

MICROVAC PUMP INSTRUCTIONS

MODEL :
212-J MICROVAC PUMP
412-J MICROVAC PUMP

SERIAL NO.



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Revision 1.2
6-01
NEW POPPET VALVE ASSEMBLY



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J SERIES MICROVAC® VACUUM PUMP

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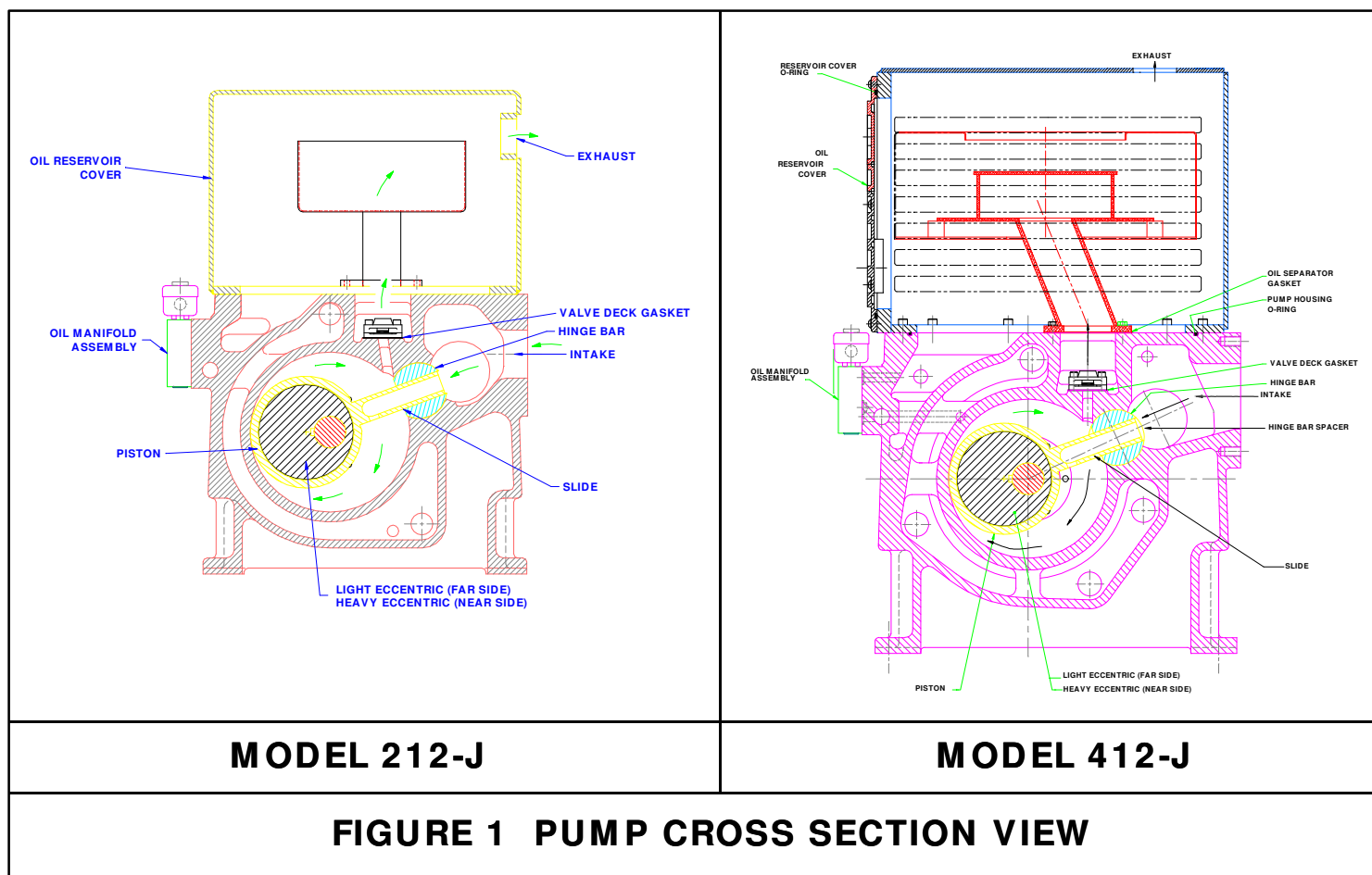
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1.0 DESCRIPTION

1.1 General (Principle of Operation)

The Stokes J Series Microvac Pumps are self-contained, rotary, oil sealed piston type units. An eccentric mounted on the drive shaft drives the piston. Two floating hinge bars that are free to oscillate in the pump housing guide the piston slide. The piston assembly rotates clockwise when facing the drive end. Air enters the pump through the intake and passes through the piston slide as the piston performs its intake stroke. As the piston nears the top center position the intake port is closed, separating the system from the pump (See Figure 1). At this point the air is entrapped in front of the piston as it begins the next stroke. As the piston continues to rotate the entrapped air is compressed and discharged through the exhaust valves and out the reservoir exhaust outlet. The exhaust valves are of a corrosion-resistant, heavy duty, poppet type.

When the pump is in operation, lubrication of the internal parts is completely automatic. Oil is forced by atmospheric pressure from the reservoir through internal oil passages to the shaft bearings. The oil is then fed into the pump to provide the necessary piston-to-cylinder oil seal. The oil in the pumping chamber is forced out through the exhaust valves with the compressed air and returns to the reservoir. A solenoid valve automatically prevents oil from flooding the pump in the event of a power failure, or when the pump is shutdown without vacuum being broken.



1.2 Gas Ballast

WARNING: *NEVER USE GAS BALLAST WHEN PUMPING GASES OR GAS MIXTURES THAT ARE EXPLOSIVE OR FLAMMABLE.*

The pump is provided with a manually operated gas ballast valve to overcome the adverse affect on vacuum resulting from oil contamination. Contamination occurs when water vapor or other gaseous components enter the pump and condense within the pump, mixing with the oil as emulsified droplets. The condensate will mix with the oil and “flash” into vapor again as the oil circulates into high vacuum in the pump cylinder limiting the vacuum to the vapor pressure of the condensed water. Gas Ballast is a controlled bleed of inert gas or air from the atmosphere into the compression chamber of the pump. The ballast gases prevent water vapor from condensing and mixing with the oil during the compression cycle. Other contaminants are also removed by ballasting except those that dissolve in the oil.

1.3 Water System

A supply of cooling water at 85° F. (30° C) and 1-1/2 G.P.M. (5.7 LPM) for the 212-J and 2 G.P.M. (7.6 LPM) for the 412-J maximum is needed at the water inlet for efficient performance. Water pressure should not exceed 35 PSIG in the pump. See Section 2.5 for additional information.

1.4 Electrical System

The main power supply is 230/460V., 60 Cy., 3 Ph. and should be wired through a suitable fused motor starter. Power for the oil solenoid is taken from any two of the motor leads. Check both motor and solenoid nameplates to insure proper voltage.

1.5 Lubricants

Refer to Section 2 for recommended pumping fluids.

1.6 Guards

The standard pump has a totally enclosed belt guard and flywheel guard to cover the motor pulley, pump pulley, belts and flywheel.

1.7 Vacuum Break and Gage Ports

The pump is provided with a 1/2” FPT Vacuum Break and a 1/4” FPT Gage Port, as shown in Figure 7.

IMPORTANT: *When using Gage Port, provide a 90° elbow and at least 12” (305 mm) of vertical pipe to the gage sensor to reduce the chance of contaminating the gage with pump lubricants.*

2.0 INSTALLATION

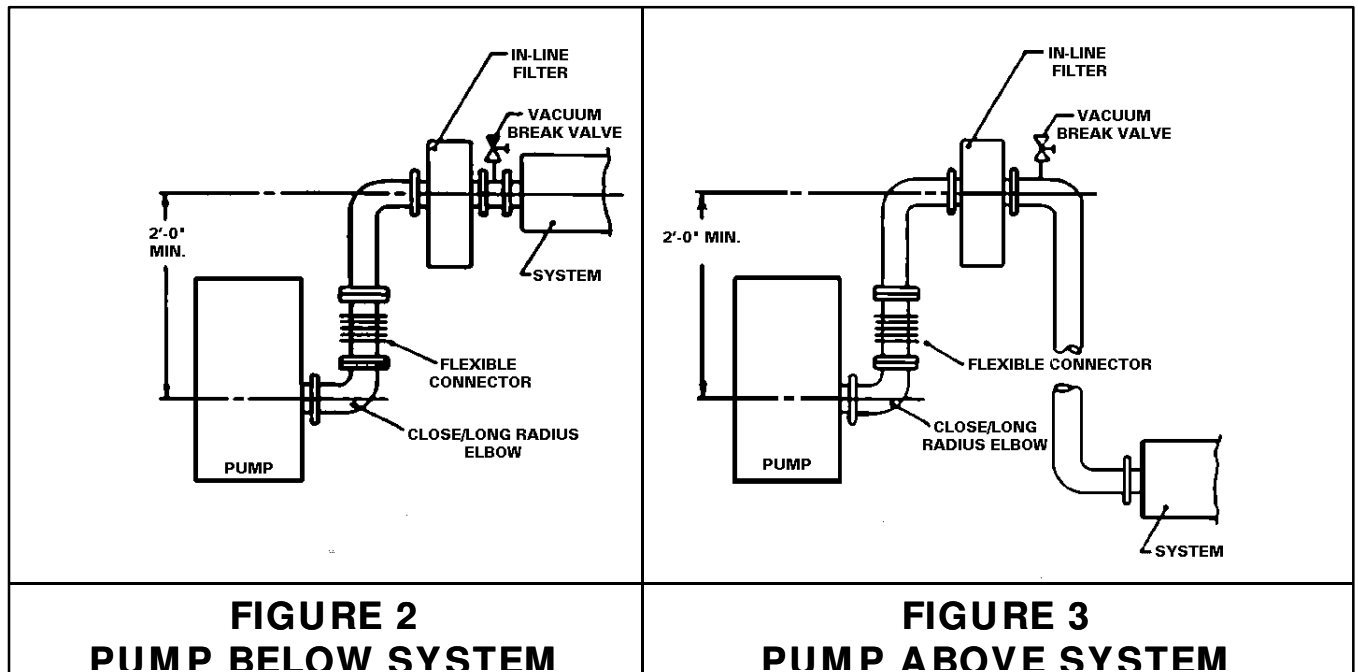
2.1 Locating and Mounting

Locate the pump as near as possible to the equipment being evacuated so that the Vacuum, Water and Exhaust connections can be conveniently made. Provide for adequate space for convenient servicing where possible.

- 2.1.2 The pump should be mounted on a rigid foundation, such as a concrete floor, and made level by shimming or grouting, if necessary. Mount the pump to foundation without putting a strain or twist in the pump housing. See Figure 7 for foundation mounting dimensions.
- 2.1.3 Remove cap from exhaust and intake openings only when ready to make a piping connection. Also remove the plastic plug (by unscrewing) from the Gas Ballast valve. When pump is to be subjected to temperatures below freezing, drain the water jacket through the housing drain plug to prevent cracking the housing, blow out the water jacket. Follow this same procedure for storage.

2.2 Vacuum Piping

All pipe lines should be as short as possible and should be no smaller than the inlet to the pump. (If it is absolutely necessary to run a long line, the pipe size should be increased 50% in diameter, or more, than the inlet to the pump.) Conductance of long lines must be checked and the line sized large enough or pumping speed of system will be seriously decreased. When connecting the pump to the system, provide a vertical pipe at least 2 ft. (610 mm) long between the pump and the system, if the pump is below the system inlet. If the pump is above or level with the system inlet, provide an inverted "U" pipe to serve as a trap for dirt from the system and to prevent migration of pump oil toward the system inlet. Be sure all vacuum piping is tight. If an inline filter is being used it should be installed as noted below. It is advisable to install a flexible connection between pump intake and vacuum piping to reduce vibration.(See Figures 2 & 3).



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A high vacuum valve (full opening type preferred) is recommended to facilitate start-up and for checking pump blank off pressure.

CAUTION: *Make sure the system to be evacuated and connecting lines are clean and free of weld splatter, dirt or grit. Foreign matter entering the pump can cause failure and possibly damage the internal parts. To prevent this it is recommended that a 16 mesh wire screen be installed at the inlet connection. After 20 hours of operation the screen must be removed.*

2.2.1 Types of Piping Joints

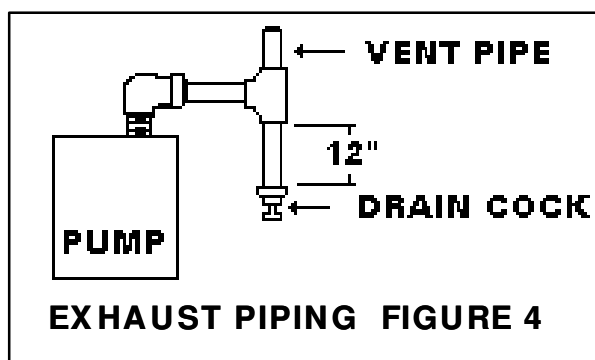
- A. Standard wrought piping with welded joints makes the best vacuum piping system.
- B. Copper piping with sweated fittings and joints can also be made vacuum tight and has the advantage of providing a neat, clean vacuum installation.
- C. Standard threaded piping, however, is satisfactory and more readily installed. The piping should be carefully hammered to loosen any scales or chips. Blow out any resultant debris with compressed air prior to installation. All male threaded joints should be carefully doped, screwed tight and NEVER "backed-off" to make parts align - this is apt to cause a leak. Paint the joints while the system is under vacuum until the paint is no longer drawn in, G.E. 1201-B, Glyptal or equivalent is recommended for painting all connections.

