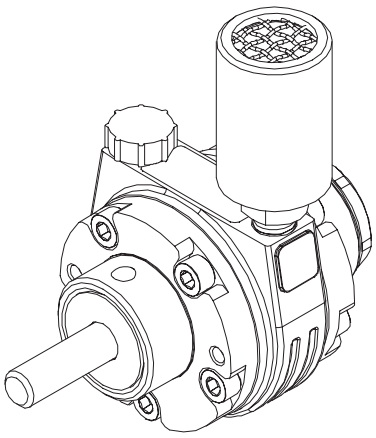
04578753
Form P7575
Edition 2
May, 2003

OPERATION AND MAINTENANCE MANUAL
for
SM1AM AND SM1UP AIR MOTORS



(Dwg. MHP2523)

⚠ WARNING

IMPORTANT SAFETY INFORMATION ENCLOSED - SAVE THESE INSTRUCTIONS

READ AND UNDERSTAND THIS MANUAL BEFORE OPERATING THIS PRODUCT

IT IS YOUR RESPONSIBILITY TO MAKE THIS SAFETY INFORMATION AVAILABLE TO OTHERS THAT WILL OPERATE THIS PRODUCT

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY

PLACING THE MOTOR IN SERVICE

- **Always install, operate, inspect and maintain this product in accordance with all applicable standards and regulations (local, state, country, federal, etc.).**
- **Always use clean, dry air at 90 psig (6.2 bar/620 kPa) maximum air pressure at the inlet. Higher pressure may result in hazardous situations including excessive speed, rupture, or incorrect output torque or force.**
- **Ensure an accessible emergency shut off valve has been installed in the air supply line, and make others aware of its location.**
- **Do not use damaged, frayed or deteriorated air hoses and fittings.**
- **Always turn off the air supply and disconnect the air supply hose before installing, removing or performing any maintenance on this motor.**
- **Do not lubricate with flammable or volatile liquids such as kerosene, diesel or jet fuel. Use only recommended lubricants.**
- **Keep work area clean, uncluttered, ventilated and illuminated.**
- **Do not remove any labels. Replace any damaged label.**

USING THE MOTOR

- **Always wear eye protection when operating or performing maintenance on this motor.**
- **Always wear hearing protection when operating this motor.**
- **Always use Personal Protective Equipment appropriate to the motor used. This may include dust mask or other breathing apparatus, safety glasses, ear plugs, gloves, apron, safety shoes, hard hat and other equipment.**

Refer All Communications to the Nearest
Select Series Fluid Products Office or Distributor.

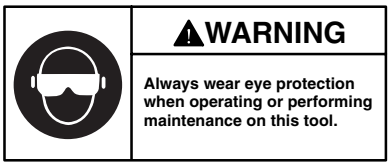
Printed in Russia

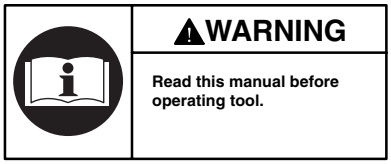
Select™
SERIES FLUID PRODUCTS

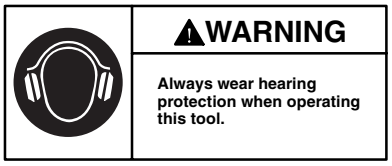
Using the Motor (Continued)

- **Keep others a safe distance from your work area, or ensure they use appropriate Personal Protective Equipment.**
- **This motor is not insulated against electric shock.**
- **Keep hands, loose clothing, long hair and jewelry away from motor.**
- **Motor and/or accessories may briefly continue their motion after throttle is released.**
- **Do not operate when tired, or under the influence of medication, drugs, or alcohol.**
- **Never use a damaged or malfunctioning motor or accessory.**
- **Do not modify the motor, safety devices, or accessories.**
- **Do not use this motor for purposes other than those recommended.**
- **Use accessories recommended for Select Series Fluid Products.**

WARNING SYMBOL IDENTIFICATION







Model Designation Breakout

SM	1AM	A	L	N
Select Series Air Motors	Series	Shaft/Interface	Rotation	Mounting
SM	1AM 1UP 2AM 4AM 6AM 8AM	A = Round Shaft with Square Key (Round Shaft on SM1AM Series) B = Round Shaft with Woodruff Key #3 C = Round Shaft with Flat on Shaft	L = Left Hand Bias (CCW) R = Right Hand Bias (CW) None = Reversible	N = NEMA Mount None = Face or Foot Mount (Foot Mount is an optional accessory)

