BLACKMER ABAQUE SERIES HOSE PUMPS

INSTALLATION, OPERATION, AND MAINTENANCE INSTRUCTIONS

MODELS: A(S)25, A(S)32, A(S)40, AX(S)40, A(S)50, A(S)65 AX(S)65, AX(S)80, A(S)80, A(S)100, AS125

INSTRUCTIONS NO. 1101-B00

Section	1100
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NOTE: Numbers in parentheses following individual parts indicate reference numbers on the corresponding Blackmer Hose Pump Parts Lists.

⚠WARNING

Hazardous voltage. Can shock, burn or cause death.

FAILURE TO DISCONNECT AND LOCKOUT ELECTRICAL POWER BEFORE ATTEMPTING MAINTENANCE CAN CAUSE SHOCK, BURNS OR DEATH.

SAFETY DATA

This is a SAFETY ALERT SYMBOL.
When you see this symbol on the product, or in the manual, look for one of the following signal words and be alert to the potential for personal injury, death or major property damage.

⚠ DANGER

Warns of hazards that **WILL** cause serious personal injury, death or major property damage.

⚠WARNING

Warns of hazards that **CAN** cause serious personal injury, death or major property damage.

⚠ CAUTION

Warns of hazards that **CAN** cause personal injury or property damage.

NOTICE:

Indicates special instructions which are very important and must be followed.

NOTICE:

Blackmer hose pumps MUST only be installed in systems which have been designed by qualified engineering personnel. The system MUST conform to all applicable local and national regulations and safety standards.

This manual is intended to assist in the installation and operation of the Blackmer hose pump, and MUST be kept with the pump.

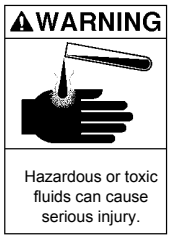
Blackmer hose pump service shall be performed by qualified technicians ONLY. Service shall conform to all applicable local and national regulations and safety standards.

Thoroughly review this manual, all instructions and hazard warnings, BEFORE performing any work on the Blackmer hose pump.

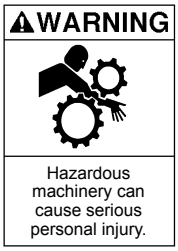
Maintain ALL system and Blackmer hose pump operation and hazard warning decals.

Models in red have been discontinued.

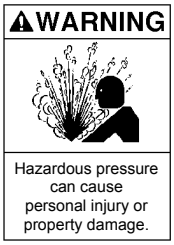
SAFETY DATA



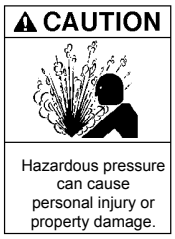
IF PUMPING HAZARDOUS OR TOXIC FLUIDS, SYSTEM MUST BE FLUSHED AND DECONTAMINATED, INSIDE AND OUT, PRIOR TO PERFORMING MAINTENANCE.



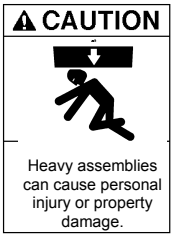
OPERATION WITHOUT PROTECTIVE DEVICES IN PLACE (COVER, WINDOW, HOOD, FAN, COUPLING PROTECTION) CAN CAUSE SERIOUS PERSONAL INJURY, MAJOR PROPERTY DAMAGE OR DEATH.



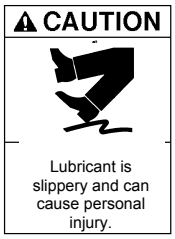
WHEN PUMP IS RUNNING, DISCONNECTING ANY PART OF THE LIQUID SYSTEM, PIPE, STRAINER, HOSE, NOZZLE, ETC. CAN CAUSE SERIOUS PERSONAL INJURY, DEATH OR MAJOR PROPERTY DAMAGE.



FAILURE TO RELIEVE SYSTEM PRESSURE PRIOR TO PERFORMING PUMP SERVICE OR MAINTENANCE CAN CAUSE PERSONAL INJURY OR PROPERTY DAMAGE.



ALWAYS USE A LIFTING DEVICE CAPABLE OF SUPPORTING THE FULL WEIGHT OF THE PUMP UNIT.



ALL LUBRICANT SPILLS SHOULD BE CLEANED PROPERLY TO PREVENT PERSONAL INJURY OR PROPERTY DAMAGE.

TECHNICAL DATA

PUMP DATA

Maximum Operating Temperature	176ºF (80ºC)
Maximum Operating Pressure	217.5 psi (15 bar)
Hose Inserts	Stainless Steel (Std.) PPH or PVDF (Opt.)

HOSE CHARACTERISTICS

Pumping is carried out by repeated compression and release of a specially designed elastomeric hose. Under normal operating conditions, the pumped fluid is in contact only with the hose and the inserts and must be compatible with them.

Three grades of elastomeric hose are available:

NR - Natural Rubber
NBR - Buna
EPDM - High Chemical Resistance (Ethylene Propylene Diene Monomer)

This pumping principle is especially suited for abrasive products. During the compression phase, the abrasive particles are pushed against the wall of the hose without damaging it. The particles are then released back into the fluid after the pump shoe passes. **NOTE:** The particle size MUST not exceed 15% of the hose inner diameter.

HOSE COMPRESSION

A determining factor in hose life is correct compression. Proper shimming of the shoes will optimize hose life. Shims are inserted between the rotor and the shoe. The number of shims used depends mainly on the pump discharge pressure.