2.2.2 Location of Gage Port

A vacuum gage connection is located at the upper left hand side of intake side of the pump. (See Figure 7). The 1/4" pipe plug found at this location should be replaced with a small vacuum ball valve to which the gage can be connected. When a Stokes McLeod Gage is used a synthetic, thick wall, smooth bore tubing, such as Tygon, makes a very satisfactory flexible connection. To prevent oil from entering the gage, locate the gage approximately 2 ft. (610 mm) above the port.

2.3 Exhaust Piping

CAUTION: *Never place a valve in the exhaust line. If a valve must be installed in the line, a relief valve must also be inserted in the line between the reservoir and the valve. The relief valve should be equal in size to the line, and set to open at 2 psig.*



- 2.3.1 It is recommended that the exhaust be piped horizontally a short distance and tied into a vertical exhaust pipe. The vertical exhaust pipe must be at least 12" (305 mm) long with the bottom end terminated with a plug or a drain cock to allow removal of moisture and contaminated oil before it can accumulate sufficiently to drain back into the pump oil reservoir. See Figure 4.

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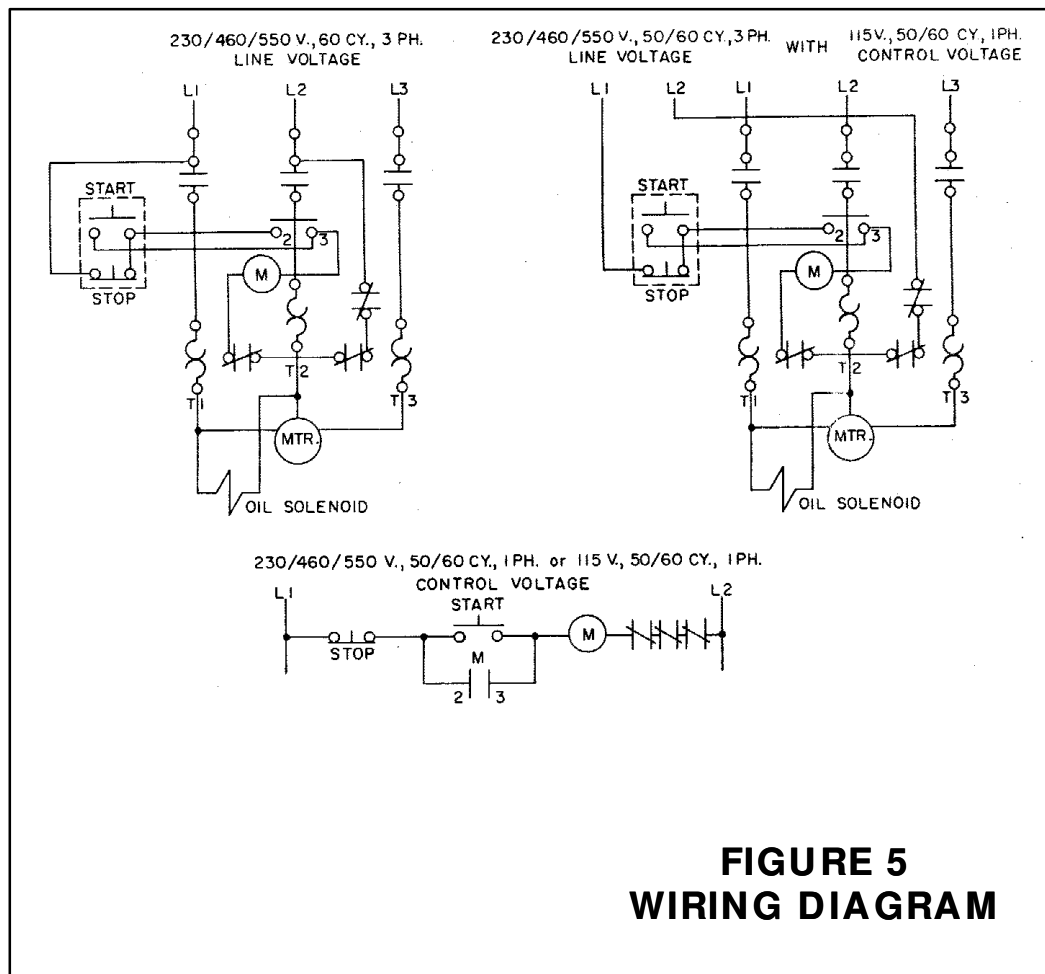
- 2.3.2 The exhaust pipe should be no smaller than the exhaust outlet and as short as possible. Pump exhaust will contain a small amount of oil and should be handled in a manner consistent with applicable regulations. If exhausted outside of the building point the end of the exhaust pipe downward to prevent the entrance of rain water.
- 2.3.3 Closed circuit Oil Mist Separators are available from Stokes which can eliminate oil fog in the majority of applications. The separator will not remove noxious or toxic gases and must be run to a suitable trap. Consult Stokes Vacuum for specifications.

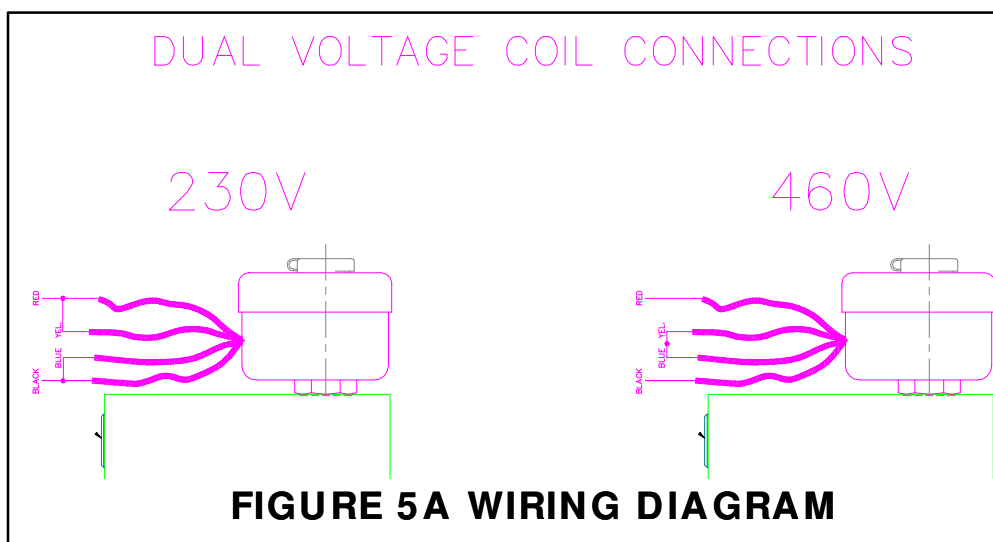
2.4 Electrical Connections (See Figure 5 & 5A)

CAUTION: *Make sure pump is properly lubricated before starting.*

- 2.4.1 Install a motor starter with safety device within easy reach of the operator.
- 2.4.2 Connect the solenoid valve as in Figure 5 & 5A.
- 2.4.3 Connect motor so that pump shaft rotates clockwise when viewed from drive end. See 3.1 for Pre-Start Check.

IMPORTANT: *Make sure the proper voltage, starters and overloads are supplied to the motor. Make sure that the solenoid coil leads are connected for proper voltage. Both may fail to operate if voltage is less than 90% of rated.*





2.5 Cooling

- 2.5.1 The Stokes Microvac pump is water cooled and must be connected to a water supply.
- 2.5.2 The 1/2" water inlet connection is located in the pump housing on the drive side near the bottom. See Figure 7.
- 2.5.3 Insert a valve in the water inlet line and regulate the water flow so that the temperature of the oil in the reservoir is between 140 Deg. and 160 Deg. F. (60 - 71 Deg. C) Oil temperature kits are available that automatically control the water flow to maintain the proper oil temperature (Contact Stokes Vacuum for specifications). If pump is outside and subjected to freezing temperatures, the water tank and circulating pump should be installed with anti-freeze in the water.

CAUTION: DO NOT START THE PUMP WHEN OIL TEMPERATURE IS BELOW 55° F. (13° C)

- 2.5.4 The 1/2" water outlet is located in the pump housing on the opposite side of the water inlet. See Figure 7.
- 2.5.5 The water outlet **SHOULD** be connected to an open drain to permit the operator to check the flow and temperature of the outlet water periodically. There **SHOULD NOT** be a valve or back pressure in the drain line. In some cases, cooling water must be discharged to a pressure drain. In such cases, discharge pressure must not exceed 35 P.S.I.G. and no block valve should be placed in discharge line unless a 35 lb. relief valve is provided to protect pump from high inlet pressure.

NOTE: *If condensables are present in gas being pumped and gas ballast is used, throttle the cooling water to raise operating temperature to the level for gas ballast (See Sect. 3)*

2.6 Lubrication of Pump

The successful operation of this pump depends largely on the type of oil used. An initial charge of oil is included with each pump. This standard oil is Stokes V-Lube (Label F) which is recommended for general operating conditions in a relatively clean environment. The oil is a multigrade petroleum oil, fortified for oxidation

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protection, containing detergent dispersants, with excellent flow characteristics at low temperature. It has a viscosity of 430 SSU at 100 Deg. F. (38 Deg. C), and 82 SSU at 210 Deg. F. (99 Deg. C), with a vapor pressure of 0.0001 mm Hg. at 145 Deg. F. (63 Deg. C)

If the pump is to be operated at vacuum levels that cause the oil temperature to exceed 160 Deg. F. (71 Deg. C) for extended periods of time, a heavier grade oil should be used. Stokes V-Lube (Label G) is available for oil temperatures up to 200 Deg. F. (94 Deg. C).

Special operating conditions may require the use of special oils. Consult Stokes Vacuum for specific recommendations when other than regular petroleum oils are being used.

2.6.1 INITIAL FILL

The Microvac pump is shipped with an initial charge of oil, (4 gallons)(15 L) for the 212J and (12 gallons)(45 L) for the 412J, in the reservoir. Before connecting the suction manifold slowly rotate the pump thru two revolutions. This will distribute the oil throughout the pump interior.

CAUTION: STARTING THE MICROVAC PUMP WHEN OIL TEMPERATURE IS BELOW 55 DEG. F., (13 DEG. C) CAN RESULT IN EXCESSIVE WEAR AND GALLING DAMAGE TO THE MOVING PARTS.

3.0 OPERATION

3.1 Pre-start Check

NOTE: *Remove belt guard cover. Turn pump over by hand at least two revolutions.*

- 3.1.1 A. Jog the motor momentarily while observing pump rotation. If the pump does not rotate in a clockwise direction, interchange any two of the three-phase leads.
- B. Make sure the oil solenoid valve operates properly by checking the oil flow indicator. The paddle wheel should rotate after system pressure is below 600 mm Hg. (6" Hg. Suction).
- C. The oil solenoid valve is normally closed, and must be energized when the pump starts.

The differential pressure between the oil reservoir (atmospheric pressure) and the pump cavity (vacuum) forces the oil to the bearings and into the pump cavity. The oil lubricates the moving parts and also creates an oil seal.

Oil starts to flow at 600 Torr. At 400 Torr the flow is approximately 50%. From 100% Torr to blank-off (15u), flow is 100%.

NOTE: *You must reach 400 torr in 10 minutes or a force feed lubrication system is required to provide adequate oil flow to the pump cavity.*

CAUTION: IF PADDLE WHEEL DOES NOT ROTATE, STOP PUMP IMMEDIATELY. (1) CHECK OPERATION OF SOLENOID. (2) CHECK OIL LINES FOR BLOCKAGE.

3.1.2 DRIVE BELT TENSION

- A. At approximately the center of the span, between drive and driven pulleys, apply 3 to 5 pounds (13.3 - 22.2 N) force for the 212-J and 5 to 7 pounds (22.2 - 31.2 N) force for the 412-J, on the belt. If tension is correct, the resulting deflection should be 7/16" (11 MM) for the 212-J and 1/2" (13 MM) for the 412-J.
- B. Adjust, if necessary, by raising or lowering the nuts on the motor support jackscrews. Tighten the jackscrew nuts securely after adjustment.

NOTE: *Maintenance of proper belt tension is important. Excessive over-tightening belts is harmful to the shaft bearings. Under-tightening belts allows the belts to slip.*

3.2 Pump Start

- 3.2.1 Turn cooling water ON.

WARNING: *REMOVE PLASTIC PLUG FROM EXHAUST PORT BEFORE OPERATING PUMP*

- 3.2.2 Depress "start" button and check solenoid valve for proper operation.

CAUTION: DO NOT START PUMP WHEN OIL TEMPERATURE IS BELOW 55° F. (13° C)

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3.2.3 Be sure the equipment being evacuated is properly cleaned and all vacuum breaks are closed. Open pump intake valve.

