

**SERVICE INSTRUCTIONS:** These *Service Instructions* are intended to be used by qualified personnel at Authorized Enerpac Service Centers. Users of Enerpac equipment should see the pump *Instruction Sheet* for installation, operation, and maintenance information.

**IMPORTANT:** This guide shows how to completely tear down the pump, which may not be required. The pump should be tested prior to service to avoid unnecessary labor. Please refer to Pump Test Procedure on page 2 and Troubleshooting Guide on page 4.

#### YOU MAY NEED:

- |                                |                      |                                |                         |
|--------------------------------|----------------------|--------------------------------|-------------------------|
| ✓ test bench                   | ✓ ammeter            | ✓ box end wrenches             | ✓ O-ring pick           |
| ✓ 0-10,000 psi hand pump       | ✓ V-152 relief valve | ✓ Allen wrenches (5/32" 7/32") | ✓ 1/4" coining tool     |
| ✓ 0-1 5,000 psi pressure gauge | ✓ unrestricted hose  | ✓ roll pin punch (5/32")       | ✓ RTV sealant           |
|                                | ✓ graduated cylinder | ✓ snap-ring pliers             | ✓ solvent               |
|                                | ✓ torque wrench      |                                | ✓ Enerpac hydraulic oil |

#### DISASSEMBLY



**WARNING:** Be sure pump is disconnected from power source before disassembling.

#### Shroud Removal

1. Remove the six 1/8" socket head screws (item 52) from bottom of yellow pump motor shroud.
2. Remove shroud (item 51) from pump, making sure foam baffle (item 53) stays on electric motor. Use care to not disconnect or damage wiring in the shroud. **NOTE:** Foam baffle may be glued to shroud.

#### Wire Removal

**NOTE:** Refer to wiring diagram on Repair Parts sheet. Mark wires before removing to aid during re-assembly.

1. Disconnect black power cord wire from thermostat (item 37).
2. Disconnect black power switch jump wire from thermostat (item 37).
3. **PUJ only:** Disconnect black pendant wire from transformer (item 22) at connection #8.
4. **PUJ only:** Disconnect white pendant wire from relay (item 23).
5. **PUJ only:** Disconnect transformer lead wire (item 67) from white power cord wire and black motor wire by unplugging connector.
6. **PUJ only:** Disconnect black motor wire from relay (item 23) and power switch (item 54) by unplugging respective flags.
7. **PUM only:** Disconnect black motor wire from power switch (item 54).

Shroud may now be removed from pump.

8. Disconnect power cord (item 40) and pendant cord (item 62) from the pump by removing their anchor screws.
9. Remove foam baffle (item 53) from motor (item 2).

**NOTE:** Foam baffle may be glued to motor.

#### ASSEMBLY

Refer to Repair Parts Sheet L1481 and use repair kit PUJ-1400BK.

**IMPORTANT:** Use suitable solvent to clean all parts prior to assembly. Clean RTV sealant from motor end cap, top and bottom of pump manifold and reservoir assembly. Rebuild using replacement items from repair kit.

#### Assemble Pump Shaft

1. Assemble gear (item 11) and disc bearings into pump manifold. Install one white bearing (item 28 from new kit) above the gear, the black bearing (item 13) directly below gear and the other new white bearing at the bottom.
2. Install shaft (item 16) through lower manifold bearing, gear and washers, and into upper manifold bearing.
3. Install new roll pin (item 12) from kit through hole in gear and shaft (items 11 and 16). With these holes aligned, use a 5/32" roll pin punch and tap the roll pin onto place.
4. Assemble bearings (items 14 and 15) to shaft. Using retaining ring pliers, place retaining ring (item 21) onto shaft.

#### Install Motor

For "E" version, refer to repair parts sheet notes.

**NOTE:** Before installation, apply a thin continuous bead of RTV sealant to motor end cap at three locations: around the tie rods and at the center boss.

1. Position the motor (item 2) onto manifold with wire leads at top of motor facing to the left with hydraulic output port facing you.
2. Secure the motor to the manifold by placing the two lock washers (item 3) and nuts (item 4) on the motor tie rods under the manifold. Torque nuts to 34-38 in-lbs.

#### Assemble Piston Block

**IMPORTANT:** During installation of piston blocks, hold manifold firmly when tightening cap screws. This will help prevent plunger spring from cocking block and causing damage to the outlets.