Pumps are factory adjusted to run at operating discharge pressures of up to 72.5 psi (5 bar) without damage to the hose. For operation at higher pressure, one or more shims may be inserted under the shoes. See Shimming Table below.

NOTICE:
THERE MUST BE THE SAME NUMBER OF SHIMS UNDER EACH SHOE.

SHIMMING TABLE

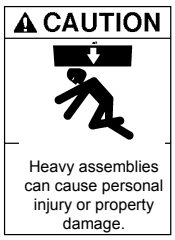
<table>
<tr><th rowspan="2">Model</th><th colspan="4">Operating Pressure</th></tr>
<tr><th>Up to 5 bar
(to 72.5 psi)</th><th>5 to 8 bar
(72.5 -116 psi)</th><th>8 to 12 bar
(116 -174 psi)</th><th>12 to 15 bar
(174 -217.5 psi)</th></tr>
<tr><td>A25
A32
A40
AX40
A50
A65
AX65
AX80</td><td>Factory Set-
No Additional
Shimming
Required</td><td>Add
1 Shim</td><td>Add
2 Shims</td><td>Add
3 Shims</td></tr>
<tr><td>A80
A100
A125</td><td colspan="3">Factory Set -
No Additional Shimming
Required</td></tr>
</table>

INSTALLATION

NOTICE:

BLACKMER HOSE PUMPS MUST ONLY BE INSTALLED IN SYSTEMS DESIGNED BY QUALIFIED ENGINEERING PERSONNEL. SYSTEM DESIGN MUST CONFORM WITH ALL APPLICABLE REGULATIONS AND CODES AND PROVIDE WARNING OF ALL SYSTEM HAZARDS.

HANDLING THE PUMP



ALWAYS USE A LIFTING DEVICE CAPABLE OF SUPPORTING THE FULL WEIGHT OF THE PUMP UNIT.

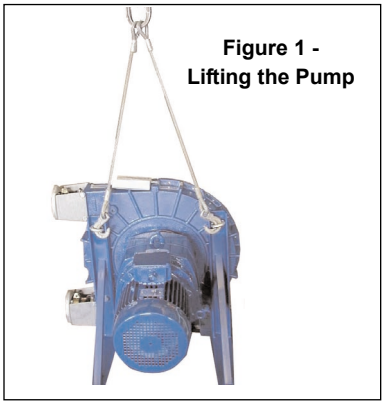


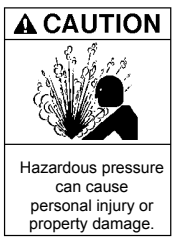
Figure 1 - Lifting the Pump

ELECTRICAL POWER SUPPLY

- ⚠ **Install, ground and wire to local and National Electrical Code requirements.**
- ⚠ **Install an all-leg disconnect switch near the unit motor.**
- ⚠ **Disconnect and lockout electrical power before installation or service.**
- ⚠ **Electrical supply MUST match motor nameplate specifications.**
- ⚠ **Motors equipped with thermal protection automatically disconnect motor electrical circuit when overload exists. Motor can start unexpectedly and without warning.**

GENERAL INSTALLATION

1. Inspect piping and supports to ensure **no piping loads** are being placed on the pump flanges.
2. Inspect complete piping system to ensure all valves and fittings are in their start up or operation positions.
3. Ensure all electrical connections are correct and secure.
4. Make sure that the inlet pressure is compatible with the pump.

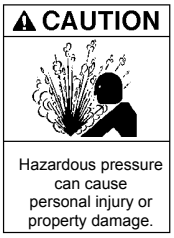


BEFORE PUMP START-UP, ALWAYS OPEN THE DISCHARGE VALVE AND THE INLET VALVE TO AVOID OVERPRESSURE.

PIPING

An improperly designed piping system or improper unit installation WILL significantly reduce pump performance and life. Blackmer recommends the following piping system layout and unit installation.

1. **The inlet pipe must be:**
   a. as short as possible.
   b. the largest diameter possible.
   c. with as few connections and valves as possible (i.e.: elbows, tees, etc.).
   d. with large radius curves whenever possible to minimize head losses.
2. **The discharge pipe must be:**
   a. as short as possible.
   b. with as few connections and valves as possible (i.e.: elbows, tees, etc.).
   c. with large radius curves whenever possible to minimize head losses.



IF THERE IS A VALVE AT THE DISCHARGE END, PROVIDE A RELIEF VALVE OR A PRESSURE CONTROLLER BEFORE IT.

PUMP LOCATION

Provide adequate space around the pump for service and maintenance. Also, provide adequate space in piping system for replacement of the hose. The distance between the pump porting and the nearest obstacle should allow for removal of the hose. Refer to Figure 2 and the corresponding chart to determine the proper distances.

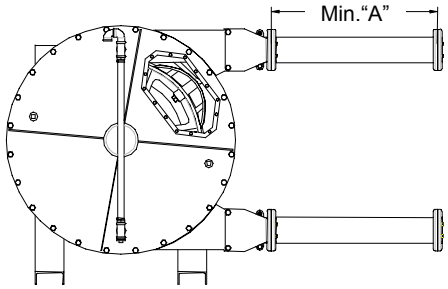


Figure 2 - Pump Spacing

Pump Model	Minimum Distance - "A"
A25	1100 mm (3.6 feet)
A32, A40	1300 mm(4.3 feet)
AX40	1600 mm (5.2 feet)
A50, A65	1900 mm (6.2 feet)
AX65, AX80	2450 mm (8.0 feet)
A80	2900 mm (9.5 feet)
A100	3400 mm (11.2 feet)
A125	4000 mm (13.1 feet)

INSTALLATION

PUMPING LIQUIDS WITH LARGE PERCENTAGE OF SOLIDS

If the fluid being pumped is loaded with particles, it is recommended to make the upper port of the pump the inlet. It will be easier to remove the sediment formed by settling out of particles contained in the liquid. Restarting the pump will be easier and resistance to the movement of the pump shoes will be reduced. **NOTE:** The particle size MUST not exceed 15% of the hose inner diameter.