Equipment Options

Series	Furnished with Cataloged Models		Optional Accessories
	Mounting	Muffler	
SM1AM	3 Hole Face Mount	Supplied with Motor	SM1AM-AG587 Mounting Foot
SM1UP			

Lubrication

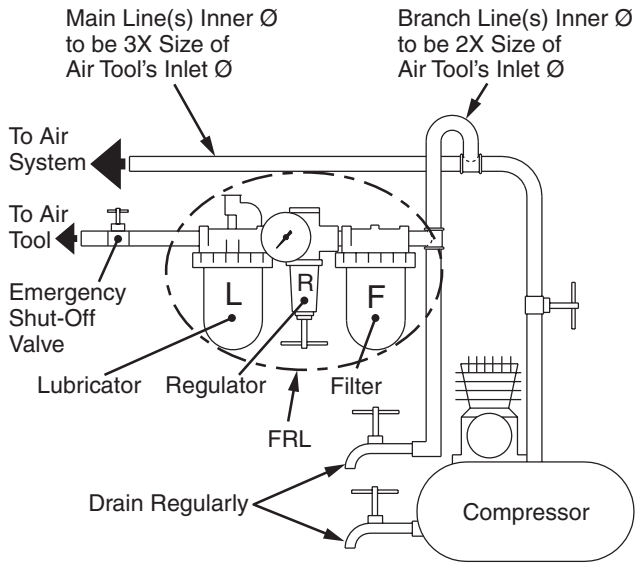
SAE No. 10

Select Series* suggests using an air line lubricator with these motors. We recommend a 1/2 inch Filter-Regulator-Lubricator (FRL) for optimum motor performance and life:

* Select Series vanes are made of a special material that does not require lubrication. While we suggest lube for optimum service life, our vanes have been shown to last substantially longer than standard laminate versions. This makes Select motors a good choice for Food Grade or Clean Room environments where oil is not permitted.

Installation

The use of an air line lubricator in the air supply line is recommended. Attach the unit as close to the motor as practical. Where the lubricator cannot be permanently mounted, we recommend using a 1/2 inch FRL.



(Dwg. TPD905-2)

Operation

NOTICE

If the motor operates sluggishly, flush it with a clean, non-toxic, nonflammable commercial solvent in a well ventilated area.

To flush the motor:

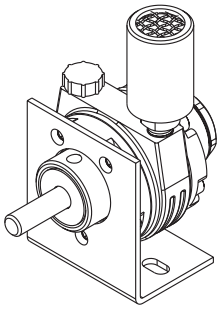
1. Disconnect the air line and muffler.
2. Pour 6 to 8 cc of solvent into each inlet.
3. Rotate the motor shaft by hand in both directions several times to ensure all internal parts of motor are thoroughly cleaned.
4. Apply air pressure to the inlet and slowly increase the air flow until there is no trace of the solvent in the exhaust.
5. After flushing, shut off the air supply and disconnect air supply line.
6. Pour 6 to 8 cc of a high detergent SAE10 motor oil into the air inlet.
7. Reconnect the air supply line, slowly increase the air pressure to ensure all internal parts of motor will be covered with a film of oil.
8. If the motor is still low in power, return motor to your nearest service repair center.

SPECIFICATIONS

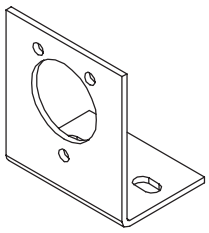
Series	Max. Power		Speed at Max. Power	Free Speed•	Starting Torque		Stall Torque		Air Consumption at Max. Power		Weight	
	hp	kw	rpm	rpm	lb.-ft.	Nm	lb.-ft.	Nm	scfm	m^3/m	lb.	kg
Reversible												
SM1AM	0.33	0.25	7600	15200	0.29	0.39	0.38	0.52	17	0.5	1.5	0.7
SM1UP	0.60	0.37	6000	12500	0.45	0.61	0.6	0.81	42	1.2	1.75	0.8

- ALL models must be operated with sufficient load to prevent speed from exceeding maximum allowable speed shown on performance curve. Performance figures are at 90 psig (620 kPa) air pressure, with muffler installed.

