Service Guide

9916-A1

Low-Pressure Transfer Pump

Description

The major components of model 9916-A1 transfer pump consist of an air-operated motor (equipped with a shut-off valve) and a pump tube. The air motor connects directly to the double-acting reciprocating pump tube.

This low-pressure (1:1 ratio) transfer pump is designed to deliver a range of light weight oils including gear lubricants.

Mounting

This pump mounts directly onto original containers or bulk tanks that have a 2 " NPTF bung fitting. The required length downtube screws directly into the 1-1/2 " NPTF female threads in the valve body.

As an alternative, the pump can also mount to a wall (with the use of a wall bracket) and be used with an optional suction hose. See **Table 2** for details.

Also, the pump screws directly onto two different size threaded standpipes [1-1/2 " NPTF (m) or 2 " NPTF (f)].

Specifications

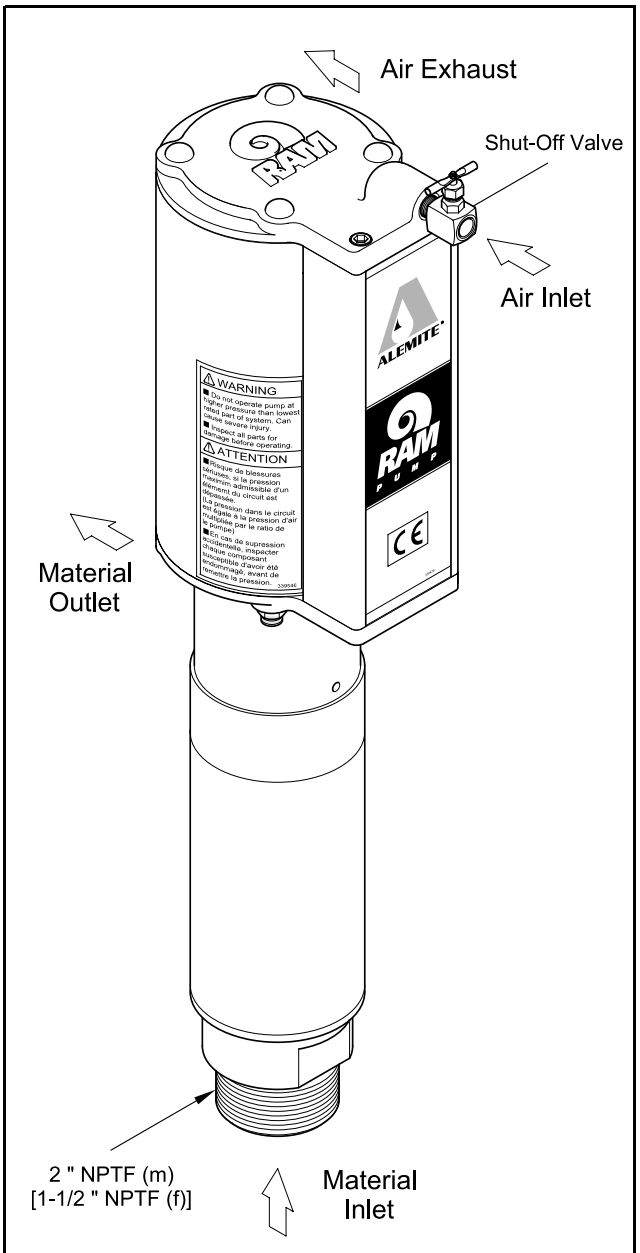
Air Motor

Piston Diameter x Stroke		Air Inlet	Maximum Air Pressure	
Inches	Centimeters		psi	Bars
3 x 3-5/16	7.6 x 8.4	1/4 " NPTF (f)	150	10.3
For details on the air motor, refer to Service Guide SER **339413**				

Pump Tube

Max. Material Pressure		Delivery/Minute (Approximate) *		Material Outlet	
psi	Bars	Gallons	Liters	w/Bushing	w/o Bushing
150	10.3	16	60.6	1/2 " NPTF (f)	3/4 " NPTF (f)
* For detailed information, refer to **Figure 3**.					

