrew (90609) retaining screw to remove pump assembly from the air motor.
3. Remove (90608) shoulder nut to remove (90609) retaining screw.

#### PUMP CONNECTOR DETAIL

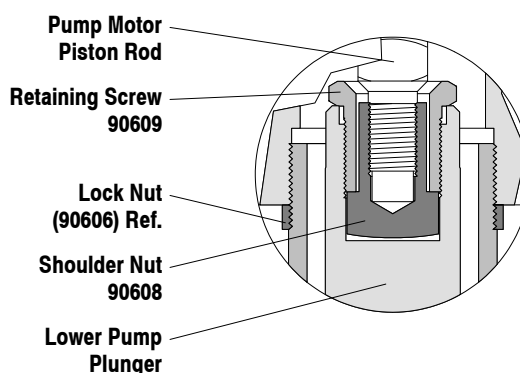


Figure 2

#### REASSEMBLY

1. Slide (90609) retaining screw over air motor rod (see figure 2).
2. Screw (90608) shoulder nut to air motor rod.
3. Apply Loctite 242 to threads of (90609) retaining screw and screw (90609) retaining screw into lower pump plunger.
4. Screw the lower pump assembly to the air motor.
5. Position air motor exhaust port approximately 90° from lower pump outlet.
6. Screw (90606) lock nut against air motor base and tighten to 50 - 65 ft lbs (67.8 - 88.1 Nm).