3.3 CHECKING OIL LEVEL

3.3.1 Check oil level each day.

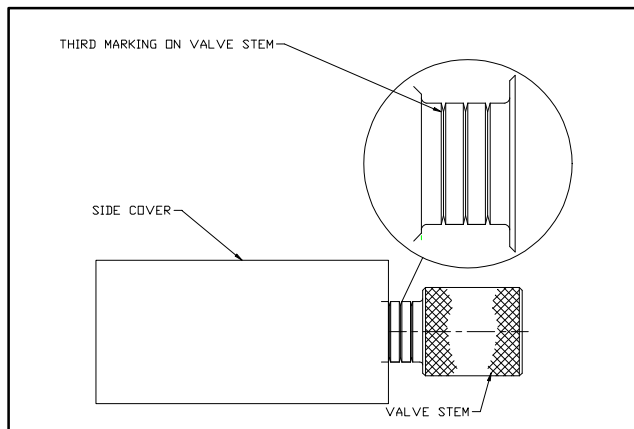
3.3.2 The oil level should be at center of sight glass or in lower half while pump is operating at high vacuum. The level will change depending on suction pressure. In most cases, oil is added after operating the pump for a short period of time.

3.3.3 To avoid loss of oil out the fill hole, do not add oil to the pump when in operation unless pump is at 1 torr or less without Gas Ballast.

NOTE: *When pumping gases that contain water vapor it may be necessary to remove the water that condenses in the pump reservoir sump. This can be done by opening the oil drain valve and draining out water, and closing valve when oil starts to flow. The interval for this must be determined for each specific operation and depends on the amount of water vapor and oil temperature. Operating the pump with the oil temperature near 160 Deg. F. (71 Deg. C.) will tend to minimize formation of water, but will not eliminate it.*

3.4 OPERATION OF GAS BALLAST

WARNING: *WHEN OPENING GAS BALLAST VALVE **DO NOT** OPEN PAST THIRD MARKING ON VALVE STEM. STEM MAY BECOME LOOSE AND CAUSE HARM.*



3.4.1 Open the Gas Ballast valve for maximum efficiency. For a lesser degree of ballasting, turn valve toward close position. Full gas ballast will cause pump temperature to rise but this is normal. For maximum effect of gas ballast, pump should be run at approximately 160 Deg. F. (71 Deg. C) Operating temperature can be raised by throttling cooling water. Oil temperature control kits are available from the factory. Consult Stokes Vacuum for specifications.

NOTE: *Be sure to remove the plastic plug in the Gas Ballast air intake. This plug is used for shipping and storage purposes ONLY.*

3.4.2 If pumping water vapor in excessive quantities, the oil may become contaminated. The oil can be purified by running the pump with Gas Ballast valve full open while the pump is shut-off from the system. When excessive contaminants are present, indicated by high oil level, or thinning, formation of varnish, etc., the oil should be replaced.

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NOTE: *In dirty applications where condensable contaminants (asphalt, pitch, epoxies, etc.) other than water vapor are present, the pump should be operated near 160 Deg. F. (71 Deg. C)*

CAUTION: GAS BALLAST SHOULD NEVER BE USED IF VAPORS BEING PUMPED ARE EXPLOSIVE, E.G. METHANE GAS, HYDROGEN, AND CERTAIN SOLVENT VAPORS. **WHEN GASES OF AN EXPLOSIVE NATURE ARE BEING HANDLED, THE SAFEST PROCEDURE IS TO PLUG THE GAS BALLAST AIR INLET WITH A 3/8" NPT PIPE PLUG.**

- 3.4.3 The check valve used for Gas Ballast should be inspected at least every six months for wear or a broken spring when operating on an (8) hour a day basis; every 3 months for (24) hour a day operation. Replacement part number is A-606-003-001.
- 3.4.4 The gas ballast valve should be closed when the pump is stopped. If the valve is open, gas will be drawn into the pump through the check valve and the vacuum manifold will be pressurized with atmospheric air. If desired, a solenoid valve attached to the gas ballast inlet and electrically connected to the motor leads can be used to turn off the gas ballast automatically on pump shutdown. Contact your local Stokes Vacuum representative for additional information.
- 3.4.5 When a pressurized gas is used to ballast the pump, the pressure must be reduced to 2 psi maximum. The use of higher pressures may damage the pump.
- 3.4.6 When pumping an explosive gas, (i.e. hydrogen, silane, methane) or corrosive gas, (Cl, F, CCl₄, etc.) the pump must be ballasted with an inert gas (nitrogen, argon). The use of air for ballasting under the above conditions can result in an explosion or excessive corrosion inside the pump.
- 3.4.7 Opening the gas ballast slightly will quiet discharge valve noise when the pump is blanked off but will prevent reaching the lowest final pressure.
- 3.4.8 To maintain a low blank-off noise level on a continuous basis, the valve seal washer can be removed from the valve stem. This will provide a small amount of ballast at all times even when the valve is fully closed. It will also break vacuum when the pump is stopped. If this vacuum break is not permissible, solenoid valves may be installed. With the washer removed and with the gas ballast valve closed, blank-off pressure will be approximately 200 microns. The seal washer can be reinstalled when ballast on a continuous basis is no longer required. Care should be taken not to damage the seal washer if it is anticipated that it will be reinstalled.

3.5 PUMP STOP

- 3.5.1 Close intake valve to system.
- 3.5.2 Stop the motor and break vacuum unless system dictates otherwise.

NOTE: *The oil solenoid valve closes automatically when the pump is stopped or in case of power failure, thus preventing pump and vacuum system from being flooded with oil.*

3.6 OPERATING NOTES

- 3.6.1 If large amounts of air pass through the pump, it may become warm and under severe conditions may become hot. This does not indicate trouble. The pump is designed for high vacuum work and should not be operated at pressures above

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400 Torr for more than 10 minutes or at intermediate vacuums for periods which cause oil temperature to exceed 200 Deg. F. (93 Deg. C.)

For optimum pump operation the oil temperature in the oil reservoir should be between 140 Deg. F. (60 Deg. C.) and 160 Deg. F. (71 Deg. C.) with the pump operating on the system or process. Oil temperature can be measured by inserting a thermometer in the fill hole or by contact pyrometer on oil line near the solenoid. If the pump is to be operated with oil temperature in excess of 160 Deg. F. (71 Deg. C.) the use of a heavier viscosity oil is recommended. (See Section 2.6.)

- 3.6.2 When starting the pump or handling large amounts of air, oil vapor in the form of smoke will issue from the exhaust. Again this is no indication of trouble, as the volume of smoke will decrease as the pressure in the system decreases.

NOTE: *Stokes Vacuum closed type oil mist separator is available to alleviate exhaust oil smog.*

- 3.6.3 If the pump has been shut down for an extended period, always turn the pump over at least two (2) revolutions by hand before starting to insure free movement of parts.
- 3.6.4 Low oil temperature can cause overloading when starting the pump and possibly prevent the pump from sealing. Microvac pumps should not be started when the oil temperature is below 55 Deg. F. (13 Deg. C.)* Optimum operating oil temperature after starting is between 140 Deg. F. (60 Deg. C.) to 160 Deg. F. (71 Deg. C.) Opening the Gas Ballast valve will help warm-up the oil. A Water Miser is recommended to automatically control the oil temperature.

**THIS APPLIES ONLY IF STOKES VLUBE "F" IS USED. CONSULT STOKES IF OTHER OILS ARE USED.*

4.0 CHECKING

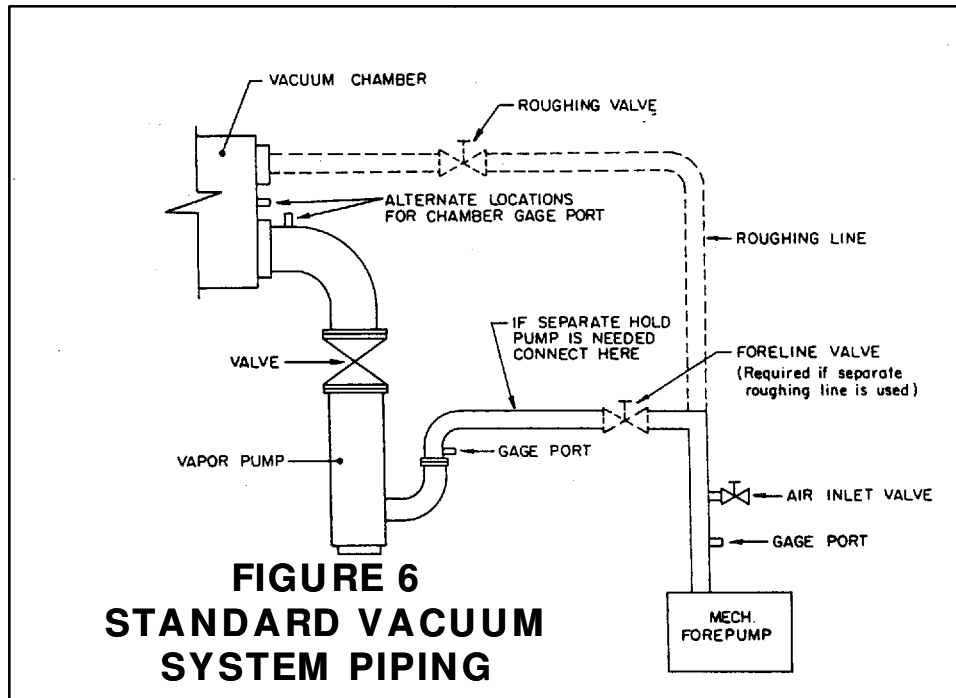
4.1 Poor Vacuum

No pump will give good results on a poor vacuum system. If the vacuum in the system is unsatisfactory, the usual cause is leakage.

4.2 Localizing Leakage

A leakup rate test will help localize a vacuum leak. Such a test is easily made by successively isolating and evacuating each section of the system. The in-leakage rate of each isolated section can be measured. The pressure change rate is then noted.

- 4.2.1 A vacuum leak detector will speed up the process of locating leaks. Stokes Vacuum offers vacuum leak detection services.



4.3 Repairing Small Leaks

To repair small leaks or to close pores, use Sealing Compound, Stokes Vacuum Part No. 4-927. When replacing plug type valves (if used) use Loctite Pipe Sealer No. 714-1 to seal the threads. Gate, Ball or Butterfly type high vacuum valves are preferred for high vacuum service.

NOTE: Stokes Vacuum does not recommend using Teflon Tape for sealing pipe threads. Teflon material is often drawn into system, causing premature wear and damage to moving parts of the pump.

4.4 Pump Activity Record

A record of oil changes, work done on pump, and changes or additions to the system is valuable when checking for leaks or poor vacuum. A sample mechanical vacuum pump preventive maintenance check list along with a summary of major attention items is enclosed for your use.

