ENERPAC
A UNIT OF APPLIED POWER INC.

Service Instructions

Poppet Valves for Torque Wrench Pumps

L1855 Rev. O 02/94

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

IMPORTANT: To avoid any unnecessary service, all valves should be tested prior to any service work. This procedure is intended for use in conjunction with torque wrench pump repair parts sheet numbers L1751, L1753, L1757, L1849, or L1850.

Items needed for testing:

- ✔ Repair parts sheet L1751, L1753, L1757 L1849, or L1850
- ✔ Remote valve block (Enerpac part number CM269885)
- ✔ Variable voltage power supply
- ✔ 10,000 psi hand pump
- ✔ Allen wrenches
- ✔ O-ring pick
- ✔ 15,000 psi gauge
- ✔ Enerpac V8 shutoff valve or equivalent
- ✔ High pressure hose (10,000 psi rated working pressure)
- ✔ Box end and open end wrenches
- ✔ Special Tools—see pages 2 and 3

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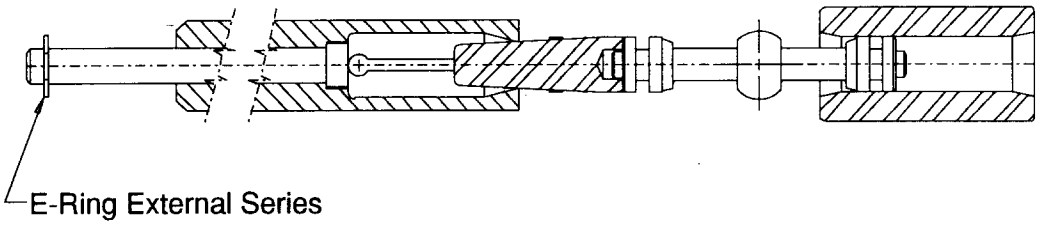
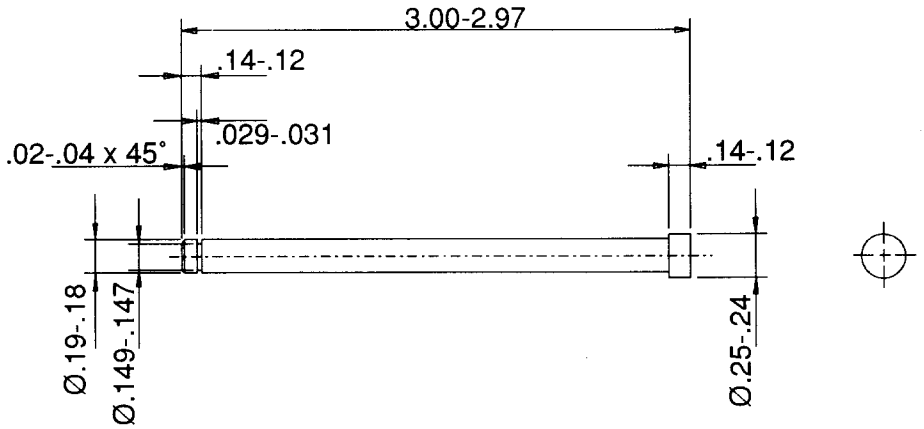
■ Special Tool Drawings