Table 1 *Model 9916-A1 Specifications*



Overall Height		Weight	
Inches	Cm	lbs	kg
18	45.7	14.7	6.7

Figure 1 *Low-Pressure Transfer Pump Model 9916-A1*

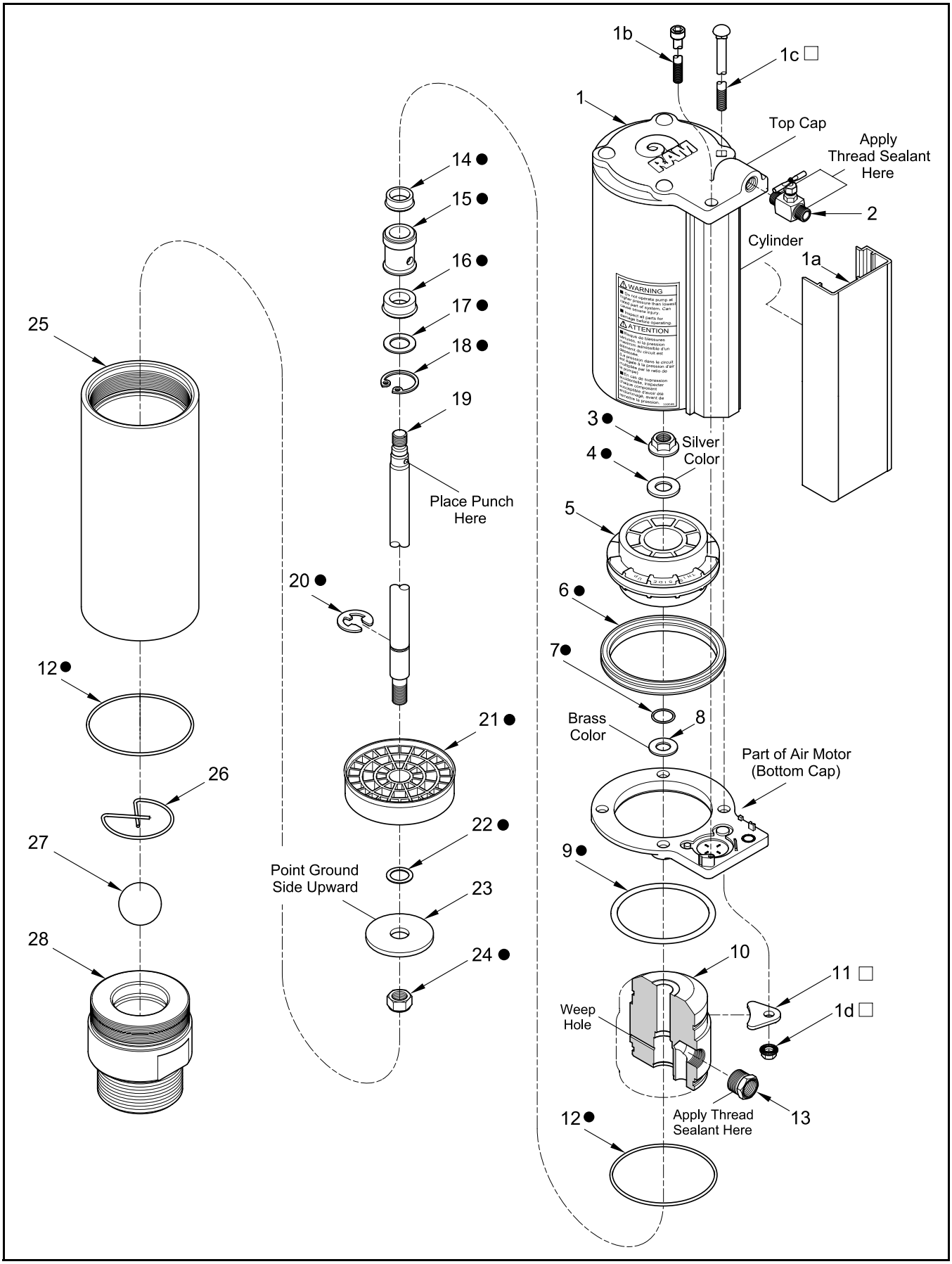


Figure 2 *Low-Pressure Transfer Pump Model 9916-A1 - Exploded View*

Item No.	Part No.	Description	Qty	Notes		Numeric Order Part # (Item #)
1		Motor Assembly, Air	1		See SER **339413**	*14536* (4)
1a	340053	Cover (w/o Decals)	1		Included w/ Motor Assembly	*51929* (24)
1b		Screw, Cap, 1/4 " -20 x 6-1/2 "	1			*170710* (20)
1c		Bolt, Carriage, 1/4 " -20 x 7-1/2 "	4	□		X171000-7 (7)
1d		Nut, Serrated Flange, 1/4 " -20	4	□		X171000-105 (12)
2	319391	Valve, Shut-Off	1			X171003-10 (9)
3	339513	Nut, Flange, 3/8 " -24	1	●		*171006-17* (18)
4		Washer, 3/8 " ID x 7/8 " OD	1	●		X171008-37 (6)
5	339429	Piston, Air	1			*172190-24* (14)
6	X171008-37	Quad-Ring, 2-5/8 " ID x 3 " OD	1	●	Pack of Ten (10)	*172190-26* (16)
7	X171000-7	O-Ring, 3/8 " ID x 1/2 " OD	1	●		319391 (2)
8	338109	Washer, 3/8 " ID x 3/4 " OD	1			320531 (13)
9	X171003-10	O-Ring, 2-3/4 " ID x 3 " OD	1	●	Pack of Ten (10)	*323474* (17)
10	339971	Body, Pump	1			338109 (8)
11	339412	Keeper	4	□		338259 (23)
12	X171000-105	O-Ring, 3 " ID x 3-1/8 " OD	2	●	Pack of Ten (10)	338271 (21)
13	320531	Bushing, 3/4 " NPTF (m) x 1/2 " NPTF (f)	1			*338272* (22)
14		Seal, 1/2 " ID x 3/4 " OD	1	●		338339-2 (27)
15	339976	Bearing (Brass)	1	●		*339375* (1d)
16		Seal, 1/2 " ID x 7/8 " OD	1	●		339412 (11)
17		Washer	1	●		*339413* (1)
18		Ring, Retaining, Internal	1	●		*339425* (1c)