EXTENDED STORAGE

If the pump is to remain in storage for more than 3 months, it is recommended the hose or the shoes be removed. If you do not remove the hose during storage, let the pump run for a minimum of 5 minutes once a week.

NOTICE:

THE WHEEL MUST ALWAYS BE POSITIONED WITH A SHOE VISIBLE THROUGH THE WINDOW OF THE PUMP AT SHUT OFF.

OPERATION

⚠WARNING

Hazardous machinery can cause serious personal injury.

OPERATION WITHOUT PROTECTIVE DEVICES IN PLACE (COVER, WINDOW, HOOD, FAN, COUPLING PROTECTION) CAN CAUSE SERIOUS PERSONAL INJURY, MAJOR PROPERTY DAMAGE OR DEATH.

⚠ CAUTION

Hazardous pressure can cause personal injury or property damage.

PUMP OPERATING AGAINST A CLOSED VALVE CAN CAUSE SYSTEM COMPONENT FAILURE, PERSONAL INJURY AND PROPERTY DAMAGE.

WARNING:

NEVER WEAR LOOSE CLOTHING WHILE OPERATING PUMP.

OPERATING PRINCIPLE

Pumping is carried out by repeated compression and release of a specially designed elastomeric hose. Two shoes located at 180° on a central wheel tightly press the hose against the pump body. The wheel rotation causes the displacement of the product inside the hose. Therefore, the flow is pulsed. The pump body is filled with a glycerin-based lubricant to ease the sliding of the shoes and to prevent overheating. See Figure 3.

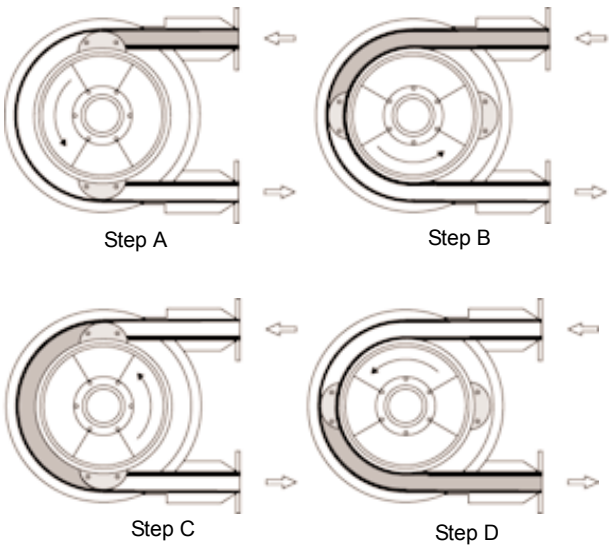


Figure 3 - Hose Pump Operating Principle

PRE-START UP CHECK LIST

1. Prior to operating, make sure the pumped fluids are compatible with the following:
   a. the peristaltic hose principle.
   b. the crushable hose.
   c. the lubricant.
   d. the inserts.
   e. the shoes.
2. Ensure the pump is compatible with the process.
3. Ensure the inlet pressure is compatible with the pump.

NOTICE:

BEFORE PUMP START-UP, CHECK THE DIRECTION OF ROTATION OF THE PUMP.

NOTICE:

CONSULT THE "PUMP TROUBLESHOOTING" SECTION OF THIS MANUAL IF DIFFICULTIES DURING START UP ARE EXPERIENCED.

OPERATING PRECAUTIONS

⚠ CAUTION

Hazardous pressure can cause personal injury or property damage.

HOSE IS UNDER PRESSURE DURING OPERATION. A HOSE BURST CAN CAUSE PERSONAL INJURY OR PROPERTY DAMAGE.

If pump hose bursts, the following may occur:

1. The casing may fill up with the pumped fluids.
2. The pumped fluid under pressure may flow out through the vent.
3. If the pump is full of liquid (“loaded”), all fluid may drain from the inlet line.
4. If the discharge line is under pressure, it may exhaust into the pump.

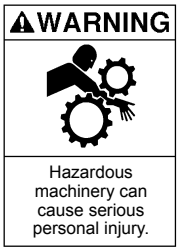
NOTICE:

WHEN DRAINING THE PUMP CASING FOLLOWING A HOSE BURST USE CARE NOT TO CONTAMINATE THE PUMP LUBRICANT WITH THE PUMPED FLUID. IF NECESSARY, REPLACE THE CONTAMINATED LUBRICANT WITH NEW LUBRICANT.

MAINTENANCE

NOTICE:

MAINTENANCE SHALL BE PERFORMED BY QUALIFIED TECHNICIANS ONLY, FOLLOWING THE APPROPRIATE PROCEDURES AND WARNINGS AS PRESENTED IN THIS MANUAL.