5.0 TROUBLESHOOTING GUIDE

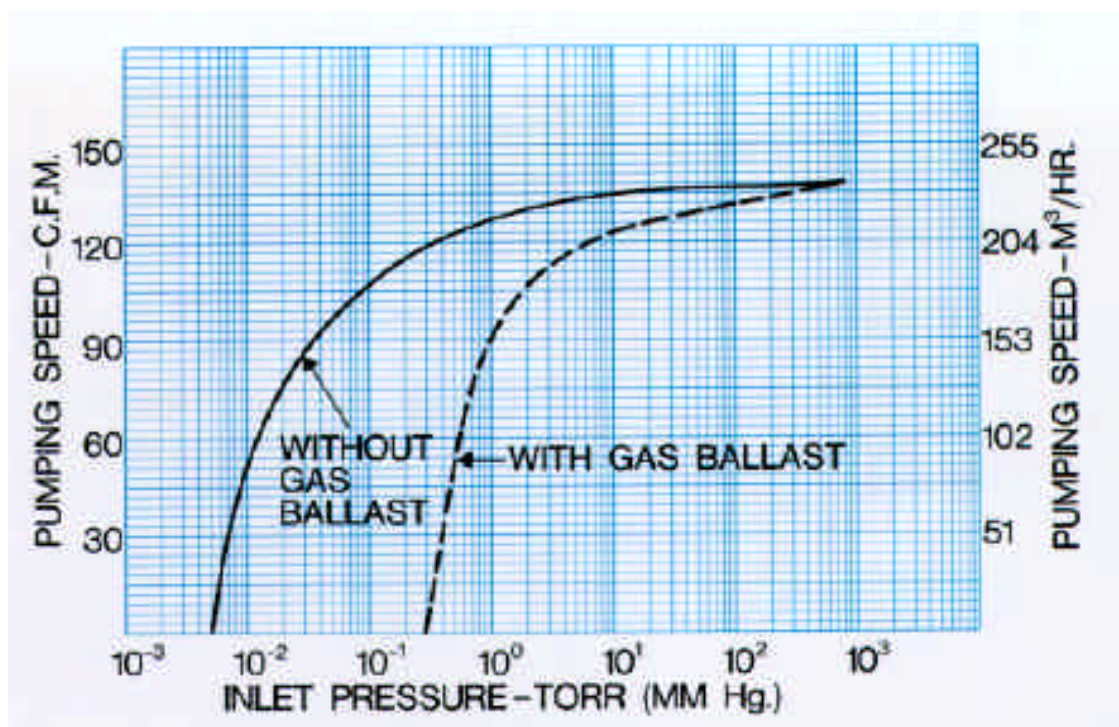
VACUUM AT PUMP IS UNSATISFACTORY	
PROBABLE CAUSE	POSSIBLE REMEDY
A. CONTAMINATED OR INSUFFICIENT OIL.	1. CHECK OIL LEVEL; UTILIZE GAS BALLAST. 2. DRAIN AND WIPE OUT RESERVOIR AND VALVE CHAMBER. REFILL WITH PROPER OIL.
B. SOLENOID OIL VALVE NOT OPERATING PROPERLY OR INOPERATIVE.	CHECK AND, IF NECESSARY CLEAN AND OR REPLACE SOLENOID VALVE OR COIL.
C. LOOSE INTAKE FLANGE OR COVER BOLTS.	TIGHTEN FLANGE AND SIDE COVER BOLTS AT REGULAR INTERVALS.
D. OIL MANIFOLD OR INTEGRAL OIL DISTRIBUTION LEAKING.	TIGHTEN PLUGS AND MANIFOLD SCREWS.
E. OIL LEVEL SIGHT GLASS LEAKING	CAREFULLY TIGHTEN SCREWS.
F. EXHAUST VALVE NOT SEALING	1. DISASSEMBLE, CLEAN AND CHECK ALL PARTS THOROUGHLY. 2. REPLACE ANY DAMAGED OR WORN PARTS.
G. PUMP SEIZES OR KNOCKS EXCESSIVELY; INTERNAL PARTS BADLY WORN OR BROKEN	DISASSEMBLE PISTON ASSEMBLY. REPLACE WORN, BROKEN OR BADLY SCORED PARTS.
H. LEAKAGE IN VACUUM SYSTEM	CHECK SYSTEM AS DESCRIBED IN SECTION 4.0.
VACUUM PUMP EXCESSIVELY NOISY	
PROBABLE CAUSE	POSSIBLE REMEDY
A. PUMP KNOCKING	1. CHECK OIL LEVEL, AND OIL SOLENOID VALVE FOR PROPER OPERATION. 2. BROKEN PARTS OR FOREIGN MATERIAL IN THE PUMP. 3. DISASSEMBLE AND REMOVE FOREIGN MATERIAL IN THE PUMP. 4. REPLACE BROKEN PARTS AS REQUIRED.
B. PUMP SEIZES DUE TO LACK OF LUBRICATION, OR PRESENCE OF FOREIGN MATERIAL.	1. CHECK SOLENOID VALVE FOR PROPER OPERATION. 2. DISASSEMBLE AND REMOVE FOREIGN MATERIAL. MAKE SURE OIL LINES ARE NOT CLOGGED. 3. SMOOTH MINOR SCORING WITH #500 EMERY CLOTH AND WASH THOROUGHLY THEN OIL BEFORE INSTALLING. (A CERTAIN AMOUNT OF SCORING TO THE PISTON AND CYLINDER AND OTHER PARTS USUALLY WILL NOT SERIOUSLY AFFECT THE VACUUM OBTAINABLE SO LONG AS SCORING IS NOT IN A CONTINUOUS GOUGE AROUND THE CIRCUMFERENCE OF THE PISTON SURFACE.)

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MOTOR STOPS OR WILL NOT START	
PROBABLE CAUSE	POSSIBLE REMEDY
A. THERMAL OVERLOAD UNITS IN MOTOR STARTER FAIL.	CHECK CAPACITY OF THERMAL OVERLOAD UNITS BY COMPARING AMPERE RATING ON MOTOR NAMEPLATE WITH OVERLOAD TABLE INSIDE STARTER BOX. IF NECESSARY USE 1 SIZE LARGER THAN STANDARD.
B. POSSIBLE INTERNAL SEIZURE.	DISASSEMBLE AND CORRECT.
PUMP DOES NOT TURN WHEN MOTOR STARTS	
PROBABLE CAUSE	POSSIBLE REMEDY
A. V-BELTS TOO LOOSE.	TIGHTEN V-BELTS. SEE SECTION 3.1.2 PARAGRAPH B.
B. CYLINDER MAY BE FLOODED WITH EXCESSIVE OIL DUE TO DEFECTIVE SOLENOID VALVE. (THE VALVE MAY HAVE STUCK IN THE OPEN POSITION AT THE MOMENT OF PREVIOUS SHUT DOWN, OR FOREIGN MATERIAL MAY BE IN VALVE SEAT.)	TURN PUMP OVER BY HAND TO REMOVE EXCESS OIL. DISASSEMBLE VALVE, CLEAN AND REPLACE ANY WORN PARTS. CHECK SOLENOID.
C. OIL VISCOSITY IS TOO HIGH OR OIL TEMPERATURE MAY BE TOO LOW.	<ol style="list-style-type: none"> 1. CHANGE TO LIGHTER GRADE OIL, OR WARM OIL BEFORE POURING INTO PUMP (ESPECIALLY WITH LOW AMBIENT TEMPERATURES.) PUMP SHOULD NOT BE STARTED WHEN OIL TEMPERATURE IS LESS THAN 70 DEGREES F. (WHEN USING V-LUBE "F" .) 2. TURN PUMP OVER BY HAND BEFORE STARTING.
PUMP TURNS BACKWARDS FOR SEVERAL REVOLUTIONS WHEN MOTOR IS TURNED OFF.	
PROBABLE CAUSE	POSSIBLE REMEDY
A. GAS BALLAST VALVE IN OPEN POSITION WHEN PUMP WAS SHUT DOWN.	CLOSE GAS BALLAST VALVE BEFORE SHUTTING OFF PUMP. THIS PREVENTS ATMOSPHERIC AIR FROM REVERSING DIRECTION OF PUMP PISTON WHEN PUMP IS SHUTDOWN. THIS PROCEDURE ALSO PREVENTS OIL FROM BEING PUSHED INTO THE INLET PIPING.

6.0 SPECIFICATIONS AND PARTS LIST

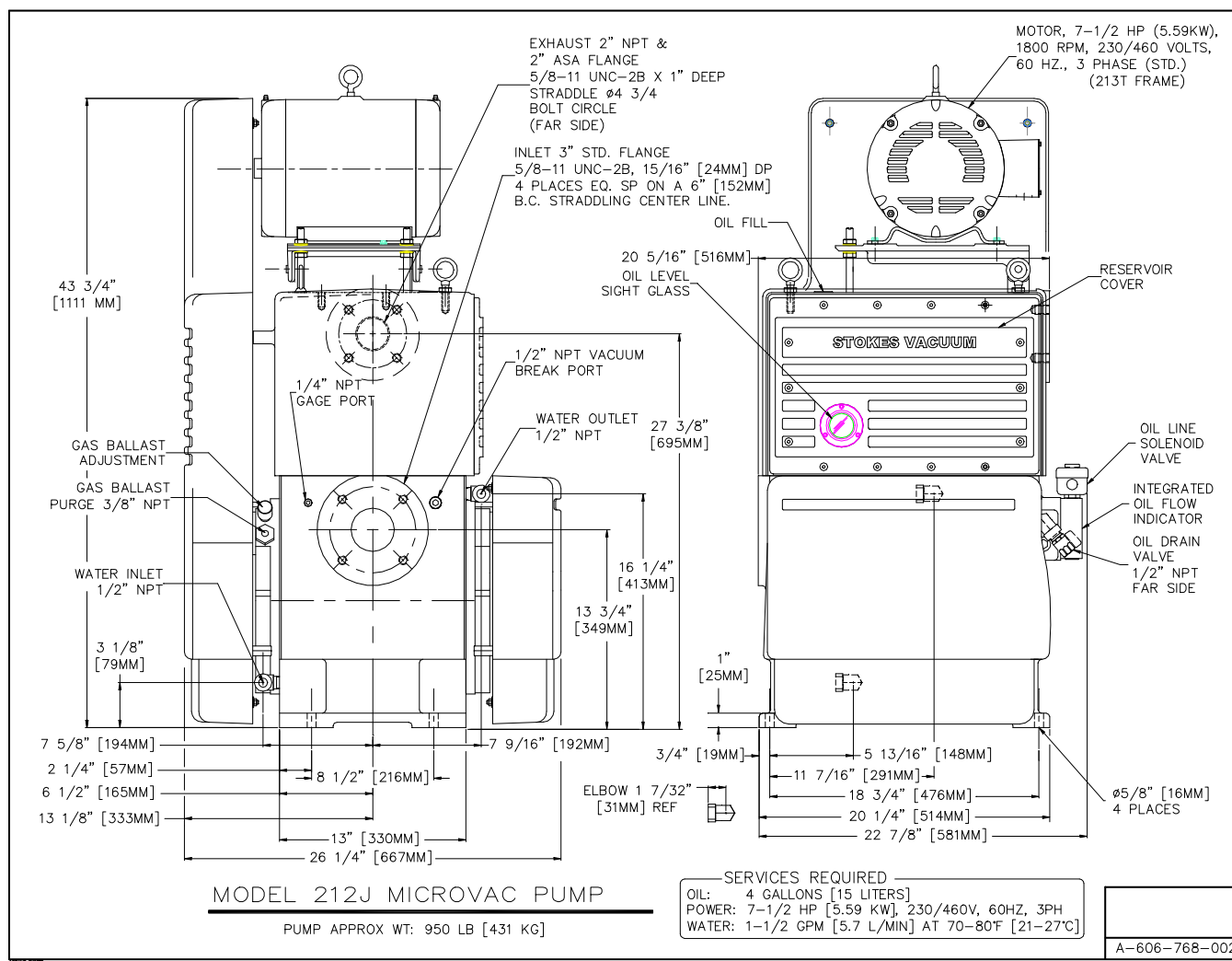
6.1 212-J Performance Curve



6.2 Microvac Model 212-J Specifications

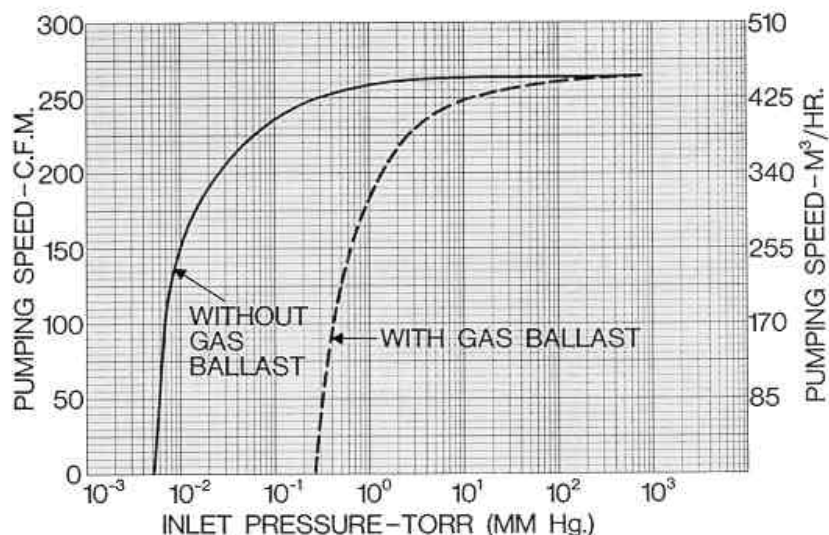
ULTIMATE VACUUM	10 MICRONS HG. OR LESS
DISPLACEMENT – CUBIC FEET	150 CFM
PUMP SPEED	500 RPM
MOTOR	7-1/2 HP
STD. ELECTRICAL SPECS.	3-60-230/460
MOTOR SPEED	1800
PIPE CONNECTIONS-	
SUCTION	3"
DISCHARGE	2"
WATER INLET	1/2"
WATER OUTLET	1/2"
OIL CAPACITY	4 GALLONS (15 LITERS)
NET WEIGHT	950 LBS. (431 KG)
SHIPPING WEIGHT	1075 LBS. (488 KG)
HEIGHT	43-3/4" (1111 MM)
FLOOR SPACE	26-1/4" X 24" (667 X 610 MM)
COOLING	WATER COOLED REQUIRES 1-1/2 GPM (7.57 LITERS/MIN) @ 85 MAX DEGREES F. (30 DEG. C)