19	339974	Rod	1			339429 (5)
20		Ring, Retaining, External	1	●		339513 (3)
21	338271	Piston, Fluid (Nylon)	1	●		339971 (10)
22		Gasket (Aluminum)	1	●		339972 (25)
23	338259	Plate (Stainless Steel)	1			339973 (28)
24		Nut, Elastic Stop, 3/8 " -24	1	●		339974 (19)
25	339972	Cylinder	1			339976 (15)
26	340189	Stop	1			*340027* (1b)
27	338339-2	Ball, Check	1			340053 (1a)
28	339973	Body, Valve	1			340189 (26)

Legend:
Part numbers left blank (or in *italics*) are not available separately
● □ designates a repair kit item

Repair Kits

Part No.	Kit Symbol	Description
393763	●	Kit, Major Repair (Includes tube of 393590 Teflon Grease)
393708	□	Kit, Repair, Air Motor Keeper
393530-24		Kit, Seal [includes five (5) of item number **14**]
393530-26		Kit, Seal [includes five (5) of item number **16**]

Accessories

Extension Description	Drum		Tank	
	16-Gallon	55-Gallon	250-Gallon Bench-Top	275-Gallon Obround
V-Cut	338147-3	338147-4	338147-8	338147-9
Threaded at both ends *	338246-3	338246-4	338246-8	338246-5
***** **NOTE**: For use with low level cut-off valve part number 321206				
Additional Accessories				
Low Level Cut-Off Valve	321206			
Siphon Kit	SWA 306			
Wall Bracket	325749			
Metal Discharge Hose (4-Feet)	338360			

Table 2 *Model 9916-A1 Accessory Components*

Performance Curves

A pump's ability to deliver material is based on the pressure (psi/Bars) and quantity (cfm/lpm) of air supplied to the motor and the amount of material discharge [back] pressure to be overcome within the system.