1. Assemble high-pressure piston block (item 7, small .24 diameter piston).

- a. Place new white o-ring from kit between block and manifold.
- b. Anchor piston block by compressing piston spring against eccentric bearing and hold firmly in place. Use care to prevent block from cocking. Tighten the two 3/16" socket screws (item 9). Torque to 14-16 ft-lbs.
2. Assembly high-flow piston block (item 5, large .53 diameter piston).
  - a. Place new black o-ring from kit between block and manifold.
  - b. Anchor piston block by compressing piston spring against eccentric bearing and hold firmly in place. Use care to prevent block from cocking. Tighten the two 3/16" socket screws (item 9). Torque to 14-16 ft-lbs.
3. **PUJ only:** Connect black motor wire (item 65) flag to relay (item 23) and then to power switch (item 54).
4. **PUJ only:** Connect transformer lead wire (item 67) to white power cord wire and black motor wire by plugging in connector.
5. **PUJ only:** Connect white pendant wire to relay (item 23).
6. **PUJ only:** Connect black pendant wire to transformer (item 22) at transformer connection #8.
7. **PUM only:** Connect black motor wire (item 65) to power switch (item 54).
8. Connect black power switch jump wire to thermostat (item 37).
9. Connect black power cord wire to thermostat (item 37).

### Pump Re-Assembly

1. Install safety relief valve (item 18) to manifold using a new gasket (item 17) from repair kit.
2. Install check for high flow piston block by replacing the 1/4" ball, spring, and plug (items 29, 30, 31) with new ones from kit. Coin seat if required by using a 1/4" coining tool.
3. Install unloading valve assembly (item 32) into high flow piston block (item 5).
 

**NOTE:** Unloading valve comes preset from factory and is not adjustable. If valve is defective, replace.

Position and tighten elbow (item 19) and unloading tube (item 20) to point at the gear (item 11) for lubrication.
4. Install new gasket (item 33) on reservoir (item 34). Align holes on pump manifold with holes on reservoir.
 

**NOTE:** After testing procedure is complete, reservoir gasket must be sealed. Apply a thin continuous bead of RTV sealant to both sides of the gasket (item 33).
5. Install the two 1/4" socket screws (item 69) and gaskets (item 70 from kit) to valve adaptor block. Torque to 12 to 18 in-lbs.
6. Install the 6 hex head cap screws (items 36) and washers (item 35) that hold the pump cover plate onto the reservoir. Lubricate these screws with a drop of RTV sealant and torque to 12-18 in-lbs.

### 4-Way Valve Installation

**NOTE:** Use a new or repaired and tested 4-way manual valve (item 50).

1. Assemble connector tube assembly (item 47) with o-rings (item 48) and back-up rings (item 49) from kit.
2. Replace and install gasket (item 68) from kit.
3. Install valve (item 50) using the five 1/4" socket head screws. Torque screws to 11-13 ft-lbs.

### Wiring Connections

Refer to wiring diagram in repair parts sheet.

1. Install the foam baffle (item 53) on motor. Center baffle between upper and lower air vent holes in motor.
2. Attach power cord (item 40) and pendant cord (item 62) to pump manifold by using the anchor strap and screws.

### Shroud Assembly

1. Carefully lower shroud over motor and baffle. Use care to not disturb wiring and to not damage foam baffle.
 

**NOTE:** Make sure baffle is between air vents on motor and NOT blocking vent slots in shroud.
2. Align holes in shroud with holes in pump manifold.
3. Attach shroud to manifold by tightening the six screws (item 52). Lubricate screws with one drop of Loctite #242 and torque screws to 12-18 in-lbs.

### TEST PROCEDURE

#### Back Pressure Test

Perform the back pressure test to determine if the high pressure portion of the system is correctly adjusted and free from leaks. The pump must be able to reach and hold 10,000 psi. See Table 1 for expected test values.

1. Place the pump assembly on a test bench, lying on its side where the bottom of the pump can easily be observed. Wipe oil from bottom of pump assembly.
2. To test the pump, connect a 0-10,000 psi hand pump with a 0-15,000 psi pressure gauge to the coupler on the pump outlet valve.
3. If the safety relief valve is replaced or is out of adjustment, it must be set prior to performing the back pressure test.
4. Adjustment of the safety valve is accomplished by activating the hand pump and observing the pressure gauge. The safety relief valve will open when its pressure setting is exceeded.
5. To set the safety relief valve, use a 7/32" Allen wrench to set the adjusting screw. Turn the safety relief set screw in until the valve releases pressure at 10,250 to 10,750 psi.

**IMPORTANT:** Do not "bottom out" the adjusting screw on the valves, as damage may occur. Continue to adjust the safety valve.

**NOTE:** Relief valve may also be set during the Performance Test.

6. Close the manual valve on the pump being tested and slowly build pressure until the gauge reads 10,000 psi.

**TABLE 1 - USE FOR BACK PRESSURE TEST**

Expected Test Valves	110 VAC Pump	220 VAC Pump
Safety relief valve	10,250 to 10,750 psi	10,250 to 10,750 psi
Unloading or by-pass valve	250 to 400 psi	250 to 450 psi

During this step, observe for any leakage on the underside of the pump. If any leaks are found, stop the test and repair the leaking items. Once all leaks are corrected, the test must be performed again to reach a maximum pressure of 10,000 psi and hold that pressure.