Tool Assembly



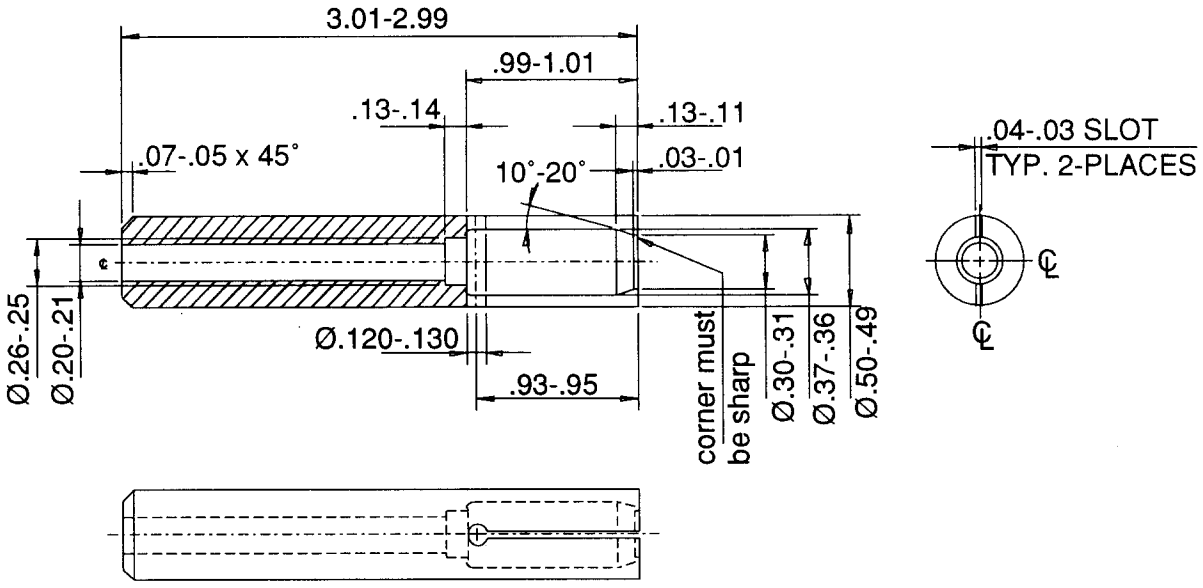
Tool No. AT101667-1 Pusher Pin

Material: low carbon C.D.S.



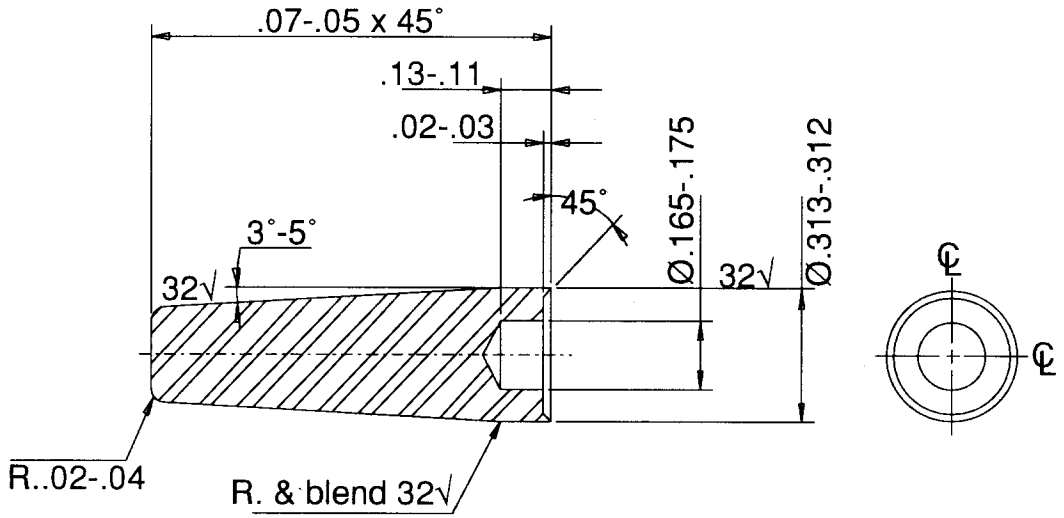
Tool No. AT101667-2 Pusher

Material: delrin



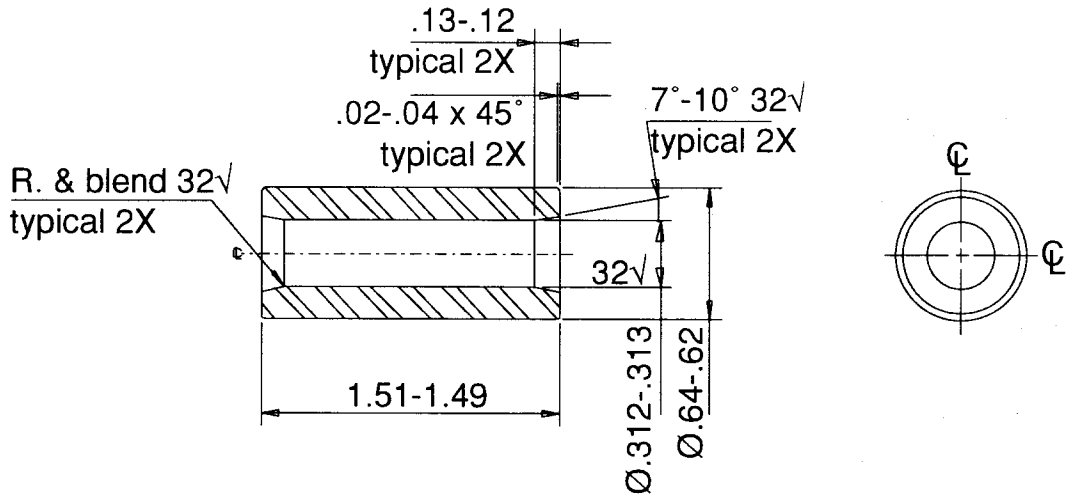
Tool No. AT101667-3 Guide

Material: low carbon C.D.S.