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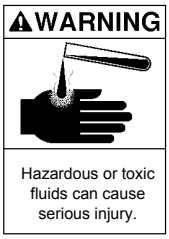

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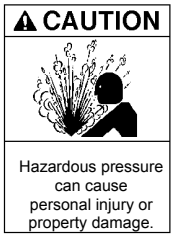

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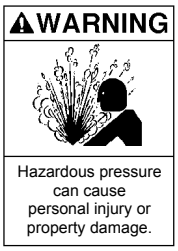

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FAILURE TO DISCONNECT AND LOCKOUT ELECTRICAL POWER BEFORE ATTEMPTING MAINTENANCE CAN CAUSE SHOCK, BURNS OR DEATH.

MAINTENANCE SCHEDULES

Lubrication

The hose is lubricated with a special glycerin-based lubricant. To maintain proper hose life and durability always use genuine Blackmer lubricant.

It is recommended the lubricant be changed:

a. After each hose burst.

b. Whenever the hose is being replaced during normal preventative maintenance.

c. After 2000 hours of operation.

Amount of lubricant required:

Pump Model	Amount of Lubricant
A25	1.4 liters (.35 U.S. gallons)
A32	2.5 liters (.66 U.S. gallons)
A40	3.0 liters (.79 U.S. gallons)
AX40	5.0 liters (1.3 U.S. gallons)
A50	10 liters (2.6 U.S. gallons)
A65	10 liters (2.6 U.S. gallons)
AX65	20 liters (5.3 U.S. gallons)
AX80	20 liters (5.3 U.S. gallons)
A80	40 liters (10.6 U.S. gallons)
A100	60 liters (15.9 U.S. gallons)
A125	120 liters (31.7 U.S. gallons)

Hose Cleaning and Replacement

Some fluids pumped may require cleaning of the hose after each operation in order to avoid the hardening of the fluid inside the hose. The hose can be cleaned easily with water or a cleaning agent. Make sure that the cleaning agent is compatible with the hose material and the fluid being pumped.

Under proper service and installation conditions, the service life of the hose may be up to 2000 hours. Depending upon the product pumped, operating pressure and speed, the hose may need more frequent replacement. Careful monitoring of the hose is recommended so that it can be replaced prior to failure. For hose removal and replacement instructions see “Hose Removal” and “Hose Assembly” sections.

It is recommended to replace the hose as part of preventative maintenance.The hose is lubricated with a special glycerin-based lubricant. To maintain proper hose life and durability always use genuine Blackmer lubricant.

Gasket Replacement

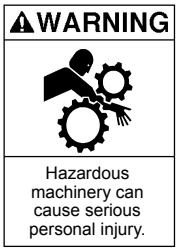
The following gaskets must be checked and replaced as necessary:·

The shaft gaskets (26) must be checked whenever the hose is replaced.·

The cover gasket (10) must be checked whenever the cover is removed.

MAINTENANCE

HOSE REMOVAL



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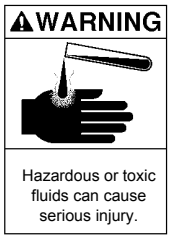

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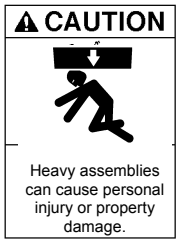


PUMP COVER IS HEAVY. WHEN REMOVING COVER, ALWAYS USE A PROPER LIFTING DEVICE CAPABLE OF SUPPORTING THE FULL WEIGHT OF THE COVER.

NOTICE:

WHEN CHANGING HOSE, WEAR SAFETY GLOVES AND KEEP HANDS AWAY FROM INLET AND DISCHARGE.

NOTICE:

IF HOSE IS STUCK ON THE INLET INSERT, LOCK OUT ELECTRICAL POWER TO PUMPING UNIT AND CUT HOSE ON INLET SIDE ALONG THE INSERT.

Hose Removal Procedure:

1. Close the inlet and discharge valves.
2. Drain the lubricant from the casing by removing the drain plug (57). Collect the lubricant in a pan. See Figure 4.

NOTICE:

Residual lubricant will remain in the pump. Use caution when removing lower pump hose clamps and hose.

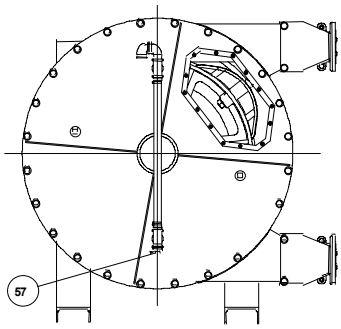


Figure 4 - Draining the lubricant

3. Disconnect the pump inlet and discharge flanges from the piping system. See Figure 5.

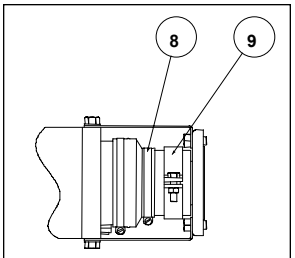


Figure 5

Inlet side:

a. Loosen the hose clamps (8) and (9).
b. Remove flange brackets (18).
c. Remove flange (47) and insert (12).
d. Remove hose clamps (8) and (9).

Discharge side:

a. Loosen the hose clamps (8) and (9). Remove clearance section of piping system to allow for hose removal.
b. Remove flange brackets (18).

THE HOSE MAY COME OUT WITH GREAT FORCE. DO NOT ALLOW ANYONE TO STAND IN FRONT OF THE PUMP OPENINGS DURING HOSE REMOVAL.