J SERIES MICROVAC® VACUUM PUMP



J SERIES MICROVAC® VACUUM PUMP

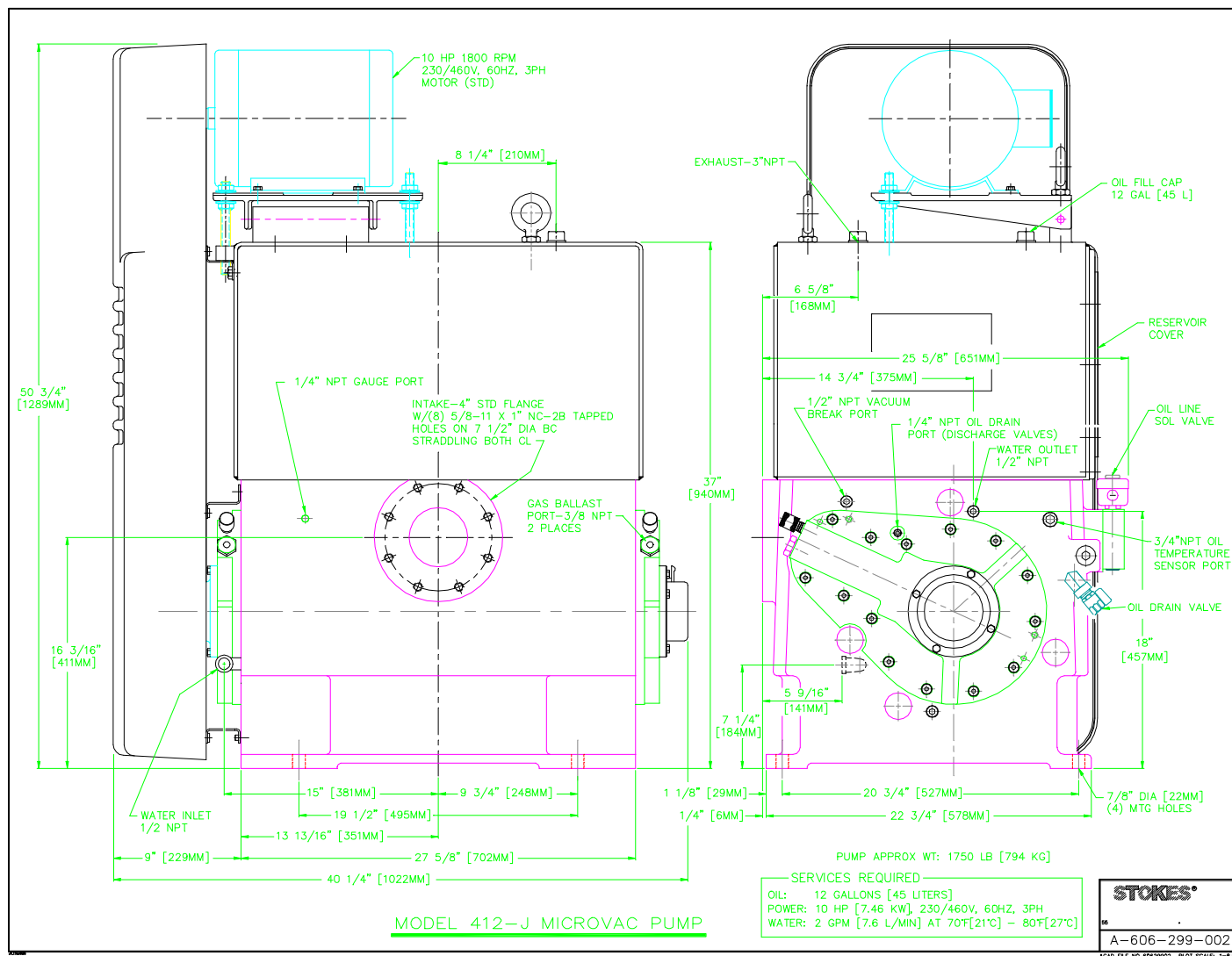
6.3 412-J Performance Curve



6.4 Micorvac Model 412-J Specifications

ULTIMATE VACUUM	10 MICRONS HG. OR LESS
DISPLACEMENT – CUBIC FEET	300 CFM
PUMP SPEED	490 RPM
MOTOR	10 HP
STD. ELECTRICAL SPECS.	3-60-230/460
MOTOR SPEED	1800
PIPE CONNECTIONS-	
SUCTION	4" (102 MM)
DISCHARGE	3" (76.2 MM)
WATER INLET	½" (13 MM)
WATER OUTLET	½" (13 MM)
OIL CAPACITY	12 GALLONS (45 LITERS)
NET WEIGHT	1750 LBS. (794 KG)
SHIPPING WEIGHT	1975 LBS. (896 KG)
HEIGHT	51-9/16" (1310 MM)
FLOOR SPACE	40-1/8" X 22-1/2" (1019 MM X 571.5 MM))
COOLING	WATER COOLED REQUIRES 2 GPM (7.57 LITERS/MIN) @ 85 MAX DEGREES F. (30 DEG. C)

J SERIES MICROVAC® VACUUM PUMP



7.0 SUMMARY MICROVAC PUMP MAJOR ATTENTION ITEMS

1. Check oil level, oil flow and condition of the pump oil periodically. If oil is contaminated, change it and if very dirty, clean the oil reservoir and exhaust valve chamber. Oil should be changed as often as necessary to maintain low blank-off and effective lubrication.
2. Replace exhaust valve springs and exhaust valve disc at least every 6 months when pump is operated 8 hours per day. Clean out any sludge accumulation in oil reservoir.
3. If the gas ballast feature is used regularly, it may be necessary to replace the check valve at least every 6 months.
4. To insure for maximum gas ballast efficiency, check outlet water temperature on jacketed models to make sure the pump is running warm. Oil in the pump reservoir should be approximately 140 degrees to 160 degrees F.(60-71 Deg. C.) for best gas ballast efficiency.
5. If pump incorporates an external oil mist separator, regularly drain off any accumulated dirty oil and discard. This will maintain the efficiency of the unit and extend the life of the element.
6. Check oil solenoid valve periodically for sludge and/or foreign particles accumulation by disassembling and cleaning. If valve sticks in open position, oil can be sucked into pump at shut down. If valve sticks in closed position, insufficient lubrication results and pump can be damaged. Disassemble valve, inspect and clean. Replace parts needing replacement.

NOT A LOT OF CARE...JUST THE RIGHT KIND...AT THE RIGHT TIME.

**USE THE STOKES VACUUM PREVENTIVE MAINTENANCE CHECK LIST
THAT FOLLOWS.**

J SERIES MICROVAC® VACUUM PUMP

MICROVAC PUMP PREVENTIVE MAINTENANCE CHECK LIST

USER _____

PUMP MODEL NO. _____

PUMP LOT NO. _____

SERIAL NO. _____

DATE PUMP INSTALLED ____ / ____ / ____

MAJOR ATTENTION ITEMS	DATE INSTALLED	FIRST INSPECTION DUE	WAS M.A.I. ACCOMP.	COMMENTS
1. CHECK OIL LEVEL, OIL FLOW AND CONDITION OF THE PUMP OIL. SCHEDULE OIL CHANGE TO SUIT YOUR APPLICATION.				
2. REPLACE EXHAUST VALVE SPRINGS AND EXHAUST VALVE DISCS. CLEAN OUT ANY SLUDGE IN OIL RESERVOIR. EVERY SIX MONTHS.				
3. CHECK THE SPRING IN THE GAS BALLAST CHECK VALVE. REPLACE CHECK VALVE IF BROKEN. EVERY THREE MONTHS.				
4. CHECK OUTLET WATER TEMPERATURE ON JACKETED MODELS TO MAKE SURE THE PUMP IS RUNNING WARM. (140 TO 160 DEG. F.)(60 – 71 DEG. C.)				
5. IF PUMP INCORPORATES AN EXTERNAL OIL MIST SEPARATOR, DRAIN OFF ANY ACCUMULATED DIRTY OIL. DAILY.				
6. FLUSH THE PUMP PERIODICALLY USING A DETERGENT TYPE OIL. SIX MONTH INTERVAL RECOMMENDED.				
7. CHECK SOLENOID VALVE FOR SLUDGE AND/OR FOREIGN PARTICLES ACCUMULATION. IF VALVE STICKS, DISASSEMBLE, CLEAN AND REPLACE WORN PARTS.				

MODEL 212J MICROVAC PUMP

LOT NO. SC-78703 (7-99) AND FUTURE

SYM	PART NO.	DESCRIPTION	REF. DWG/ COMP. LIT.	QTY	UM	RSP
1	606-727-001	PUMP HOUSING		1	EA	
2	085-048-064	PLUG EXPANSION		4	EA	✓
3	423-860-001	REDUCING BUSHING		1	EA	
4	008-002-034	PIN DOWEL		4	EA	
5	026-010-036	PLUG 1/8 NPT		1	EA	
6	026-010-037	PLUG 1/4 NPT		1	EA	
7	026-010-039	PLUG 1/2 NPT		4	EA	
8	026-010-040	PLUG 3/4 NPT		3	EA	
9	085-050-765	STREET ELBOW 1/2 NPT		3	EA	
10	085-050-738	BALL VALVE		1	EA	
11	243-926-002	GASKET VALVE DECK		2	EA	✓
12	263-840-004	VALVE DECK		2	EA	✓
13	085-050-414	SCREW SOCKET HEAD M8 X 1.25 X 30 MM LG.		8	EA	
14	264-504-003	OIL BAFFLE		1	EA	
15	085-041-960	SCREW HEX HEAD M8 X 1.25 X 20 MM LG.		6	EA	
16	085-050-358	LOCKWASHER INTERNAL TOOTH		6	EA	
17	246-763-002	OIL BAFFLE GASKET		1	EA	
18	606-753-002	RESERVOIR OIL		1	EA	
19	085-050-761	O' RING 18		1	EA	✓
20	085-050-356	SCREW HEX HEAD M10 X 1.5 X 25 MM LG.		10	EA	
21	085-041-950	LOCKWASHER SOCKET HEAD		10	EA	
22	085-050-756	EYEBOLT		2	EA	
23	085-041-954	NUT M12 X 1.75 MM		2	EA	
24	085-036-021	PLUG 1 NPT		1	EA	
25	606-180-003	MOTOR PLATFORM BLOCK		1	EA	
26	085-050-815	SCREW SOCKET HEAD M12 X 1.75 X 70 MM LG.		2	EA	
27	085-050-816	LOCKWASHER SPLIT SOCKET HEAD		2	EA	
28	606-755-001	MOTOR PLATFORM		1	EA	
29	085-050-760	JACK SCREW M12 X 1.75 X 140 MM LG.		2	EA	
30	085-050-757	WASHER SPHERICAL MALE HALF 1/2 BOLT SIZE (M12)		4	EA	
31	085-041-954	NUT M12 X 1.75 MM		4	EA	
32	085-041-960	SCREW HEX HEAD M8 X 1.25 X 20 MM LG.		4	EA	
33	085-050-358	LOCKWASHER INTERNAL TOOTH		4	EA	

RSP = RECOMMENDED SPARE PART
UM = UNIT OF MEASURE

MODEL 212J MICROVAC PUMP

LOT NO. SC-78703 (7-99) AND FUTURE

SYM	PART NO.	DESCRIPTION	REF. DWG/ COMP. LIT.	QTY	UM	RSP
34	606-754-001	RESERVOIR COVER		1	EA	
35	085-050-737	O' RING 15 5/8		1	EA	✓
36	085-050-116	O' RING 1 3/4		1	EA	✓
37	085-050-125	LENS PYREX		1	EA	
38	605-770-003	LENS RETAINER		1	EA	
39	085-050-357	SCREW BUTTON HEAD M5 X .8 X 12 MM LG.		3	EA	
40	085-039-332	SCREW SOCKET HEAD M8 X 20 MM LG.		14	EA	
41	085-050-358	LOCKWASHER INTERNAL TOOTH		14	EA	
42	605-988-007	SIDE COVER		1	EA	
43	085-041-609	O' RING 5/8		1	EA	✓
44	026-010-038	PLUG 3/8 NPT		1	EA	
45	085-050-117	O' RING 13 1/2		1	EA	✓
46	085-019-757	BALL BEARING		2	EA	✓
47	085-019-492	LOCKNUT BEARING		2	EA	✓
48	085-019-491	LOCKWASHER BEARING		2	EA	✓
49	085-050-286	SCREW SOCKET LOW HEAD M10 X 1.50 X 25 MM LG.		20	EA	
50	085-050-287	SOCKET SETSCREW M12 X 1.75 X 16 MM LG.		4	EA	
51	606-762-002	STANDOFF METRIC		8	EA	
52	605-988-008	SIDE COVER		1	EA	
53	085-050-122	VALVE CHECK		1	EA	✓
54	085-050-128	SCREEN WIRE		1	EA	✓
55	085-050-192	O' RING 15/16		1	EA	✓
56	085-050-115	O' RING 1/2		1	EA	✓
57	085-050-120	SEAL WASHER		1	EA	
58	085-041-609	O' RING 5/8		1	EA	✓
59	026-010-038	PLUG 3/8 NPT		1	EA	
60	026-010-051	PLUG 1/4 NPT		2	EA	
61	085-050-117	O' RING 13 1/2		1	EA	✓
62	262-315-005	ENDCAP		2	EA	
63	085-039-332	SCREW SOCKET HEAD M8 X 20 MM LG.		8	EA	
64	085-050-358	LOCKWASHER INTERNAL TOOTH		8	EA	
65	085-019-755	O' RING 4-7/8		2	EA	✓
66	085-028-091	MOTOR		1	EA	✓