This chart contains curves based on three different air pressures. The curves relate delivery in gallons (liters) per minute (X axis) to air consumption in cubic feet (liters) per minute (right Y axis) and to material discharge pressure in psi/Bars (left Y axis).

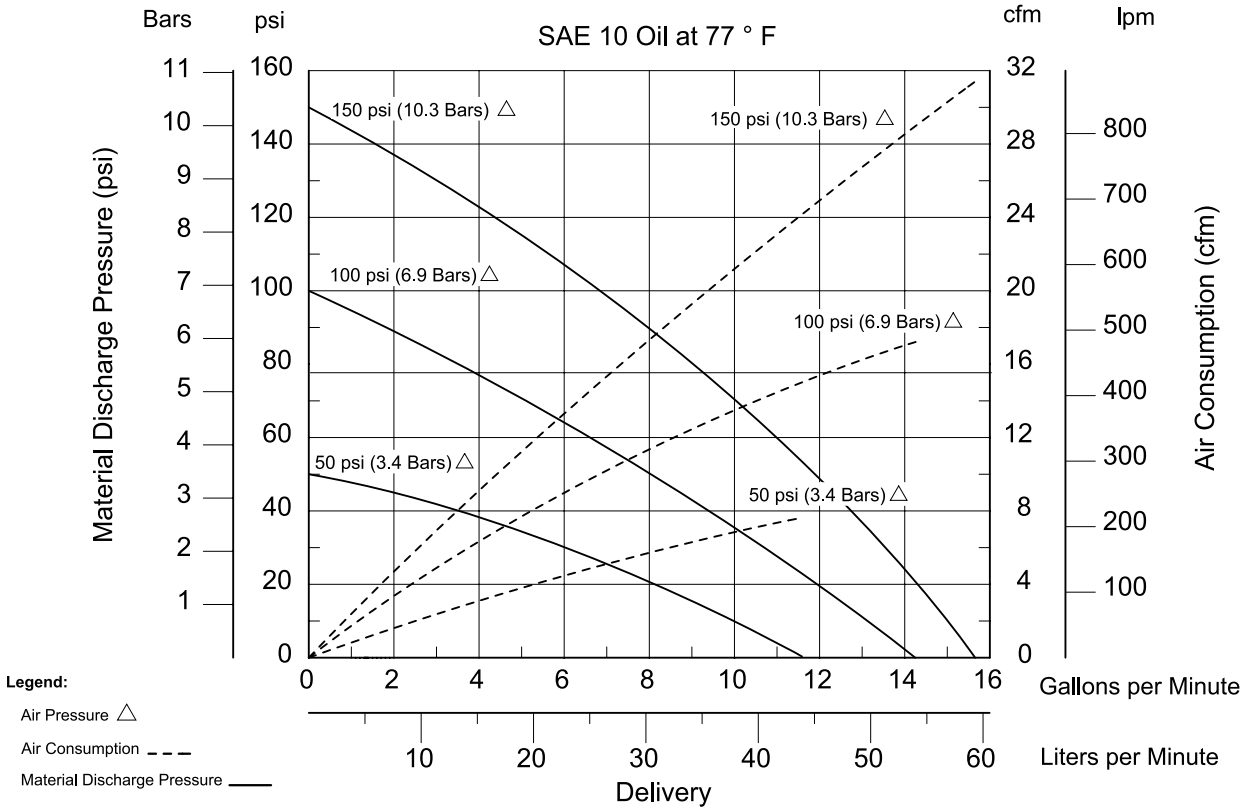


Figure 3 *Delivery versus Discharge Pressure and Air Consumption*

Overhaul

NOTE: Refer to **Figure 2** for component identification on all overhaul procedures.

Prior to performing any maintenance procedure, the following safety precautions must be observed. Personal injury may occur.

WARNING

Do not use halogenated hydrocarbon solvents such as methylene chloride or 1,1,1 trichloroethane in this pump. An explosion can result within an enclosed device capable of containing pressure when aluminum and/or zinc-plated parts in the pump come in contact with halogenated hydrocarbon solvents.