FOOT MOUNT DRAWING



SM1A Foot Mount

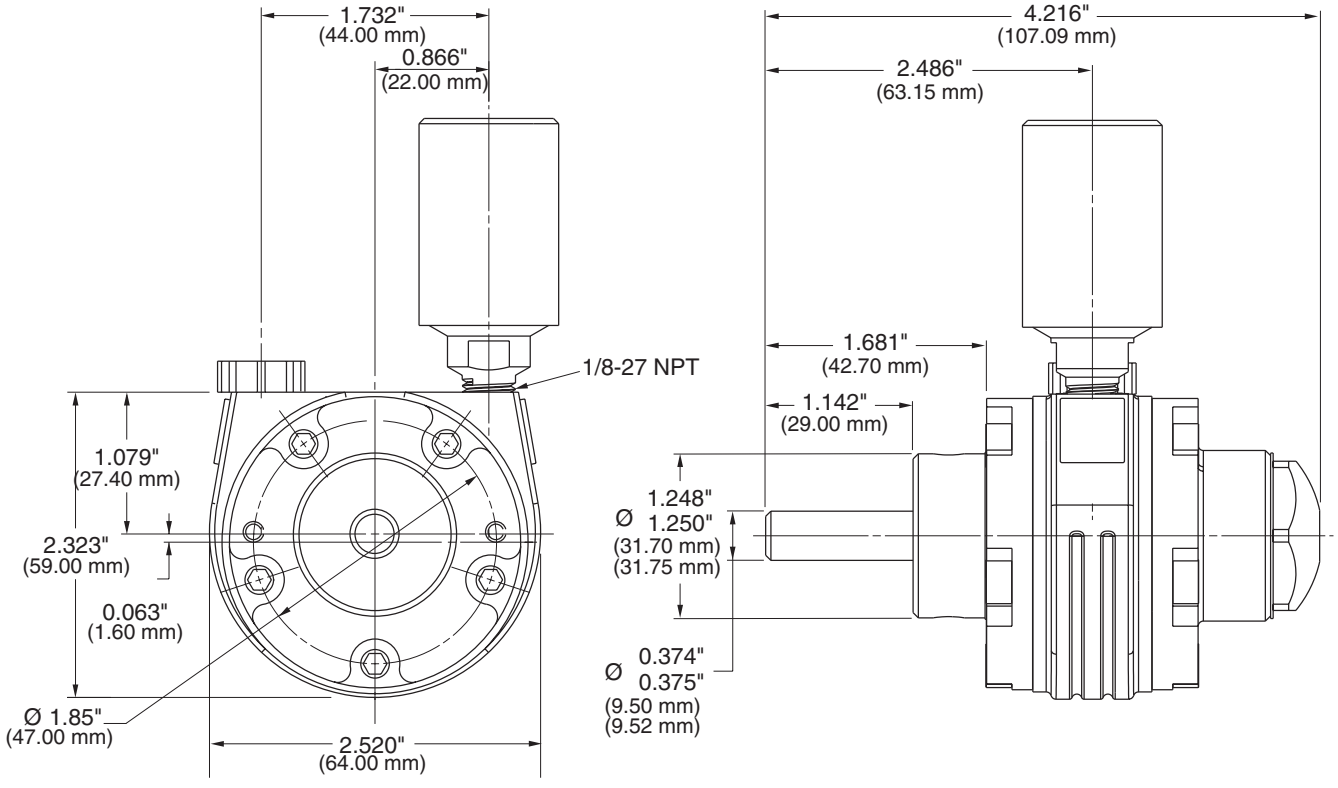


SM1AM-AG587

(Dwg. MHP2460)