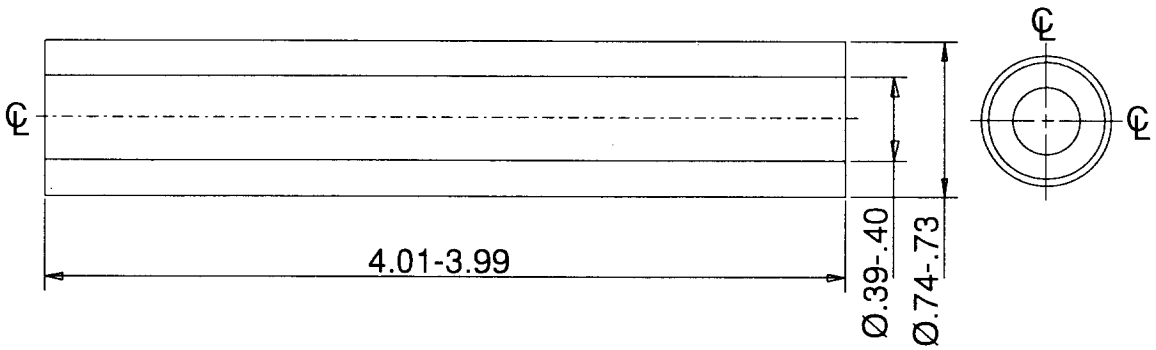
Tool No. AT101667-4 Sizing Ring

Material: low carbon C.D.S.



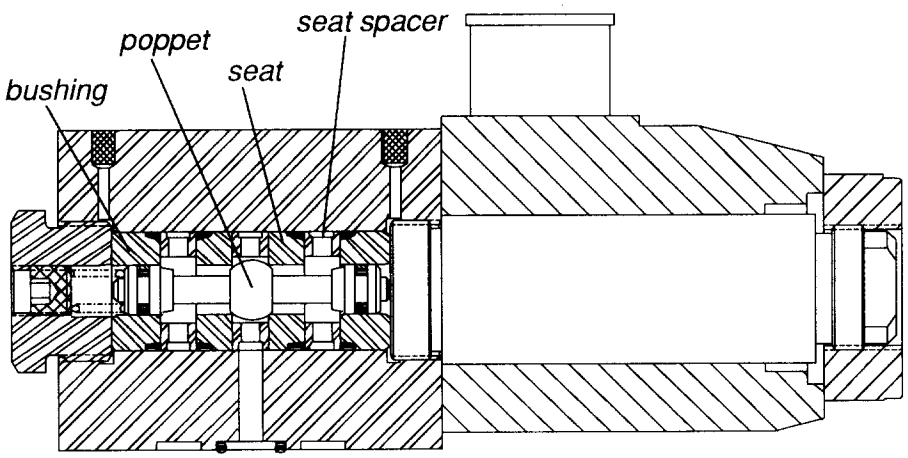
Tool No. AT101667-5 Assembly Guide

Material: delrin



■ Valve Function

The Enerpac poppet valve design concept is based on creating a metal-to-metal seal between a poppet and a sharp-edged, round seat. The pressure acting on the poppet is offset by force created by the same pressure acting on the bushing area of the valve, resulting in a hydraulically balanced design. The shift force requirements are thus minimized allowing the use of smaller solenoids to actuate the valve. The poppet-to-seat interface is the most critical part of this design. Roundness is very important and any distortion of these surfaces causes leakage, especially as the oil temperature rises. Due to the critical nature of these parts they must be replaced as a set.



■ Valve Identification

There are two different valves used on Enerpac torque wrench pumps. The only difference between these two valves is the solenoid voltage.

Pump Model			Valve Model	Solenoid Voltage
PME10027 PME10047 PME10427 PME10447	PMU10027 PMU10047 PMU10427 PMU10447	PME30487	VSG2310P-12000	115V 1PH 50/60Hz
PME10022 PME10042 PME10422 PME10442	PMU10022 PMU10042 PMU10422 PMU10442		VSG3510P-12000	220V 1PH 50/60Hz

■ Troubleshooting

The two possible functional problems which may occur over time are the failure to shift (or return) and leakage (internal or external).

Failure to shift, barring some obvious internal breakage, would be the result of solenoid or spring failure. The spring force on each unit is optimized by adjustment of the set screw on the end opposite the solenoid. Tampering with this setting could also result in a failure to shift (see spring setting procedure). The solenoid has a manual override button in the center of the core which can be used to aid in troubleshooting.

If a valve fails to actuate, push the manual override button on the solenoid to actuate. If actuation is achieved, the coil is likely failed and should be replaced. If the valve fails to return, the spring is likely failed or maladjusted and should be adjusted or replaced (see spring setting procedure).