Release all pressure within the system prior to performing any overhaul procedure.

- **Disconnect the air supply line from the pump motor.**
- **Into an appropriate container, operate the control valve to discharge remaining pressure within the system.**

Never point a control valve at any portion of your body or another person. Accidental discharge of pressure and/or material can result in injury.
Read each step of the instructions carefully. Make sure a proper understanding is achieved before proceeding.

Disassembly

Separate Air Motor from Pump Tube

1. Clamp the pump assembly in a soft-jaw vise at Valve Body (**28**).
2. Remove Cover (**1a**).
   - Pry and swing the Cover sideways away from the **Cylinder**.
   - Refer to SER **339413** for details.
3. Remove Screw (**1b**) from the **Top Cap**.
4. Remove Nuts (**1d**) that secure the Body to Air Motor Assembly (**1**).
5. Remove Bolts (**1c**) from the **Top Cap**.
   - Remove Keepers (**11**) from the Body.
6. Remove the **Top Cap** from the **Cylinder**.

CAUTION

Remove the Cylinder with care. Damage to Quad-Ring (6) and/or O-Ring (9) can occur.

7. With a side-to-side motion, pull the **Cylinder** from the Body and Air Piston (**5**).
8. Remove O-Ring (**9**) from the Body.
9. Remove the **Bottom Cap** from the Body.
10. Unscrew Shut-Off Valve (**2**) from the Air Motor Assembly as required.

Pump Assembly

11. Unscrew the Pump Body from Cylinder (**25**).

    NOTE: Use Bushing (**13**) as leverage.

12. Remove O-Ring (**12**) from the Pump Body.

Air Piston Assembly

13. Remove Nut (**3**) and Washer (**4**) that secures Air Piston (**5**) to Rod (**19**).

    NOTE: Place an appropriate size punch or other suitable tool into the hole of the Rod.

14. Remove the Air Piston from the Rod.
15. Remove Quad-Ring (**6**) from the Air Piston.
16. Remove O-Ring (**7**) and Washer (**8**) from the Rod.

Rod and Fluid Piston Assembly

17. Remove the Rod (with attached components) from the Pump Body.
18. Remove lower Nut (**24**) that secures Fluid Piston (**21**) to the Rod.

    NOTE: Place an appropriate size punch or other suitable tool into the hole of the Rod.

19. Remove Plate (**23**), Gasket (**22**), and the Fluid Piston from the Rod.
20. Remove Retaining Ring (**20**) from the Rod as needed.

Pump Body Assembly

21. Remove O-Ring (**9**) from the Pump Body.
22. Remove Retaining Ring (**18**), Washer (**17**), Seal (**16**), Bearing (**15**), and Seal (**14**) from the Pump Body.
23. Unscrew Bushing (**13**) from the Pump Body as required.

Valve Body Assembly

24. Unscrew Valve Body (**28**) from Cylinder (**25**).

25. Remove O-Ring (**12**) , Stop (**26**), and Ball (**27**) from the Valve Body.

Clean and Inspect

1. Clean all metal parts in cleaning solvent. The solvent should be environmentally safe.

2. Inspect all parts for wear and/or damage.
   - Replace as necessary.

3. Inspect Air Piston (**5**) and Fluid Piston (**21**) for fatigue cracks.
   - Replace as necessary.

4. Inspect Rod (**19**) closely. Use a magnifying glass to detect any score marks on the Rod.
   - Replace as necessary.

5. Closely inspect the mating surfaces of all check valve components for any imperfections. Ensure a smooth and clean contact is obtained when assembled.

   EXAMPLE: Place Ball (**27**) into Valve Body (**28**). Fill the Valve Body with solvent. Make sure no leakage occurs.

Assembly

NOTE: Prior to assembly, certain components require lubrication. Refer to **Table 3** for details.

Pump Tube Assembly

NOTE: Refer to **Figure 4** for a section view of the pump tube assembly.