**WARNING: Protect your skin and eyes from oil spray before you pressurize the pump components. If skin comes in contact with oil, wash with a mild soap containing lanolin or other emollients. If skin is broken or irritation persists, contact a physician. If oil gets in eyes, flush eyes with clear water for 15 minutes and contact a physician if irritation persists. If oil is swallowed, DO NOT induce vomiting. Contact a physician.**

**Performance Test**

This test will check the functional performance of the pump in the following areas: low pressure flow rate, unloading (by-pass) valve operation, high pressure flow rate, and current draw. See Table 2 for expected test values.

1. To perform the low pressure flow test, choose one of the methods described below.
  - a. Check the low pressure flow by connecting an unrestricted hose from the valve on the pump to the flow meter on the test bench. The flow meter should read 0.65 GPM.
  - b. An alternate method can be performed by directing the unrestricted hose from the pump valve to a one liter graduated cylinder. Collect the flow for 10 seconds. You should collect 410 ml. in 10 seconds.
2. When the unloading, or by-pass valve releases at 250 to 400 psi, the bench ammeter will show a drop in current. The by-pass valve is preset at the factory and is not adjustable. Replace valve if defective.
3. To perform the high pressure flow test, connect a hose to the outlet valve on the pump to the V-152 relief valve on the test bench. The V-152 (tank port) should be connected to an unrestricted hose that will be used to direct the flow from the pump into a graduated cylinder for measurement.
4. Start pump. Close valve and slowly adjust the T-handle on the V-152 until the pump is producing 8,500 psi.
5. Collect the flow from the V-152 for 30 seconds. You should collect 147 ml. in 30 seconds to establish a flow rate of 18 cu. in/min.
6. After flow rate is verified, check current draw with the ammeter on the test bench. To check the current draw, run the pump so that the oil is going over the internal relief valve or the pressure gauge reads over 10,000 psi and observe the ammeter.

- a. Maximum draw is 9.50 Amps for the 115 VAC model and 4.50 Amps for the 220 VAC model.
- b. Repeat test with pendant jog switch.
7. To perform pressure holding test, operate pump and close valve. Allow pressure to build to 8,000 psi. Turn off pump to see if it will hold pressure. If pump does not hold pressure, refer to Troubleshooting Guide on page 4. If pump holds pressure satisfactorily at this point, it should be able to start under full load (10,000 psi).

**TABLE 2 - USE FOR PERFORMANCE TEST**

<b>Expected Test Valves</b>	<b>110 VAC Pump</b>	<b>220 VAC Pump</b>
Flow at 100 psi	0.65 GPM (150 cu. in/min) (2.5 liters/min)	0.65 GPM (150 cu. in/min) (2.5 liters/min)
Flow at 8,500 psi	0.078 GPM (18 cu. in/min) (295 liters/min)	0.078 GPM (18 cu. in/min) (295 liters/min)
Flow at 10,000 psi	9.50 Amperes	4.50 Amperes

## TROUBLESHOOTING GUIDE

Problem	Probable Cause	Remedy
Motor current draw is excessive.	<ol style="list-style-type: none"> <li>1. Defective motor.</li> <li>2. By-pass valve malfunction.</li> <li>3. Damaged or worn piston blocks.</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove the motor. Test and replace if necessary.</li> <li>2. Inspect and test the by-pass valve if required. Valve is preset. If damaged or incorrectly set, replace.</li> <li>3. Test and inspect the piston blocks. Replace if necessary.</li> </ol>
Noisy pump operation.	<ol style="list-style-type: none"> <li>1. Piston block piston sticking. Springs or balls damaged, or missing springs.</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove the piston blocks. Inspect and replace as required. Each piston block is non-serviceable.</li> </ol>
Pump fails to maintain pressure.	<ol style="list-style-type: none"> <li>1. Oil leaking from one or more components within the reservoir.</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove the pump from the reservoir and perform the back pressure test outlined in the test procedure.</li> </ol>
Low oil output.	<ol style="list-style-type: none"> <li>1. Pump component parts leaking.</li> <li>2. By-pass valve may be malfunctioning.</li> <li>3. Oil intake screens on piston blocks may be clogged with debris.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform the back pressure test to isolate leaks.</li> <li>2. Test and inspect by-pass valve. Replace and set if necessary.</li> <li>3. Inspect intake screens. Flush all components of contamination. Replace damaged components.</li> </ol>
Dump feature not responding or dumping slowly.	<ol style="list-style-type: none"> <li>1. Dump valve may be malfunctioning, or contamination plugging dump valve.</li> </ol>	<ol style="list-style-type: none"> <li>1. Disassemble dump valve. Inspect ball seat, piston and o-rings for damage. Check if valve bleed hole may be plugged by contamination.</li> </ol>

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