4. Energize unit and jog the pump until the hose comes out through the discharge side of the pump.
5. Once hose is out of pump, remove flange and insert on the discharge side of pump.

HOSE ASSEMBLY

1. Support pump cover with proper lifting equipment. Remove cover bolts (33), nuts (36) and washers (34). Use lifting equipment to remove cover (2).

PUMP COVER IS HEAVY. WHEN REMOVING COVER, ALWAYS USE A PROPER LIFTING DEVICE CAPABLE OF SUPPORTING THE FULL WEIGHT OF THE COVER.

MAINTENANCE

2. Clean the pump casing (1) and cover (2) with water or a cleaning fluid compatible with the pump materials.

NOTICE:
Make sure all internal pumping surfaces are clean. Dry all non-painted pump surfaces and coat with pump lubricant.

3. Lubricate all internal parts of the casing with the pump lubricant.
4. Secure the pump cover (2) to the pump casing (1) with all necessary bolts (33), washers (34) and nuts (36).
5. Ensure that the pump window cover (15) and seal (46) are securely in place.

WARNING:
NEVER INSERT HOSE OR OPERATE PUMP WITHOUT COVER AND WINDOW PROPERLY ATTACHED TO THE PUMP CASING.

6. Slide the hose boot (6) onto the discharge side of the pump casing (1). Ensure clamps (7) and (8) are in place.
7. Tighten clamp (7) around the boot to hold it to the pump casing. **NOTE:** To ensure the hose slides freely through the boot DO NOT TIGHTEN clamp (8). See Figure 6.

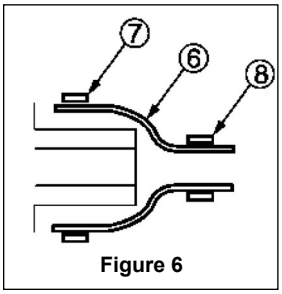
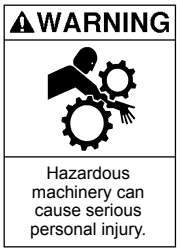


Figure 6

8. Install discharge flange (47) to the flange brackets (18) with two diametrically opposite flange screws and nuts.
9. Coat the outside of the hose (16) with lubricant (14).
10. Insert the free end of the hose (16) into the inlet side of the pump casing (1).
11. Jog the motor to draw the hose into the pump. Bring the hose close to the discharge flange (47), leaving enough room to slide the hose clamp (9) over the hose.
12. Jog the motor again to bring the hose up to the discharge flange face.



DO NOT USE YOUR HANDS TO GUIDE THE HOSE INTO THE PUMP.

AVOID STANDING IN LINE WITH THE PUMP HOSE SO YOU WILL NOT BE PULLED IN OR HIT WITH THE HOSE DURING INSTALLATION.

13. Coat the outside of one of the inserts (12) with lubricant.
14. Install the insert (12) into the discharge side of the hose through the flange (47) opening until it is flush with the flange face. See Figure 7A & 7B.

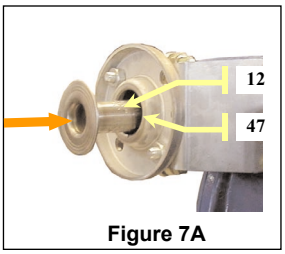


Figure 7A

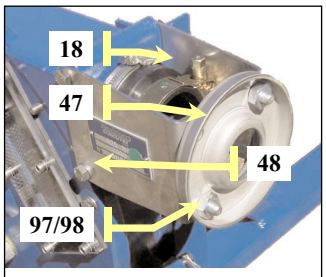


Figure 7B - Hose Assembly

15. Tighten the hose clamp (9) firmly around the hose on the discharge side.
16. Slide hose boot (6) on to the inlet side of the pump casing .
17. Ensure the clamps (7) and (8) are in place. Tighten clamp (7) around boot to hold it to the casing.
18. Slide clamp (9) on to the end of the inlet side of the hose. **NOTE:** Clamps (8) and (9) MUST NOT be tightened to ensure that the insert slides into the hose.
19. Coat the outside of the remaining insert (12) with lubricant. Put the insert through the opening of the inlet flange (47).
20. Push the insert (12) and flange (47) assembly into hose (16) until the insert and the flange are firmly against the face of the hose.
21. Inlet flange (47) must be secured to the flange brackets (18) by means of two diametrically opposite flange screws and nuts.
22. If the motor direction of rotation can be reversed, jog the motor to bring the discharge insert (12) tightly against the discharge flange face (47). Check that the insert is still flush against the face of the inlet flange. If it is not, push the insert into the hose so that is flush with the face of the inlet flange (47).

    If the motor can not be reversed, ensure that the inlet and discharge inserts (12) are firmly against the faces of the flanges (47).
23. Tighten the hose clamp (9) firmly around the hose on the inlet side.
24. Tighten both hose clamps (8) firmly around their respective hose boots (6) on both the inlet and discharge sides.
25. Remove the pump cover window (15). Fill the pump with the specified amount of lubricant for the model being used. Refer to “Lubrication” in the Maintenance Section of this manual. **NOTE:** Fluid level should be slightly below the pump axis.

NOTICE:
USE CAUTION AND WEAR PROPER CLOTHING WHEN HANDLING PUMP LUBRICANT.

26. Reinstall the window gasket (46) and pump window (15) on the pump cover (2) using the bolts (37) and washers (38).

27. Run the pump to check that it is operating smoothly.

BEFORE START UP ENSURE THAT THE INLET AND DISCHARGE VALVES ARE OPEN.