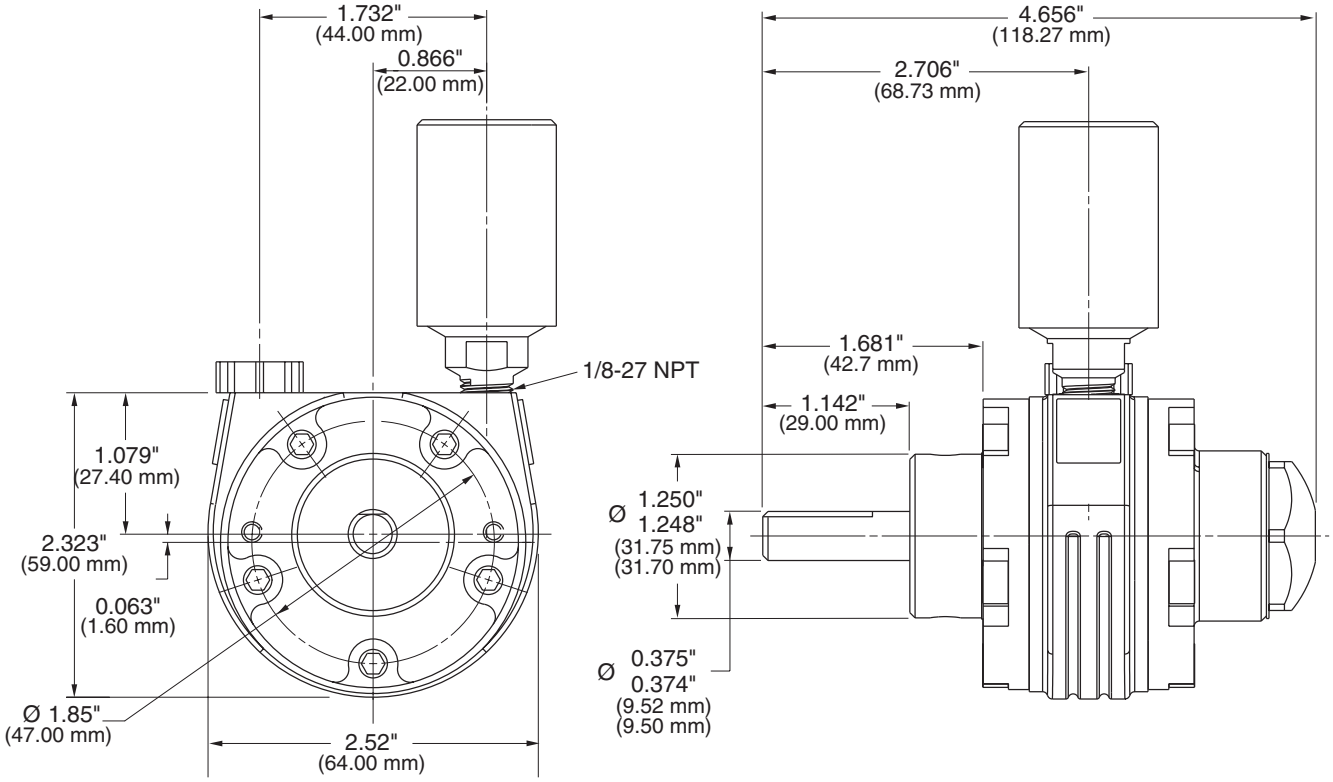
DIMENSION DRAWINGS

Models SM1AMA and SM1AMAL



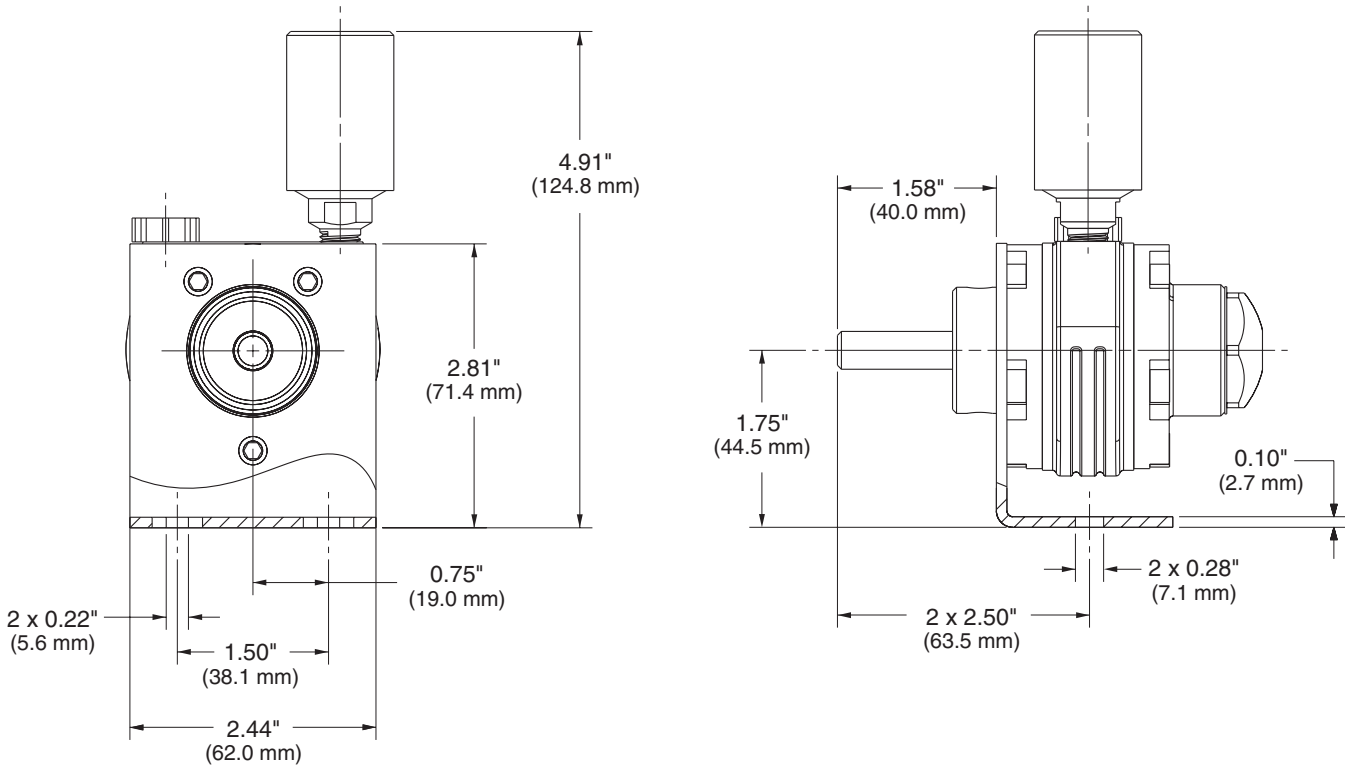
(Dwg. MHP2525)

Models SM1UPC, SM1UPCL and SM1UPCR

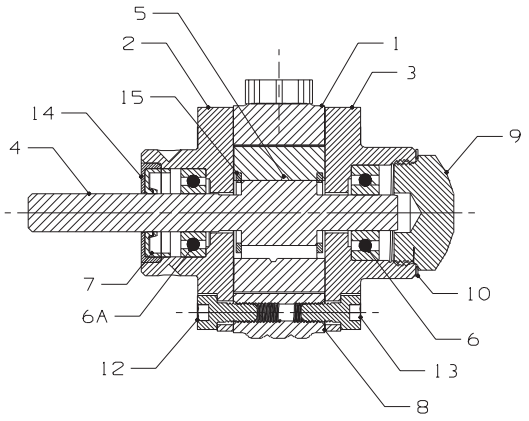


(Dwg. MHP2526)

Models SM1AM and SM1UP Foot Mounts



(Dwg. MHP2549)



(Dwg. TPM1036)

Item	Description	Part Number
1	Cylinder	**
2	Front End Plate	**
3	Rear End Plate	**
4	Rotor	**
5	Vane (4)	**
6	Rear Rotor Bearing	**
6A	Front Rotor Bearing	**
7	Rotor Shaft Seal	**
8	End Plate Gasket (2)	**
9	Rear End Cap	**
10	End Cap Gasket	**
11	Muffler Assembly	**
*	Muffler Screen	**
*	Muffler Felt	**
12	Front End Plate Cap Screw (5)	**
13	Rear End Plate Cap Screw (5)	**
14	Shield	**
15	Spacer (2)	**
	Accessories available at extra cost	
*	Mounting Foot	SM1AM-AG587

* Part not shown

** Parts not sold separately (only sold in complete Motor or Tune-Up Kit)

Service Kits
(includes illustrated parts 5, 6, 6A, 7, 8 and 10)

Select Motor Series	Select Tune-up Kits	Select Vane Pack
SM1AMA	SM1AMA-TK1	SM1AMA-005
SM1AMAL	SM1AMAL-TK1	SM1AMAL-005
SM1UPC	SM1UPC-TK1	SM1UPC-005
SM1UPCL	SM1UPCL/CR-TK1	SM1UPCL-005
SM1UPCR		

NOTICE

If the motor operates sluggishly, flush it with a clean, non-toxic, nonflammable commercial solvent in a well ventilated area.