Pump Body Assembly

1. Install and seat Seal (**14**) [stem end first], Bearing (**15**) [stepped end first], Seal (**16**) [stem end first], and Washer (**17**) into the bottom of Pump Body (**10**).

2. Secure the components with Retaining Ring (**18**).
   - Make sure the Retaining Ring seats properly in the groove.

3. Install O-Ring (**9**) onto the top groove of the Pump Body.
   - Install O-Ring (**12**) onto the bottom groove of the Pump Body.

4. Screw Bushing (**13**) [with thread sealant] into the Pump Body as required
   - Tighten the Bushing securely.

Rod and Fluid Piston

5. Install Retaining Ring (**20**) onto Rod (**19**) as required.

   *IMPORTANT: Make sure the ground side of Plate (**23**) contacts Fluid Piston (**21**).*

6. Install Fluid Piston (**21**) [segmented side first], Gasket (**22**), and Plate (**23**) [ground side first] onto the bottom of the Rod.

7. Install Nut (**24**) that secures the Plate to the Rod.
   - Tighten the Nut securely.
   - Place an appropriate size punch or other suitable tool into the hole of the Rod.

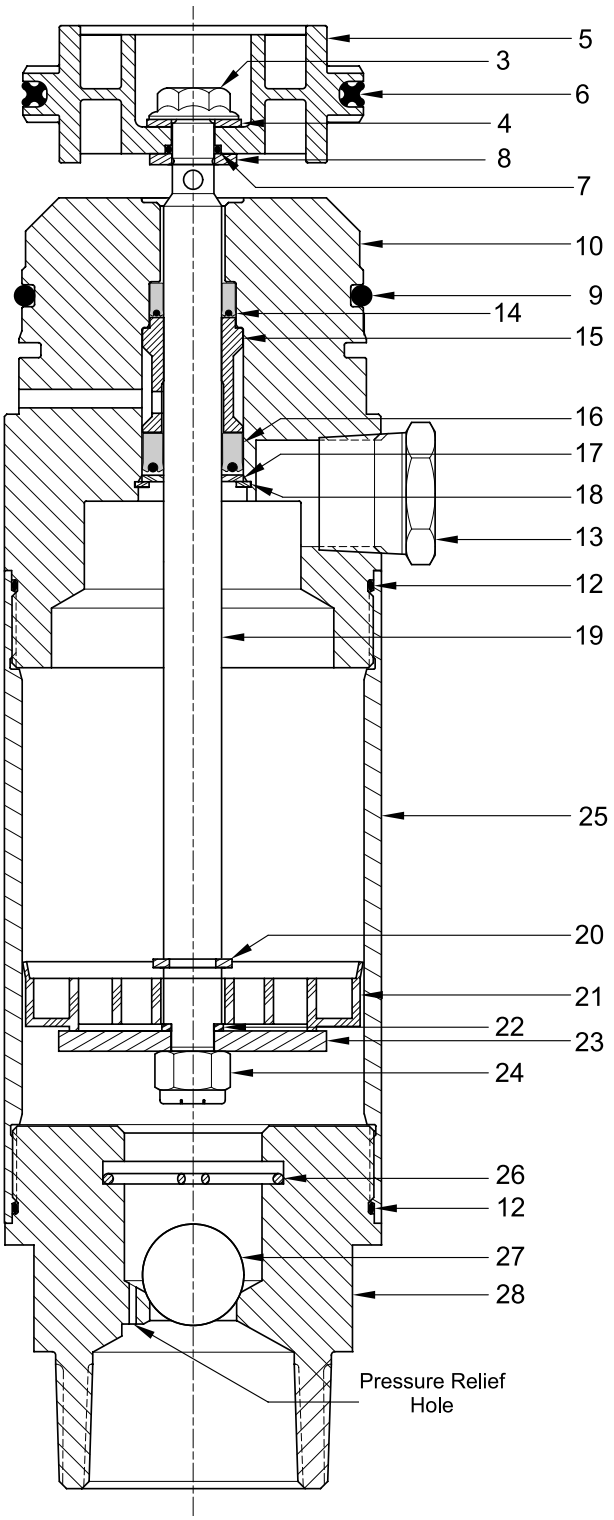
CAUTION

Install the Rod assembly into the Body with a twisting motion. Use care not to damage the Seals.