RSP = RECOMMENDED SPARE PART
UM = UNIT OF MEASURE

MODEL 212J MICROVAC PUMP

LOT NO. SC-78703 (7-99) AND FUTURE

SYM	PART NO.	DESCRIPTION	REF. DWG/ COMP. LIT.	QTY	UM	RSP
67	085-027-308	PULLEY		1	EA	✓
68	085-013-669	BELT SET		1	EA	✓
69	085-029-600	ROTARY OIL SEAL		2	EA	✓
70	243-595-011	PISTON & SLIDE		1	EA	✓
71	278-575-001	ECCENTRIC (HOLLOW)		1	EA	
72	085-022-001	PLUG EXPANSION		4	EA	
73	297-857-004	HINGE BAR		2	EA	
74	252-616-012	SHAFT		1	EA	
75	262-318-003	RING SHOULDER SHAFT		1	EA	✓
76	266-169-025	PULLEY		1	EA	
77	266-169-027	FLYWHEEL		1	EA	✓
78	264-524-001	WOODRUFF KEY		2	EA	
79	264-540-001	SHIM BEARING		1	EA	✓
80	296-264-007	RING SHOULDER SHAFT		1	EA	
81	408-324-005	ECCENTRIC KEY		1	EA	✓
82	606-279-002	OIL MANIFOLD BLOCK		1	EA	
83	026-010-039	PLUG 1/2 NPT		3	EA	
84	085-050-327	SCREW PANHEAD M5 X .8 X 20 MM LG.		1	EA	
85	605-770-003	LENS RETAINER		1	EA	
86	606-127-001	WHEEL PADDLE		1	EA	
87	606-130-001	AXLE WHEEL		1	EA	
88	085-050-125	LENS PYREX		1	EA	
89	085-050-116	O' RING 1 3/4		1	EA	✓
90	085-050-129	SOLENOID VALVE WITH ORING		1	EA	✓
91	085-050-357	SCREW BUTTON HEAD M5 X .8 X 12 MM LG.		3	EA	
92	085-041-609	O' RING 5/8		2	EA	✓
93	085-050-328	SCREW SOCKET HEAD M10 X 1.5 X 45 MM LG.		2	EA	
94	606-002-001	STEM VALVE		1	EA	✓
95	606-003-001	RETAINER CHECK VALVE		1	EA	✓
96	606-757-001	BELT GUARD BRACKET		1	EA	
97	085-032-616	WASHER (NYLON) 3/8" ID X 1" OD X 1/16 THK. NATURAL COLOR		10	EA	
98	085-041-960	SCREW HEX HEAD M8 X 1.25 X 20 MM LG.		10	EA	
99	085-041-947	LOCKWASHER SPLIT		1	EA	

RSP = RECOMMENDED SPARE PART
UM = UNIT OF MEASURE

**MODEL 212J MICROVAC PUMP
LOT NO. SC-78703 (7-99) AND FUTURE**

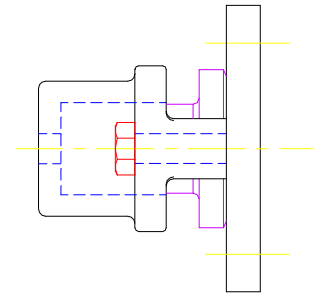
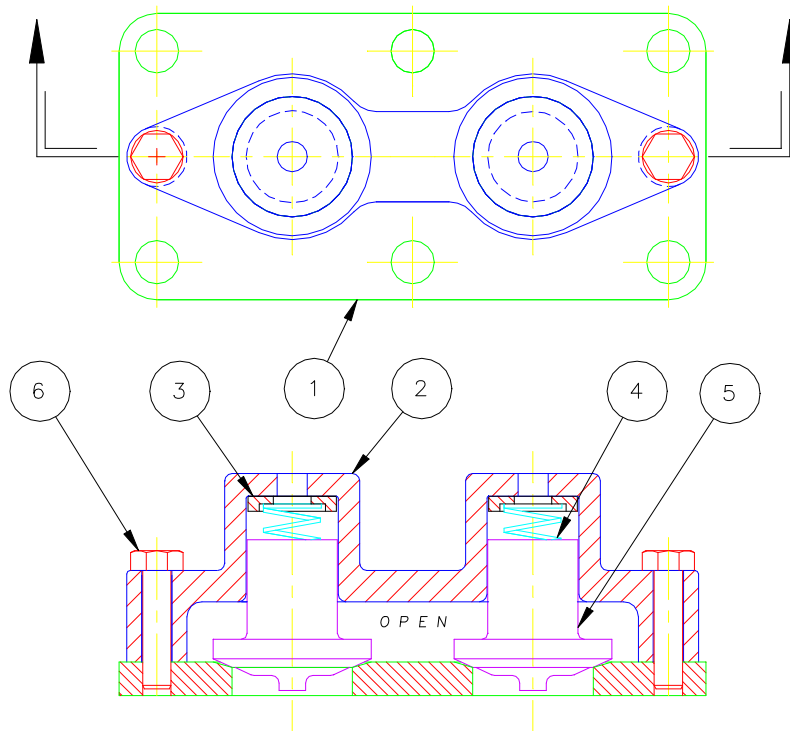
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RSP = RECOMMENDED SPARE PART
UM = UNIT OF MEASURE

NOTES:

1. VENDOR SHALL SUPPLY VALVE ASSEMBLED.
2. APPLY REMOVABLE THREAD LOCK (LOCTITE 242) TO ITEM ⑥ AND TORQUE SCREWS TO 10.3 FT LBS.
3. SCREWS SHALL BE ZINC PLATED GRADE 10.9.
4. APPROXIMATE WEIGHT: 1.25 LBS

		VENDOR TO SUPPLY THE FOLLOWING		
ITEM	QTY	DESCRIPTION	P/N	REV
1	1	POPPET VALVE SEAT	B-607-353-003	-
2	1	POPPET VALVE CAP	B-607-354-002	-
3	2	POPPET VALVE INSERT	A-607-416-001	-
4	2	POPPET VALVE SPRING	A-085-052-306	-
5	2	POPPET	A-607-415-001	-
6	2	HEX HD CAPSCREW M6 X 1 X 25MM LG	085-041-992	



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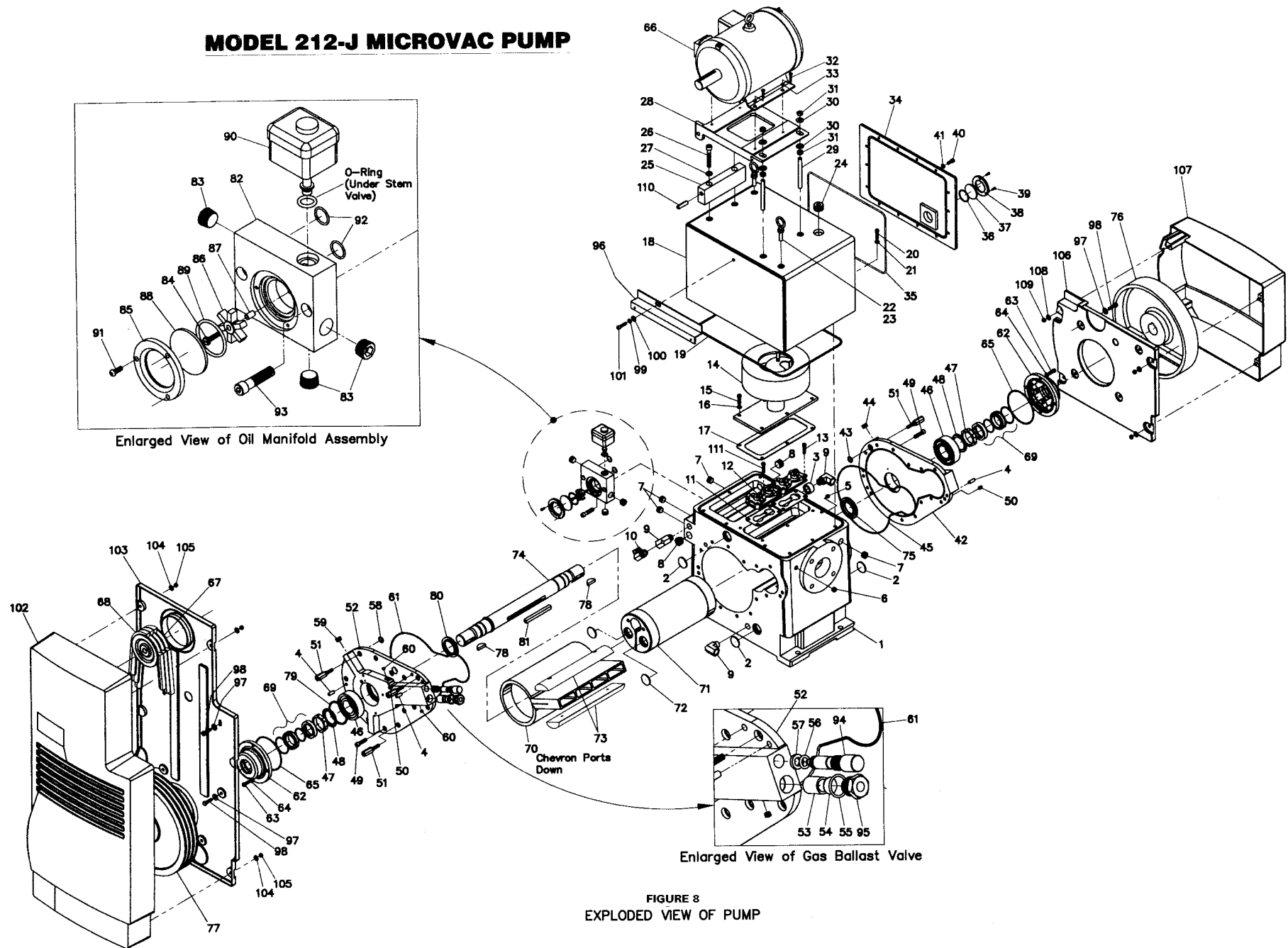
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DESCRIPTIVE TITLE POPPET VALVE ASSEMBLY

DRAWN BY R.K. DATE 3/2/00 SCALE: 1=1
CHECKED BY _____ DATE _____
APPROVED BY _____ DATE _____
S. O. 420-004 PRODUCT CODE NO. _____

			B
			A
DATE	APP	REVISIONS	
STOKES VACUUM Inc. 5500 Tabor Road Philadelphia, Pennsylvania 19120			
DWG. NO. <u>B-607-417-001</u>			

MODEL 212-J MICROVAC PUMP



Model 412-J14 Microvac Pump

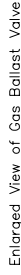
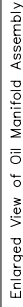
ITEM NO.	CODE NO.	DESCRIPTION	QTY.	REF. DRAWING
1	606-191-003	PUMP HOUSING 412J	1	D-606-191-003F
2	607-059-003	RESERVOIR,MACHINING	1	D-607-059-003
3	605-432-005	COVER	1	D-605-432-005A
4	605-988-004	SIDE COVER, DRIVE END	1	D-605-988-004E
5	605-988-003	SIDE COVER,DEAD END	1	D-605-988-003E
6	243-595-011	PISTON & SLIDE 412/212	2	D243-595-011G
7	252-459-001	ECCENTRIC,SOLID	1	C252-459-001X
8	278-575-001	ECCENTRIC,HOLLOW 412/212	1	C-278-575-001M
9	262-315-005	CAP,DRIVE END	1	C262-315-005F
10	264-789-003	CAP,DEAD END	1	C-264-789-003B
11	607-417-001	POPPET VALVE ASSEMBLY	4	B-607-417-001
12	264-785-002	RING, BEARING 412 W/ PIN	1	C-264-785-002P
13	085-033-232	BRG RLLR SPH 2.1654 IDX3.9370	1	
14	262-992-005	SHAFT	1	D262-992-005-J
15	408-324-005	SQUARE KEY	2	A-408-324-005B
16	264-524-001	WOODRUFF KEY	1	A-264-524-001D
17	269-256-005	OIL SEPARATOR	1	D-269-256-005B
18	262-318-003	RING	2	A-262-318-003A
19	297-857-004	HINGE BAR	4	B-297-857-004E
20	268-788-001	SPACER	1	A-268-788-001D
21	606-180-001	BLOCK, HINGE	1	A-606-180-001A
22	606-279-002	OIL MANIFOLD	1	C-606-279-002
23	606-130-001	AXLE	1	A-606-130-001
24	605-618-002	STUD	2	A-605-618-002A
25	606-003-001	RETAINER	2	A-606-003-001B
26	606-002-001	STEM VALVE	2	A-606-002-001D
27	606-127-001	PADDLE	1	B-606-127-001B
28	605-770-003	RETAINER, LENS	2	A-605-770-003B
29	606-309-003	BELT GUARD ASSY.	1	A-606-309-003
30	606-272-004	BRACKET,BOTTOM	1	B-606-272-004
31	408-306-008	BRACKET,MIDDLE	1	B-408-306-008
32	085-019-755	O RING 4-7/8 IDX5-1/8 OD.139CS	2	*
33	085-029-600	SEAL ROTARY OIL	1	A-085-029-600A*
34	085-041-609	O RING 5/8 ID X .139 CS VITON	4	
35	085-050-120	SEAL 1/4 ID X 5/8 OD X 3/16 TK	2	
36	085-050-192	O-RING 15/16 ID X .139W (-213)	2	
37	085-050-115	O-RING 1/2 ID X .139 W (-206)	2	
38	243-926-002	GASKET,VALVE PLATE	4	A-243-926-002A
39	085-050-119	O-RING 28 1/4 ID X .210 C/S	1	
40	085-050-118	O-RING 23 ID X .210 C/S	1	
41	085-050-116	O-RING 1 3/4 ID X .139 C/S	2	
42	269-037-001	GASKET,OIL SEPARATOR	1	B-269-037-001
43	085-019-757	BALL BEARING	2	
44	085-050-117	O-RING 13 1/2 ID X.139 C/S	2	