To flush the motor:

1. Disconnect the air line and muffler.
2. Pour 6 to 8 cc of solvent into each inlet.
3. Rotate the rotor shaft by hand in both directions several times to ensure all internal parts of motor are thoroughly cleaned.
4. Apply air pressure to the inlet and slowly increase the air flow until there is no trace of the solvent in the exhaust.
5. After flushing, shut off the air supply and disconnect air supply line.
6. Pour 6 to 8 cc of a high detergent SAE 10 motor oil into the air inlet.
7. Reconnect the air supply line, slowly increase the air pressure to ensure all internal parts of motor will be covered with a film of oil.
8. If the motor is still low in power, check for damaged vanes or foreign material in the vane slots in the Rotor.

Vane Replacement

NOTICE

Periodically, check the Vanes for wear. Always replace Vanes in sets, never replace an individual Vane.

Vanes will last 5,000 to 15,000 hours of operation, depending upon the speed of the motor, operating pressure, lubrication and preventative maintenance. Periodically, you should check the Vanes for wear, and replace them if the width of the Vane is equal to or less than the replacement width shown below:

-Width of new Vane: 21/64 inch (8.33 mm)
-Replacement width: 5/16 inch (7.94 mm)

Always replace Vanes in sets; never replace an individual Vane. Replace Vanes as follows:

1. Disconnect the air line at the motor.
2. Unscrew and remove the Rear End Cap.
3. Unscrew and remove the Rear End Plate Cap Screws.
4. Using a puller, pull the Rear End Plate along with the Rear Rotor Bearing from the motor.
5. Wipe each of the new Vanes to be installed with a thin film of light oil.
6. Orientate the Rotor with one open vane slot facing down vertically in the Cylinder.
7. Insert Vane into slot with notch facing the center of the Rotor.
8. Rotate the Rotor 90 degrees and repeat the procedure.
9. Repeat the procedure with each Vane.

NOTICE

The use of other than genuine Select Series replacement parts may result in decreased tool performance and increased maintenance, and may invalidate all warranties.

⚠ WARNING

Always wear eye protection when operating or performing maintenance on this motor.
Always turn off air supply and disconnect supply hose before installing, removing or adjusting any accessory on this motor, or before performing any maintenance on this motor.

Disassembly

General Instructions

1. Always disconnect the air line at the motor before attempting any disassembly.
2. Do not disassemble the motor any further than necessary to replace or repair damaged parts.
3. Do not withdraw the Rotor from the Cylinder unless it is absolutely necessary. Vanes can easily be replaced without withdrawing the Rotor. (see “Vane Replacement” section)
4. When grasping a part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members and housings.
5. Do not remove any part which is a press fit in or on a subassembly unless the removal of that part is necessary for repairs or replacement.
6. Important: After these motors were assembled at the factory, Cylinder Dowel alignment pins were pressed into the End Plates and Cylinder. During disassembly, these pins will usually remain with the Cylinder. Do not remove them.

Disassembly of the Rear End Plate

1. Unscrew and remove the Rear End Cap (11).
2. Unscrew and remove the Rear End Plate Screws (13).
3. Using a puller, pull the Rear End Plate (3) along with the Rear Rotor Bearing (6) from the motor.
4. The Rear Rotor Bearing is a slip fit in the Rear End Plate. Slide or push it from the bearing recess.

Disassembly of the Front End Plate

1. Unscrew the Front End Plate Cap Screws (12).
2. Using a puller, pull the Front End Plate (2) along with the Front Rotor Bearing (6A) from the rotor shaft.
3. The Rotor Shaft Seal (9) is pressed into the Front End Plate. Do not remove this Seal unless you have a new Seal on hand. This Seal is always destroyed in the removal process. If you have to remove the Rotor Shaft Seal, pry it out with a large screwdriver.