PUMP WHEEL

Pump wheel (3) removal and reassembly is required when any of the following pump maintenance is performed:

a. Seal replacement.

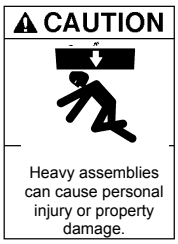
b. General pump overhaul.

c. Gear motor, gearbox or bearing shaft removal or replacement.

To disassemble the wheel (3), the pump hose must first be removed. Follow the instructions outlined under "Hose Removal."

Wheel Disassembly

1. Remove the bolts (20A) from the wheel hub (20) (Figure 8).
2. To aid in wheel disassembly, screw bolts (20A) into the tapped holes of the hub (20).
3. Using a proper lifting device, remove the wheel (3) by sliding it off the shaft.



USE PROPER LIFTING DEVICE CAPABLE OF SUPPORTING THE FULL WEIGHT OF THE PUMP WHEEL.

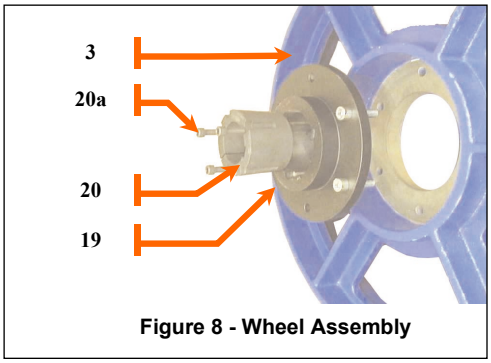


Figure 8 - Wheel Assembly

Wheel Assembly

1. Check the shaft seal (26). Replace if necessary.
2. Check the condition of the reducer shaft key. Replace if necessary.
3. Insert the hub assembly (19), (20) into the center of wheel. **NOTE:** DO NOT tighten bolts (20A) to allow wheel assembly to slide freely on the shaft.
4. Using proper lifting equipment, slide the wheel (3) with its hub (20) assembly onto the reducer shaft.
5. Align the wheel (3) in the pump casing (1) as shown in Figure 9 and chart below.
6. Gradually tighten the bolts (20A) making sure the wheel remains aligned.

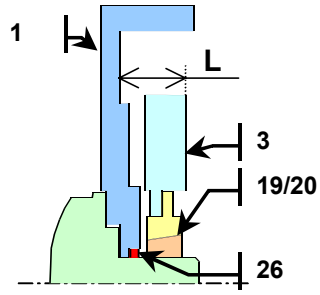


Figure 9 - Wheel Alignment

Pump Model	Alignment Dimension - "L"
A25	60.5 mm (2.38 inches)
A32, A40	73 mm (2.87 inches)
AX40	80 mm (3.15 inches)
A50, A65	102 mm (4.02 inches)
AX65	126 mm (4.96 inches)
AX80	79 mm (3.11 inches)
A80	144.5 mm (5.69 inches)
A100	Not Applicable
A125	Not Applicable

SHOE REPLACEMENT

To replace the shoes (5) the pump hose must first be removed. Follow the instructions under the "Hose Removal" section.

Shoe Disassembly

1. Loosen the bolts (28) and remove the shims from under the shoes. **NOTE:** Some shims may not be removable. These shims are factory-installed and must be retained for shoe reassembly.
2. Unscrew the bolts (28) and remove the washers (29).
3. Remove the shoes (5).

Shoe Assembly

1. Screw the bolts (28) with the washers (29) through the outer diameter of the wheel.
2. Insert the factory installed shims on to the bolts.
3. Position the shoes (5) on the wheel (3).
4. Insert the proper number of shims depending upon the pump operating pressure. See "Shimming Table" in the Technical Data Section of this manual. For instructions on installing the shims, see "Shim Installation" section below.

5. Tighten the bolts (28), making sure that the shoes (5) remain straight. See Figure 10.

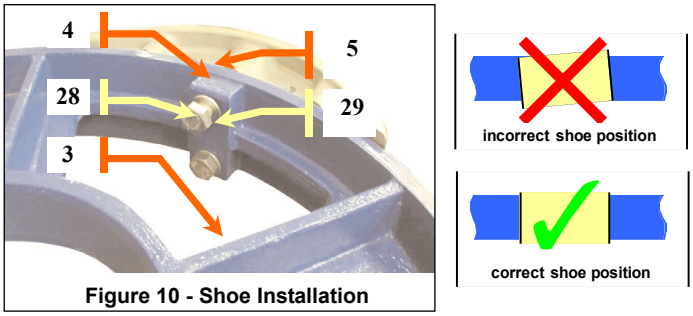


Figure 10 - Shoe Installation

SHIM INSTALLATION

It may be necessary to add or remove shims from under the shoes. Refer to "Shimming Table" in the Technical Data Section of this manual.

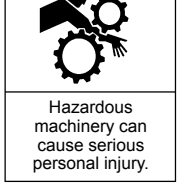
It is not necessary to remove the pump cover (2) to install shims.

Shim Installation Procedure:

1. First, position the shoe (5) in front of the window (15). If shoe is not positioned correctly, jog the pump until the shoe is fully visible through the window (15).
2. Lockout electrical power before attempting maintenance to the unit to insure that the pump can not be started accidentally.