ITEM NO.	CODE NO.	DESCRIPTION	QTY.	REF. DRAWING
45	085-050-125	LENS PYREX FL PL GLASS CIRCLE	2	
46	085-029-217	EXPANSION PLUG	6	
47	085-050-122	VALVE CHK CRTG BRS BODY (1"D X	2	
48	085-050-128	SCREEN WIRE MESH 24 X 24 .014	2	
49	085-050-738	VALVE BALL MINI 1/2 NPT	2	
50	268-783-009	PULLEY,3 GROOVES (DRIVEN) 412J	1	C-268-783-009
51	026-010-037	PLUG 1/4 NPT 3000 LB	6	
52	026-010-038	PIPE PLUG 3/8NPT X-HVY HEX SOC	2	
53	026-010-039	PLUG 1/2 NPT SOC HD	7	
54	026-010-040	FPS STEEL PLUG 3/4 NPT 3000#	3	
55	607-453-001	BUSHING, OIL FILL	1	A-607-453-001
56	085-050-765	EL 90 STR 1/2 BRS	2	
57	085-050-327	SCR PNH SLTD STL M5X.8X20MM LG	1	
58	085-050-357	SCR CAP SKT BTN HD M5X.8X12MM	6	
59	085-050-361	SCR CAP SKT HD M6X1X30MM LG	6	
60	085-039-332	SCR SOC M8 X 20MM LG STL ALLOY	16	
61	085-054-148	SCREW,HEX.HD.CAP M8X1.25X16MM	24	
62	085-050-297	SCR CAP HEX HD M10X1.5X12	9	
63	085-050-286	SCR CAP SKT LOW HD M10X1.5X25	28	
64	085-042-269	SCR HEX M10 X 1.5 X 30MM LG ST	18	
65	085-050-328	SCR CAP SKT HD M10X1.5X45MM LG	18	
66	085-050-287	SCR SET SKT STL M12X1.75X16MM	4	
67	606-003-001	RETAINER CHECK VALVE	2	
68	001-001-101	SCR, HEX HD 3/4-10 X 3-1/4 LG	12	
69	085-054-249	SCREW,CAP, HEX HD. M16 X 90MM	2	
70	008-002-034	PIN DOWEL STL 3/8 X 1"LONG	4	
71	085-035-996	ROLL PIN STL 1/2 D X 1 3/4 LG	2	
72	085-050-338	LK WASH EXT TOOTH M10 SPR STL	21	
73	007-024-003	WASHER, FLAT S.A.E. 3/8	9	
74	085-019-491	LOCKWASHER BRG 2 ID X.058 THK	2	
75	085-019-757	BALL BEARING	2	
76	085-041-950	WASHER LOCK SPLIT M10	25	
77	085-050-358	LK WASH INTL TOOTH M8 SPR STL	16	
78	085-041-950	WASHER LOCK SPLIT M10	4	
79	085-050-152	WASHER SPHER MALE HALF(CONVEX)	4	
80	085-019-492	LOCK NUT BRG STL N 10	2	
81	085-050-280	NUT HEX THIN CL4 STL M16X2	4	
82	085-032-616	WASHER PLAIN NYLON 3/8 ID X	5	
83	085-027-292	MTR EL 10HP 1800/230/460/3/60	1	A-085-027-292
84	085-050-233	PULLEY 3 GRV A-4.6 PD B-5.0 PD	1	A-085-050-233
85	085-050-126	V-BELT BX SECT SET OF 3 BELTS	1	
86	085-050-129	VALVE SOL 2WAY NC 7/16 ORIFICE	1	A-085-050-129
87	605-587-003	PLATFORM, MOTOR	1	
88	270-231-001	RETAINING PIN	1	
89	085-054-240	EYEBOLT, COLLAR M16	2	

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3501 Island Avenue Philadelphia, Pennsylvania 19153

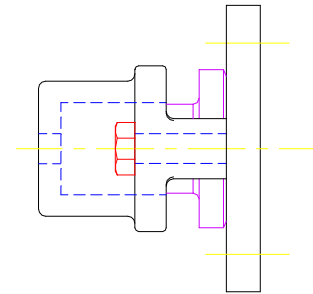
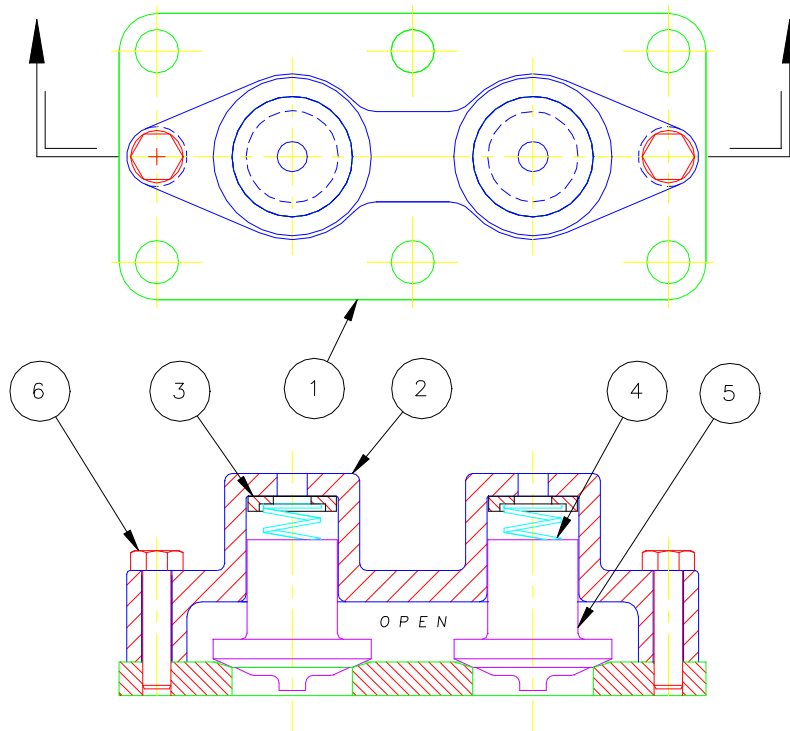


REVISION 03/2004

NOTES:

1. VENDOR SHALL SUPPLY VALVE ASSEMBLED.
2. APPLY REMOVABLE THREAD LOCK (LOCTITE 242) TO ITEM ⑥ AND TORQUE SCREWS TO 10.3 FT LBS.
3. SCREWS SHALL BE ZINC PLATED GRADE 10.9.
4. APPROXIMATE WEIGHT: 1.25 LBS

		VENDOR TO SUPPLY THE FOLLOWING		
ITEM	QTY	DESCRIPTION	P/N	REV
1	1	POPPET VALVE SEAT	B-607-353-003	-
2	1	POPPET VALVE CAP	B-607-354-002	-
3	2	POPPET VALVE INSERT	A-607-416-001	-
4	2	POPPET VALVE SPRING	A-085-052-306	-
5	2	POPPET	A-607-415-001	-
6	2	HEX HD CAPSCREW M6 X 1 X 25MM LG	085-041-992	



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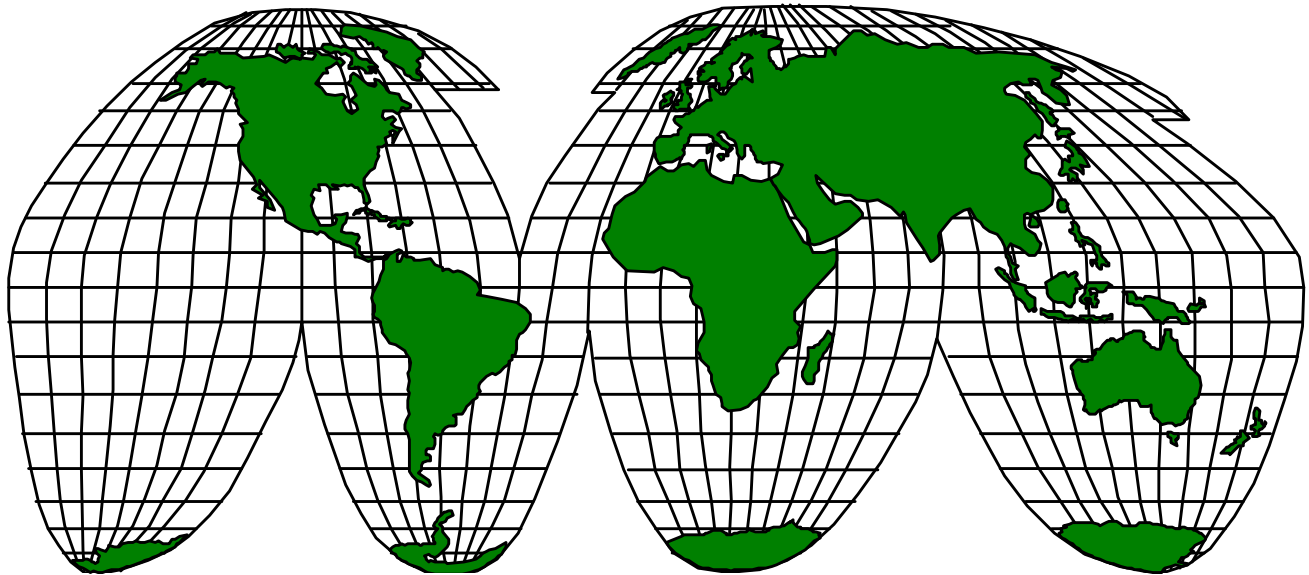
DESCRIPTIVE TITLE POPPET VALVE ASSEMBLY

DRAWN BY R.K. DATE 3/2/00 SCALE: 1=1
CHECKED BY _____ DATE _____
APPROVED BY _____ DATE _____
S. O. 420-004 PRODUCT CODE NO. _____

			B
			A
DATE	APP	REVISIONS	
STOKES VACUUM Inc. 5500 Tabor Road Philadelphia, Pennsylvania 19120			
DWG. NO. <u>B-607-417-001</u>			

***For Fast Part's Sales and Service
for your Stokes Equipment, call
the office nearest you!!!***

***FOR THE INTERNATIONAL SALES AND SERVICE CENTER
NEAREST YOU PLEASE CALL 1-800-445-3411 AND ASK FOR
OUR INTERNATIONAL CUSTOMER SERVICE DEPARTMENT.***



PARTS ORDERING INFORMATION

The Stokes Customer Service Department is organized to assist you in keeping your equipment operating and to provide necessary parts as spares for your critical inventory as well as replacement parts as needed.

For faster service when ordering parts, please observe the following procedure:

- ✓ Order by part number shown on the parts list.
- ✓ Always include the model, lot and serial number of the equipment. These numbers can be found on the nameplate.
- ✓ Use the same nomenclature as shown on reference drawings and parts list. Also refer to drawing numbers and parts list symbol numbers whenever possible.
- ✓ When ordering electrical parts and solenoid operated valves, be sure to specify voltage, cycles and phase as well as the part number.



PARTS ORDERING INFORMATION

The Stokes Customer Service Department is organized to assist you in keeping your equipment operating and to provide necessary parts as spares for your critical inventory as well as replacement parts as needed.

A wide range of critical and wear parts are stocked for your convenience. Special parts, not normally replaced, are not always stocked and Stokes is prepared to manufacture these on a priority basis.

In spite of our very effective Inventory Control System, unusual demands may find us out of stock on critical items and we strongly recommend that you carry an inventory of critical parts, as well as those special parts relative to your equipment. Wear items, those recommended for your inventory, are noted on the Parts List by an asterisk (*). Having these parts readily available will assure maximum "Up-Time" for your equipment and minimum loss of production.

Those parts, marked by a plus sign (+) in the quantity column, are normally stocked in Philadelphia, with smaller quantities in our Service Centers around the country. If your parts list is not clear or seems to be incomplete, please contact the Stokes Customer Service Department, 5500 Tabor Road Philadelphia Pa. 19120, for an updated or clarified list.

For faster service when ordering parts, please observe the following procedure:

- 1) Order by part number shown on the parts list.
- 2) Always include the model, lot and serial number of the equipment. These numbers are listed in the instruction manual, on the parts list, and also stamped on the nameplate of the machine.
- 3) Use the same nomenclature as shown on reference drawings and parts list. Also refer to drawing numbers and parts list symbol numbers whenever possible.
- 4) When ordering electrical parts and solenoid-operated valves, be sure to specify voltage, cycles and phase as well as the part number.

- 5) **For faster service send parts orders directly to BOC EDWARDS/Stokes Vacuum, Customer Service Dept., 5500 Tabor Road, Philadelphia, Pa. 19120 or contact Customer Service Dept. at 1-800-445-3411.**

Warranty and Field Service Policy

INTRODUCTION

The following describe Stokes warranty and service policies. These, in connection with the operating instructions attached, were produced for your benefit.

Maximum results can only be achieved if your technical staff thoroughly familiarizes itself with all features of Stokes equipment, many of which are unique. For this purpose Stokes will provide demonstration and instruction services whenever necessary and will gladly answer any questions that may arise.