4. The Front Rotor Bearing is a slip fit in the Front End Plate. Slide or push it from the bearing recess.

Removal of the Rotor

1. If the Rotor (4) must be withdrawn from the Cylinder, remove the Rear End Plate as previously described.
2. Unscrew the Front End Plate Cap Screws.
3. Carefully withdraw the assembled Front End Plate and Rotor from the Cylinder. Caution: As you withdraw the Rotor, grasp the rotor body so that the Vanes (5) do not fall out.
4. After withdrawing the Rotor, remove the Vanes.
5. Support the Front End Plate as close to the rotor body as possible, and press the Rotor from the Front Rotor Bearing.

Assembly

General Instructions

1. Always wipe all parts with a thin film of oil before installing them in the motor.
2. Always press on the **inner ring** of a ball-type bearing when installing the bearing on a shaft.
3. Always press on the **outer ring** of a ball-type bearing when pressing the bearing into a bearing recess.
4. Whenever grasping a part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members and housings.

Assembly of the Rear End Plate

1. Support the Motor on the Front End Plate (2).
2. Place End Plate Gasket (10) on the rear face of the Cylinder (1), making certain that it is properly oriented relative to the Cylinder Dowels and tapped holes in the Cylinder.

NOTICE

If you are installing a new Gasket, you will have to punch or cut two holes in it to accommodate the Cylinder Dowels. Do this by placing the Gasket on the Gasket on the Rear End Plate to determine the location of the dowel holes. Use a proper size gasket punch to cut the required dowel holes.

3. Align the dowel holes in the Rear End Plate (3) with Cylinder Dowels in the Cylinder and, using a plastic hammer, tap the Rear End Plate into place against the Gasket.
4. Using a sleeve that contacts only the inner ring of the Bearing, press the Rear Rotor Bearing (6) onto the rotor shaft until it seats in the bearing recess in the Rear End Plate.

⚠ CAUTION

Do not bind the End Plate against the Rotor.

5. Rotate Rotor (4) by hand. It should rotate freely with no binding or rubbing against the Cylinder. If the Rotor rubs or binds, tap the top edge of the Rear End Plate with a plastic hammer in the area midway between the inlet and outlet ports. Tap the End Plate gently. The Rotor needs only 0.0015 inch (0.038 mm) clearance from the top of the Cylinder. If the Rotor continues to rub, it may be contacting the Front End Plate due to pressing on the Rear Rotor Bearing. Lightly tap the output end of the rotor shaft with a plastic hammer. The Rotor needs about 0.002 inch (0.05 mm) clearance between the rotor body and each End Plate.
6. When the Rotor turns freely, install the End Plate Cap Screws (13). Tighten them to 8 to 10 ft-lb (10.8 to 13.5 Nm).
7. Slip End Cap Gasket (10) over the threaded hub of Rear End Cap (9) and thread the Rear End Cap into Rear End Plate.

Assembly of the Front End Plate

1. Support the Motor on the Rear End Plate.
2. Place an End Plate Gasket on the front face of the Cylinder, making certain that is properly oriented relative to the Cylinder Dowels and tapped holes in the Cylinder.

NOTICE

If you are installing a new Gasket, you will have to punch or cut two holes in it to accommodate the Cylinder Dowels. Do this by placing the Gasket on the Gasket on the Rear End Plate to determine the location of the dowel holes. Use a proper size gasket punch to cut the required dowel holes.

3. Align the dowel holes in the Front End Plate with the Cylinder Dowels in the Cylinder and, using a plastic hammer, tap the Front End Plate into place against the Gasket.
4. Using a sleeve that contacts only the inner ring of the Bearing, press the Front Rotor Bearing (6A) onto rotor shaft until it seats in the bearing recess in the Front End Plate.
5. Rotate the Rotor by hand. It should rotate freely with no binding or rubbing against the Cylinder. If the Rotor rubs or binds, tap the top edge of the Front End Plate with a plastic hammer in the area midway between the inlet and outlet ports. Tap the End Plate gently. The Rotor needs only 0.0015 inch (0.038 mm) clearance from the top of the Cylinder. If the Rotor

continues to rub, it may be contacting the Rear End Plate due to pressing on the Front Rotor Bearing. Remove the Rear End Cap and lightly tap the end of the rotor hub with a plastic hammer. The Rotor needs about 0.002 inch (0.05 mm) clearance between the rotor body and each End Plate.