FAILURE TO DISCONNECT AND LOCKOUT ELECTRICAL POWER BEFORE ATTEMPTING MAINTENANCE CAN CAUSE SERIOUS PERSONAL INJURY OR DEATH.

3. Unscrew the bolts (37) and remove the washers (38), the window (15) and its gasket (46). See Figure 11.
4. Loosen the shoe bolts (28). **NOTE:** DO NOT remove the shoe bolts.
5. Insert the correct number of shims (4) through the window opening. Refer to "Shimming Table" for correct number of shims required for the application.
6. Tighten the bolts (28). When tightening the bolts make sure that the shoe remains straight. See Figure 10 under "Shoe Assembly" for correct shoe positioning.
7. Reinstall the window gasket (46), the window (15) and the washers (38). Install and tighten the bolts (37). Figure 11.



OPERATION WITHOUT PROTECTIVE DEVICES IN PLACE (COVER, WINDOW, HOOD, FAN, COUPLING PROTECTION) CAN CAUSE SERIOUS PERSONAL INJURY, MAJOR PROPERTY DAMAGE OR DEATH.

8. Jog the pump until the second shoe is visible through the window (15).
9. Repeat steps 4 through 7 above to install shim(s) on the next shoe.

NOTICE:
THERE MUST BE THE SAME NUMBER OF SHIMS UNDER EACH SHOE.