8. Install the Rod assembly into the bottom of the Pump Body.
   - Position the Fluid Piston flush with the bottom of the Body.

Item No.	Description	Item No.	Description
Clean Oil			
7	O-Ring, 3/8 " ID x 1/2 " OD	12	O-Ring, 3 " ID x 3-1/8 " OD
9	O-Ring, 2-3/4 " ID x 3 " OD	16	Seal, 1/2 " ID x 7/8 " OD
Magnalube-G Teflon Grease			
8	Quad-Ring, 2-5/8 " ID x 3 " OD	14	Seal, 1/2 " ID x 3/4 " OD
Coat the Inside Diameter of the Air Motor Assembly			

Table 3 *Lubricated Components*



Refer to **Figure 2** Parts List for Parts Identification

Figure 4 *Pump Tube Assembly (w/o Air Motor) - Section View*

Air Piston

CAUTION

Use care not to switch Washers (4 and 8). Component damage can occur.

9. Install Washer (**8**) [brass color] , O-Ring (**7**), and Air Piston (**5**) (observe THIS SIDE UP] onto the Rod.

10. Install Washer (**4**) [silver color] and Nut (**3**) that secures the Air Piston to the Rod.
    - Tighten the Nut securely.
    - Place an appropriate size punch or other suitable tool into the hole of the Rod.

11. Install Quad-Ring (**6**) onto the Air Piston.

Cylinder

12. Screw Cylinder (**25**) onto the Pump Body.
    - Use care passing the O-Ring.
    - Do not tighten at this time.

Stop and Valve Body Assembly

13. Install O-Ring (**12**) onto Valve Body (**28**).

14. Install Ball (**27**) and Stop (**26**) into the Valve Body.
    - Make sure the Stop seats fully into the groove.

15. Screw the Valve Body assembly into the Cylinder.
    - Use care passing the O-Ring.

16. Clamp the Valve Body securely in a soft-jaw vise.

17. Tighten the Pump Body securely into the Cylinder and at the same time the Cylinder onto the Valve Body.
    - Use Bushing (**13**) as leverage.

Attach Air Motor to Pump Tube

18. Clamp the pump assembly in a soft-jaw vise at Valve Body (**28**).

19. Install the **Bottom Cap** onto the Body.

20. Install O-Ring (**9**) onto the upper groove of the Body.

CAUTION

Install the Cylinder with care. Damage to Quad-Ring (6) and/or O-Ring (9) can occur.

HINT: Angle the **Cylinder** onto the Quad-Ring.

21. Install the **Cylinder** over the Body's O-Ring and seat it properly onto the **Bottom Cap**.

22. Install the **Top Cap** onto the **Cylinder**.
    - Use care passing the O-Ring.

23. Install Keeper (**11**) into the groove of the Body.
    - Make sure the hole aligns with Carriage Bolt (**1c**).

24. Install one Carriage Bolt through the Air Motor and through the Keeper.

25. Install Flange Nut (**1d**).
    - Do not tighten the Flange Nut at this time.

26. Repeat procedural steps **23 - 25** for the additional Keepers and Carriage Bolts.

CAUTION

Do not overtighten Flange Nuts (1d). Component damage can occur.

27. Torque each Flange Nut in an alternate pattern from 60 to 70 inch-pounds (6.8 - 7.9 Nm).

28. Install Screw (**1b**) into the **Top Cap**.
    - Tighten the Screw to 50 inch-pounds (5.6 Nm).

29. "Snap" Cover (**1a**) onto the **Cylinder**.

30. Screw Shut-Off Valve (**2**) [with thread sealant] into the Air Motor Assembly.
    - Tighten the Shut-Off Valve securely in the position required.

Operation

WARNING

Do not exceed the lowest pressure rating of any component in the system.

Never point a control valve at any portion of your body or another person. Lubricant discharged at high velocity can penetrate the skin and cause severe injury. Should any fluid appear to puncture the skin, get medical care immediately.