6. When the Rotor turns freely, install the Front End Plate Cap Screws (12). Tighten them to 8 to 10 ft-lb (10.8 to 13.5 Nm).
7. Moisten the lip of a new Rotor Shaft Seal (7) with O-Ring lubricant, and press the Seal, lip side first, into the Front End Plate until the trailing face of the Seal is flush with the face of the End Plate.

Assembly of the Motor

1. Position the Rotor vertically on the table of an arbor press so that the short hub is upward.
2. Place the Rear End Plate, flat side first, on the short hub of the Rotor.
3. Place a 0.002 inch (0.05 mm) thick shim on each side of the Rotor between the rotor body and the Rear End Plate.
4. Using a sleeve that contacts only the inner ring of the Bearing, press the Rear Rotor Bearing (6) onto the hub of the Rotor until it seats in the bearing recess in the Rear End Plate.
5. Withdraw the shims.
6. Stand the assembled Rotor and End Plate upright on on the hub of the Rear End Plate.
7. Moisten each Vane (5) with film of light oil.
8. Place a Vane, notched side first, in each vane slot.
9. Place an End Plate Gasket on the rear face of the Cylinder, making certain that it is properly oriented relative to the Cylinder Dowels and tapped holes in the Cylinder.

NOTICE

If you are installing a new Gasket, you will have to punch or cut two holes in it to accommodate the Cylinder Dowels. Do this by placing the Gasket on the Rear End Plate to determine the location of the dowel holes. Use a proper size gasket punch to cut the required dowel holes.

10. Slide the assembled Rotor and Rear End Plate into the Cylinder until the End Plate contacts the Cylinder Dowels.
11. Using a wire hook inserted between the End Plate Cylinder, pull the rubber band free of the rotor, thus leaving the Vanes, Vane Springs and Vane Pins trapped in the Cylinder.
12. Align the dowel holes in the Rear End Plate with the Cylinder Dowels in the Cylinder and, using a plastic hammer, tap the Rear End Plate into place against the Gasket.
13. Install the Front End Plate as described in Steps 1, 2, 3 and 4 in the section titled Assembly of the Front End Plate.
14. Rotate the Rotor by hand. It should rotate freely with no binding or rubbing against the Cylinder. If the Rotor rubs or binds, tap the top edge of the Rear End Plate with a plastic hammer in the area midway between the inlet and outlet ports. Tap the End Plates gently. The Rotor needs only 0.0015 inch (0.038 mm) clearance from the top of the Cylinder. If the Rotor continues to rub, it may be contacting the Rear End Plate due to pressing on the Front Rotor Bearing. Lightly tap the end of the rotor hub with a plastic hammer. The Rotor needs about 0.002 inch (0.05 mm) clearance between the rotor body and each End Plate.
15. When the Rotor turns freely, install the End Plate Cap Screws (12, 13) and tighten them to 8 to 10 ft-lb (10.8 to 13.5 Nm).
16. Install the Rotor Shaft Seal (7) and Front End Cap as described in Step 7 in the section titled Assembly of the Front End Plate.
17. Install the Rear End Cap (9) as described in Step 7 in the section titled Assembly of the Rear End Plate.
18. Again, check the Rotor to see that it rotates freely. Make certain it is rotating freely before connecting the air supply line.

TROUBLESHOOTING GUIDE

Trouble	Probable Cause	Solution
Low power or low free speed	Low air pressure at the inlet	Check air pressure at the inlet. For top performance and durability of parts, the air pressure must be 90 psig (6.2 bar/620 kPa) at the inlet.
	Worn or broken Vanes	Install a new set of Vanes.
	Improper lubrication or dirt building up in the Motor	Lubricate as instructed under LUBRICATION. If this does not help, flush the Motor as instructed under OPERATION.
Rough operation	Worn or broken Rotor Bearings	Examine each Bearing. Install new bearing where necessary.
Scoring of End Plates and/or Cylinder	Rotor does not have proper clearance	Refer to Assembly of Motor section. (Step 16)

⚠ WARNING

SAVE THESE INSTRUCTIONS. DO NOT DESTROY.

RECYCLING INSTRUCTIONS

When the life of the tool has expired, it is recommended that the tool be disassembled, degreased and parts be separated by material so that they can be recycled.