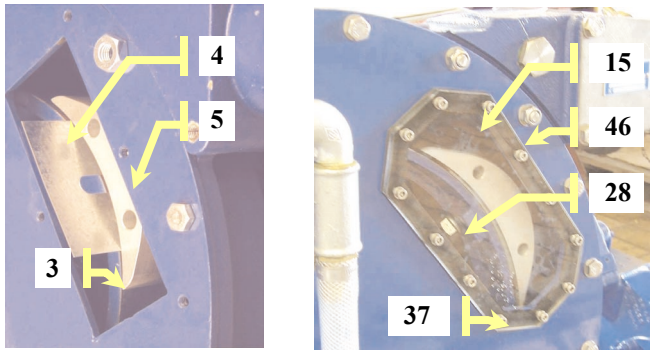


Figure 11 - Pump Window

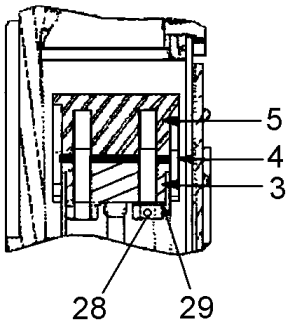


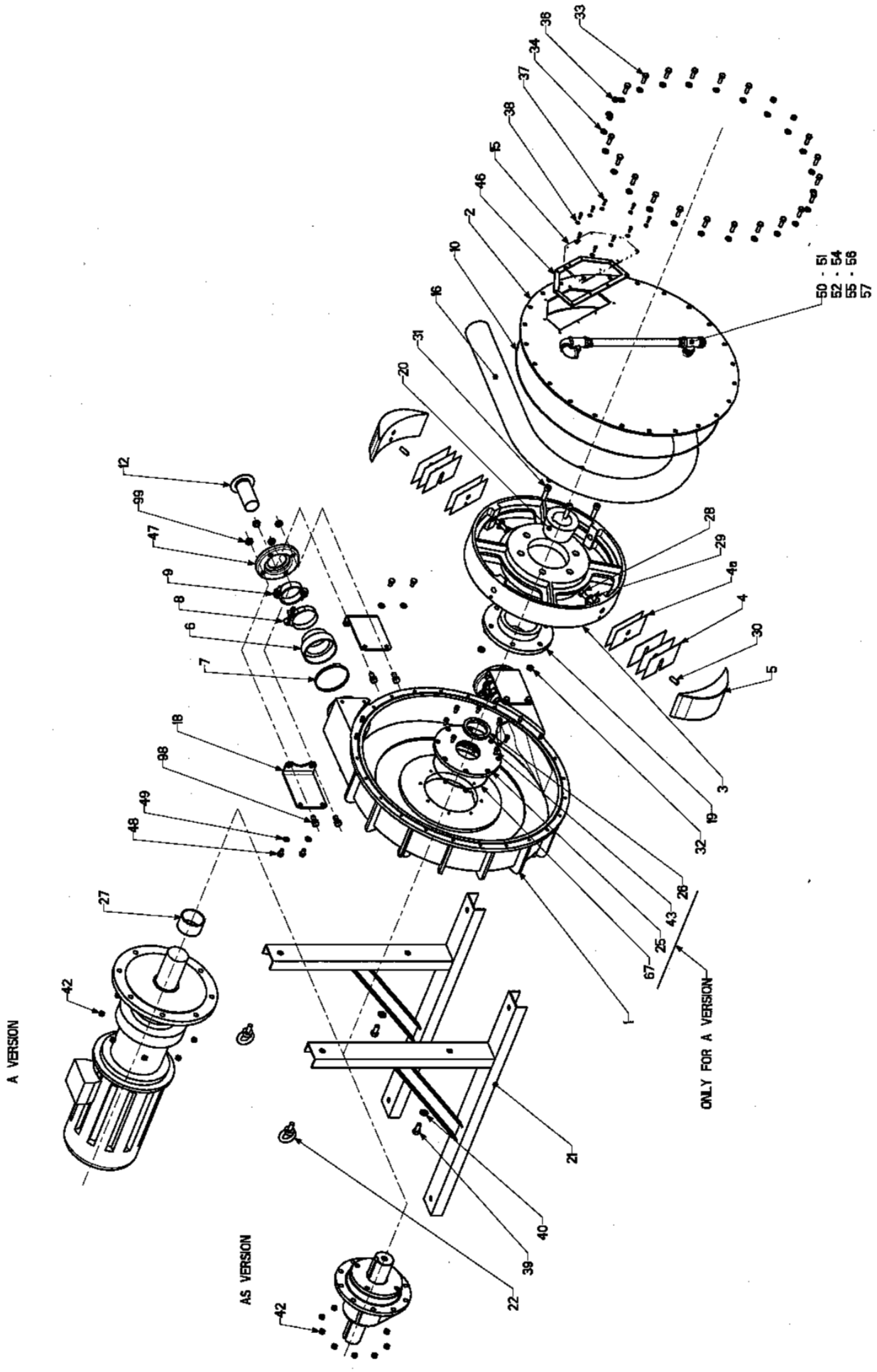
Figure 12 - Shim Installation

PUMP TROUBLESHOOTING

NOTICE:

MAINTENANCE SHALL BE PERFORMED BY QUALIFIED TECHNICIANS ONLY, FOLLOWING THE APPROPRIATE PROCEDURES AND WARNINGS AS PRESENTED IN THIS MANUAL.

PROBLEM	POSSIBLE CAUSE	SOLUTION
Pump Not Working	Defective power supply	Check electrical connections: - Presence of all 3 phases - Connectors are appropriate for line voltage (star/triangle). - If applicable, check the characteristics of the variable frequency motor (starting torque, power available).
	During an extended shutdown period, one of the shoes may have remained out of lubricant. If shoe is no longer lubricated, there will be an increased starting resistance.	Remove the hose and reassemble (see “Hose Removal”). DO NOT force the pump to start - if the motor has excessive power, there is strong risk of damaging the hose or reducer.
	Some sediments or foreign matter may remain in the hose, thus jamming the pump.	Reverse direction of rotation of the pump or remove the hose.
Low Flowrate	The inlet or discharge valve is partially closed.	Open inlet or discharge valve fully.
	Air leaks in the inlet piping.	Check inlet piping for leaks.
	Shimming is insufficient.	Adjust shimming of shoes and add shims if necessary Refer to “Shimming Table” and “Shim Installation” sections.
	The product pumped is too viscous. High head loss at inlet.	Check inlet line (see “Piping”). Install a Blackmer vacuum assist system.
	Pump Hose is damaged.	Replace pump hose. Refer to “Hose Removal & Assembly.”
Lubricant Temperature too High	The lubricant is not adequate.	Drain pump casing. Use only Blackmer recommended lubricant. Refer to “Lubrication” section.
	The lubricant is dirty or old.	Drain pump body and replace with new lubricant.
	The lubricant level is too low.	Add lubricant. Refer to “Lubrication” section for proper amount.
	Temperature of fluid pumped is too high.	Check the maximum allowable temperature of the fluids pumped with the materials of the pump hose.
	Overshimming of the shoes.	Check the shimming under shoes and remove as necessary. Refer to “Shim Installation” section and “Shimming Table.”
	The pump speed is too high.	Reduce pump speed.
Service Life of Hose is too Short	The Lubricant is not adequate.	Drain pump body. Use only Blackmer recommended lubricant. Refer to “Lubrication” section.
	Chemical incompatibility between hose and the fluid being pumped.	Check the chemical compatibility of hose and fluid pumped. Replace hose with proper compatibility.
	The temperature of fluid pumped is too high.	Check maximum allowable temperature of pump hose.
	The discharge pressure is too high.	Check maximum allowable discharge pressure of pump. Minimize the head losses at discharge.
	Inadequate shimming of the shoes.	Check shimming and adjust to pump operating conditions. Refer to “Shimming Table” and “Shim Installation” sections.
	The speed of the pump is too high.	Reduce pump speed.
Hose is Being Driven into Pump Casing on the Inlet Side	Not enough lubricant.	Check level of lubricant and adjust as required (“Lubrication”).
	Overshimming of shoes.	Check shims under shoes and adjust as required. Refer to “Shimming Table” and “Shim Installation” sections.
	Foreign matter or fluid sediments in hose.	Reverse the direction of pump rotation (inlet side up).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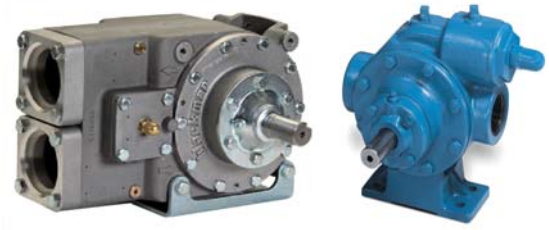
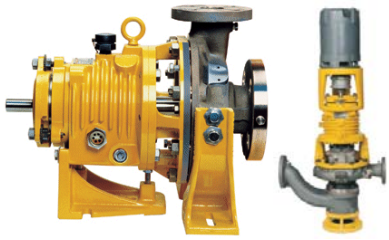


Sliding Vane Pumps: 5 to 2200 GPM
Refined Fuels, Liquefied Gases, Process, Transport, Marine



System One Centrifugal Pumps
10 to 7500 GPM
Process, Marine

C-Series Eccentric Disc Pumps
1 to 150 GPM
Shear Sensitive, Food, Process

Abaque Peristaltic Hose Pumps
0.5 to 220 GPM
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