Ensure all components are in operable condition. Replace any suspect parts prior to operation. Personal injury can occur.

1. Make sure air pressure at the regulator reads zero.

2. Slowly supply air pressure [recommended minimum of 25 psi (1.7 Bars)] to the pump's motor.
    - The pump assembly should cycle.

If the pump assembly does not cycle, refer to the **Troubleshooting Chart** for details.

With air pressure at zero:

3. Connect a product hose to the pump's material outlet.
    - Direct the hose into an appropriate container.

4. Place the pump in the product to be dispensed.

5. Slowly supply air pressure to the pump's motor.

6. Allow the pump to cycle slowly until the system and product is free of air.

If the pump assembly does not prime, refer to the **Troubleshooting Chart** for details.

WARNING

Should leakage occur anywhere within the system, disconnect air to the motor. Personal injury can occur.

With air pressure at zero:

7. Attach a control valve to the outlet hose of the pump.

8. Slowly supply 35 psi (2.4 Bars] air pressure to the pump's motor.

9. Operate the control valve into a container.

10. Allow the pump to cycle until the system and product is once again free of air.

11. Shut off the control valve.

12. Set the air pressure to 100 psi (6.9 Bar).

13. Visually inspect the pump for external leaks.
    - The pump should not cycle.

If the pump does not stall, refer to the **Troubleshooting Chart** for details.

14. Check the motor for air leakage.

If the motor leaks, refer to the **Troubleshooting Chart** in the **Air Motor Service Guide** for details.

Installation

Additional items that should be incorporated into the air piping systems are listed in **Table 4**.

Part Number	Description
5604-2	Moisture Separator
7604-B	Regulator and Gauge

Table 4 *Air Line Components*

Troubleshooting Chart

Pump Indications	Possible Problems	Solution
Pump does not cycle	1. Air motor not operating properly 2. Pump tube jammed and/or contains loose components 3. Insufficient air pressure	1. Inspect air motor and rebuild or replace as necessary 2. Rebuild pump tube 3. Increase air pressure
Pump will not prime	1. Excessive cycling speed 2. Pump leaking internally	1. Reduce air pressure 2. See **Internal Leaks**
Pump cycles rapidly	Product source empty	Replenish product
Pump will not stall (cycles more than once or twice per hour)	1. Pump requires break-in period 2. Pump leaking internally 3. Pump leaking externally 4. Distribution system leaking	1. Operate the pump against moderate fluid pressure for up to one hour 2. See **Internal Leaks** 3. See **External Leaks** 4. Correct leak
External Leaks		
Product leakage visible at weep hole in Pump Body (**10**)	1. Damaged Seal (**16**) 2. Damaged Rod (**19**)	1. Replace Seal (**16**) 2. Inspect Rod (**19**) and replace as necessary
Product leakage visible at top of Cylinder (**25**)	1. Cylinder (**25**) not sufficiently tight 2. Damaged O-Ring (**12**)	1. Tighten Cylinder (**25**) into Pump Body (**10**) 2. Replace O-Ring (**11**)
Product leakage visible at bottom of Cylinder (**25**)	1. Cylinder (**25**) not sufficiently tight 2. Damaged O-Ring (**12**)	1. Tighten Cylinder (**25**) into Valve Body (**28**) 2. Replace O-Ring (**12**)
Air leakage at weep hole in Pump Body (**10**)	Damaged Seal (**14**)	Replace Seal (**14**)
Internal Leaks		
Pump does not prime or cycles continuously, or slowly (once or twice/hour)	1. Foreign material between Ball (**27**) and Valve Body (**28**) 2. Foreign material between Plate (**23**) and Fluid Piston (**21**) 3. Worn or damaged Ball (**27**) 4. Worn or damaged Valve Body (**28**) 5. Worn or damaged Plate (**23**) 6. Worn or damaged Fluid Piston (**21**) 7. Worn or damaged Cylinder (**25**)	Locate and eliminate source of foreign material. Disassemble pump tube, clean, inspect, and replace worn or damaged components

Changes Since Last Printing

Replaced Stop 339975 with 340189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