Please read the following subject matter for further details of services that are available and provisions under which they can be supplied.

DEMONSTRATION OF NEW EQUIPMENT

1. With certain Stokes equipment, demonstration service is included for the purpose of checking the installation and operation of the equipment. These services include one round trip from the factory or district service office and include traveling and living expenses. The specified time will be on the basis of an eight hour day (Monday through Friday), holidays excluded.
2. If additional demonstration services are required, a charge will be made for the additional time and expenses.
3. Stokes equipment is shipped with a normal amount of disassembly. It is the responsibility of the purchaser to provide suitable foundations and have the equipment fully assembled, and to have all wiring and piping completed in accordance with Stokes installation instructions before requesting demonstration. At least one week advance notice is requested in order to insure having qualified personnel available.
4. Stokes' responsibility extends only to the equipment it has supplied. In the event that ancillary or auxiliary items are added, the operation of these items by Stokes' Service Personnel will be at the Purchaser's risk.

GENERAL SERVICE POLICY

1. Stokes provides the serviceperson, upon request, for the purpose of checking machines, recommending replacement parts, overhauling, rebuilding, etc. The customer will be charged for time and expense.
2. On courtesy calls, initiated by Stokes, minor adjustments will be made and instructions given free of charge. Should the customer request service beyond what might reasonably

- be defined as "major adjustments and instructions", a charge will be made for the additional time required. Should the request for additional service involve an unscheduled overnight stop-over or other unanticipated expense, the customer will also be billed for the added expenses involved.
3. Stokes servicepersons are specialists. Their primary functions are to demonstrate, to identify sources of trouble and to instruct customers' operating and maintenance personnel in methods of prevention and correction. To obtain maximum utilization of the servicepersons, customers should provide all necessary assistance in the form of movers, mechanics, operators, etc. Customers should also provide any standard tools and facilities that may be required and that cannot readily be carried by a serviceperson such as lifting equipment, electric drills, etc.

REBUILDING, REPAIRING AND MODIFYING STOKES EQUIPMENT

Customers interested in major overhaul and/or repair work on their existing machines should first consider the age and general condition of the equipment under consideration, the current cost of comparable new equipment and comparable design features. If it is deemed advisable to rebuild rather than replace, the equipment should be returned to the Stokes factory.

Pumps being rebuilt are thoroughly disassembled, cleaned and reassembled with new parts. The rebuilt pump is put on the test block and checked for performance. Only when acceptable performance is demonstrated, is the pump released for shipment.

Pumping units are available for rental, subject to availability, by customers who need additional pumping capacity for short periods or to fill in while the regular equipment is being repaired or rebuilt.

The cost of disassembling, cleaning and inspection is included in the price. The parts for the major repair kit used are included in the parts section of this manual. If the additional parts required or if repairs are found to be so extensive that rebuilding is considered uneconomical and the project is dropped, the customer will be invoiced a previously established fixed fee.

PUMPING HAZARDOUS GASES

Pumping certain gases or gaseous mixtures is hazardous. Consequently, we cannot assume responsibility for the operational safety of our pumping components. We can only alert you to this hazard and suggest procedures to minimize the possibility of an explosion.

1. The mechanical pump should be located in a safe area so that the reactive gas is unlikely to be present in the atmosphere surrounding the unit.

2. It is essential that the vacuum system, including discharge line, be free of air leaks, so that gases will not leak into or out of the system.
3. The pump should be purged with nitrogen (or other suitable inert gas) prior to, during and after operation. Purge port connections should be made at two locations: Port A - to be at the pump inlet on the pump side of the inlet line valve; Port B - to be in the discharge of the pump.

Port A (at inlet) is to be used with the inlet valve closed, but with the pump in operation. This will help reduce the percentage of reactive gas present in the unit and the discharge. When the inlet valve is open, Port A should be closed. After the evacuation is complete, the inlet valve should be closed and Port A reopened to purge the pump and to fill all voids in the pump and discharge line.

Port B (discharge) is to be used while the unit is in operation, with inlet valve open (but with Port A closed). This will assure a continuous positive flow of inert gas through the pump's discharge section to safely carry off the reactive gas being evacuated from the system. The inert gas flow must be sufficient to prevent exhaust gases from back diffusing through the exhaust line into the pump.

4. The discharge line from the vacuum pump should be vented to a suitable safe area outside of any building where it is unlikely that the reactive gas could accumulate. The work area around the pumping equipment should also be ventilated to avoid the possibility of reactive gas accumulations.
5. A suitable flame arrester should be placed in the discharge line. The discharge pipe should be marked to avoid the possibility of workmen welding, or working near the area with open flames or dangerously hot equipment.
6. While it is normally unlikely that the reactive gas will be present in the work area, insurance regulations in a given locality may require special electrical components. Where stricter electrical specifications are dictated, the main control panel for the pump(s) can be located outside the hazardous area with only the vacuum switch with its associated time delay and control relays located on the mechanical booster pump. These small electrical components do not require a very large housing and can be assembled directly on the pump in a safe enclosure. The various motor and control leads can then be fed to the pumps from a safe remote location.



STOKES EQUIPMENT WARRANTY

PRODUCT	MICROVAC PUMP	VACUUM BLOWER	MICROVANE PUMP	DRY PUMP
NUMBER OF WARRANTY YEARS	TWO YEAR	TWO YEAR	ONE YEAR	ONE YEAR
PARTS CONSIDERED EXPENDABLE	EXHAUST VALVE AND GAS BALLAST SPRINGS; SOLENOID VALVE COIL; SHAFT SEALS; "V" BELTS; GASKETS.	"O" RINGS; SHAFT SEALS	SOLENOID VALVE COIL; SHAFT SEALS; GASKETS; "O" RINGS, SHAFT SLEEVE, VALVE SPRINGS, EXHAUST VALVES, VANES	SOLENOID VALVE COIL; SHAFT SEALS; GASKETS; "O" RINGS, SHAFT SLEEVE

BOC EDWARDS/Stokes Vacuum warrants every Stokes product against defects in material and workmanship for a period stated above (number of warranty years) from the date of shipment, as described in our "Condition of Sale."

Every part is covered by the warranty except normally replaceable parts that are considered expendable; their life expectancy being determined by the type of service to which the pump is subjected. However, repair or replacement of any part will be made F.O.B. seller or supplier's plant, if the part in question was defective at the time of delivery.

BOC EDWARDS/Stokes Vacuum will honor this warranty for the period stated above (number of warranty years) from the date of shipment, when the user demonstrates that the following basic conditions have been met:

- ☐ The equipment must be properly installed and operated in accordance with the established procedures outline in the Instruction Manual supplied with the equipment.
- ☐ The equipment must be protected to prevent dirt, foreign materials and corrosive vapors from entering the intake and causing damage to the working parts.
- ☐ Service the equipment at proper intervals consistent with its usage. Use the proper grade and quality of recommended oil. Stokes "V" Lube is available in several grades to assure you of meeting the latter requirements.
- ☐ Follow preventive maintenance schedule as outlined in the Operating Instruction Manual.

Our Engineering-Advisory Services are available, at no charge, to assist the user and to insure that the user obtains the maximum performance and operating life from the "tried and proven" Stokes Vacuum Equipment. Use this service for advice regarding special or unusual applications of your equipment.



Quality Survey

Thank you for purchasing your equipment from Stokes Vacuum Inc. In our pursuit of complete customer satisfaction we would appreciate your comments on the usefulness and readability of this manual. Please fax (215) 831-5420 or mail this sheet to BOC EDWARDS/Stokes Vacuum 5500 Tabor Road, Philadelphia, PA. 19120 Attn: Technical Publications Department. Your cooperation is greatly appreciated.

Thank you again,

Robert J. Landis
Manager, Technical Publications

Stokes Model Number _____ Stokes Order Number _____

Revision Date of Manual _____

Please Rate the Following Items

Compared to similar manuals, this manual is... _____ *Good* _____ *Fair* _____ *Poor*

Ease of reading is ... _____ *Good* _____ *Fair* _____ *Poor*

Level of information is ... _____ *Good* _____ *Fair* _____ *Poor*

Photographs and/or Illustrations are ... _____ *Good* _____ *Fair* _____ *Poor*

The amount of information was ... _____ *Good* _____ *Fair* _____ *Poor*

Comments?

STOKES CARE . . . JUST THE RIGHT KIND . . . AT THE RIGHT TIME

INSIST ON STOKES GENUINE PARTS AND LUBRICANTS

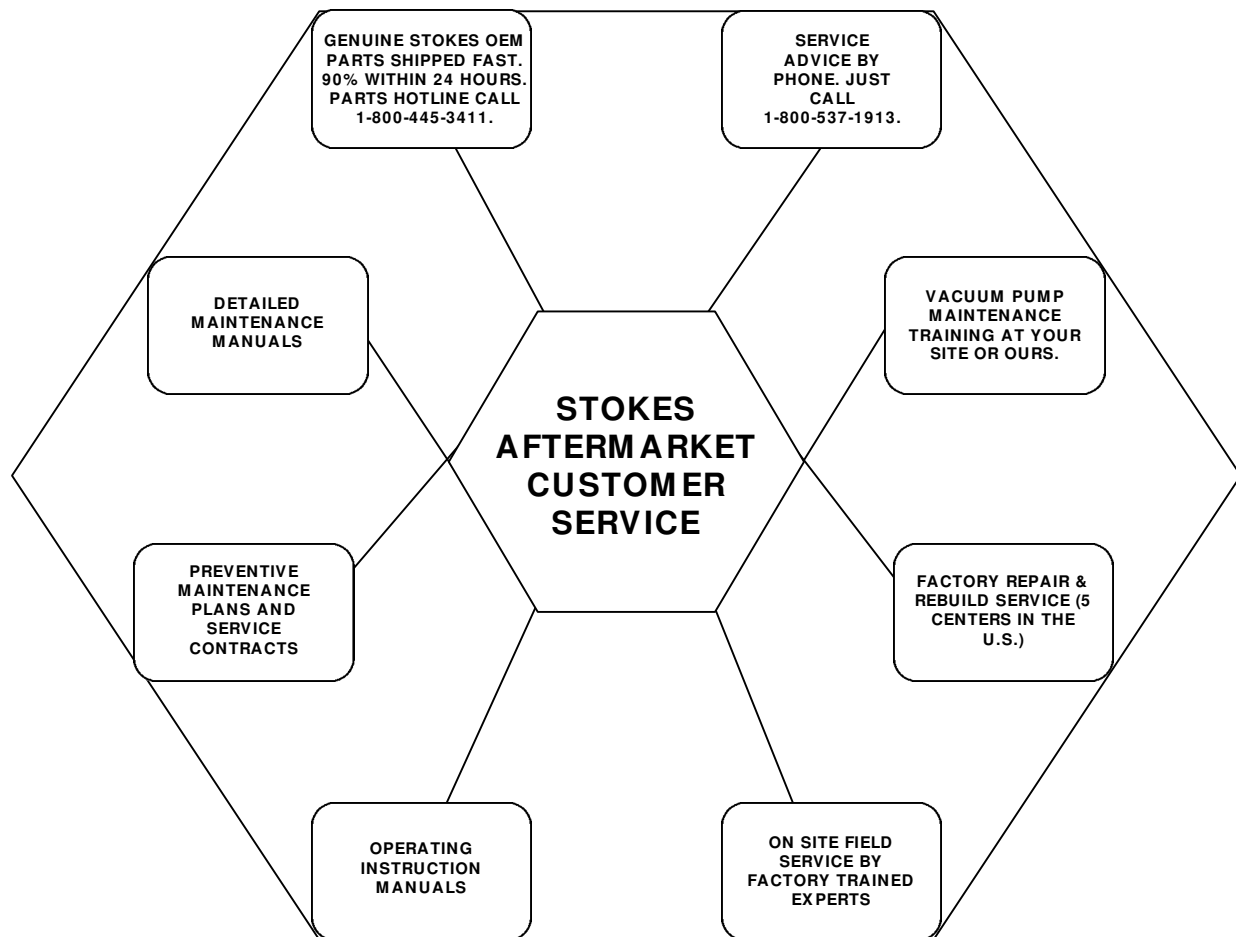


QUALITY PARTS REPAIR FIELD SERVICE WE CARE



TO YOU, OUR VALUABLE CUSTOMER, YOUR COMPLETE SATISFACTION IS OUR GOAL. USE STOKES GENUINE OEM PARTS, PREVENTIVE MAINTENANCE AND OIL REQUIREMENTS TO ASSURE YOUR SATISFACTION AND WARRANTY.

CONTACT STOKES FOR ALL YOUR SERVICE NEEDS



USE YOUR INSTRUCTION MANUAL. YOU WILL FIND A PREVENTIVE MAINTENANCE CHECKLIST, THE TYPE OF LUBRICANTS TO BE USED, A RECOMMENDED SPARE PARTS LIST, ACCESSORIES FOR OUR VACUUM PUMPS AND BLOWER AND OTHER HELPFUL INFORMATION.

STOKES VACUUM HAS BEEN A WORLD RENOWNED MANUFACTURER OF HIGH QUALITY VACUUM EQUIPMENT FOR OVER 100 YEARS.

BOC EDWARDS
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PHILADELPHIA, PA. 19120 USA
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