Leakage can occur internally from one side of the valve to the other due to a worn or failed o-ring on the outside diameter of the seats or a bad sealing surface at the poppet-seat interface. External leakage can occur through the filters on the outside of the valve body if the o-ring on the outside diameter of the bushing is worn or failed. Leakage may also occur if the glyd-ring on the bushing end of the poppet is cut, worn, or extruded.

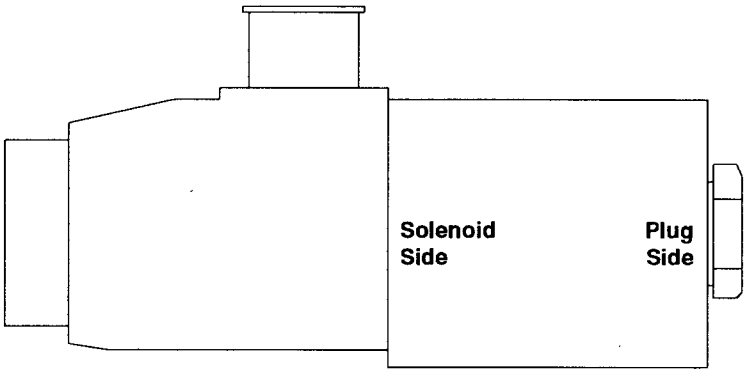
■ Internal Leakage Test Procedure

IMPORTANT: The valve-to-remote valve block interface is not keyed making it possible to mount the valve either *forward* or *backward*. As a result, you should label the valve and the remote valve block ports before performing this test. See the section below for the labeling procedure.

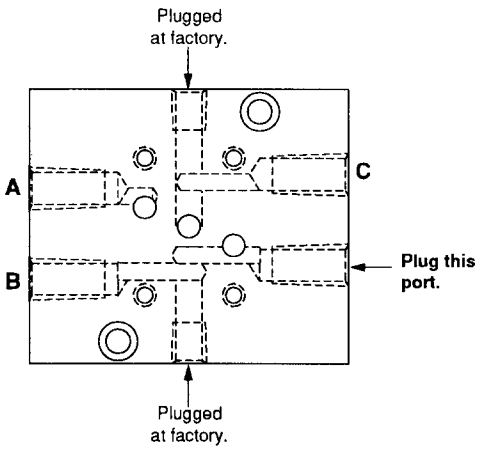
Remote Valve Block (CM269885):

Label valve and valve block as follows:

1. Find path that runs straight through the valve block. The path can be identified by passing air or light through the block.
2. Orient the valve block as shown at right.
3. Label ports A, B, and C, and plug the remaining port.
4. Orient the valve with the solenoid side facing to the left. Before removing solenoid from valve, label the solenoid side of the valve.
5. Mount the valve on the valve block.



Port A = solenoid side of valve
Port B = valve center
Port C = plug side of valve



To test the valve for internal leakage it will be necessary to use a hand pump, shut-off valve, gauge, and hose. The gauge must be installed between the shut-off valve and the valve being tested.

Test the valve as follows:

1. With the ports (B) and (C) vented to atmosphere, apply 10,000 psi to the port closest to the solenoid end of the valve (A). A gauge must be installed in-line on the pressure supply line. Close the shut-off valve to isolate from the pressure source (hand pump). There may be a short seat-in period, then the valve should hold and the gauge should indicate zero leakage.
2. Release pressure using hand pump.
3. With ports (A) and (B) vented to atmosphere, energize the solenoid and apply 10,000 psi to the port opposite the solenoid end of the valve (C). A gauge must be installed in-line on the pressure supply line. Close the shut off valve to isolate from the pressure source (hand pump). There may be a short seat-in period, then the valve should hold and the gauge should indicate zero leakage.

If internal leakage is found, check the seat, o-rings, and poppet-seat interface and replace if necessary.

■ Valve Disassembly Procedure

Important
The four o-rings (item 4) are not reusable and must be replaced whenever the valve is serviced.
The poppet assembly is a pretested unit and must be replaced as a set.
Make note of which sides the solenoid assembly (item 13) and valve plug (item 1) are located. See page 5 for labeling notes. This will be necessary for reassembly. If these items are incorrectly installed during reassembly, the valve will not operate properly.

1. Remove the solenoid assembly (item 13) from the valve block (item 11).
2. Remove the valve plug and spring (items 1 & 2) from the valve block (item 11). Remove the set screw (item 10) from the valve plug (item 1).
3. Remove the o-rings (item 12) from the valve block (item 11).
4. Use a pick to remove the filters (item 9) from the valve block (item 11).

Important
It will be necessary to use the assembly guide (part number AT101667-5) to remove the remaining components.

5. Lay the valve block on a flat surface, with the poppet vertical, allowing room underneath for the internal components to slide out.
6. Use the assembly guide and small hammer to remove the poppet assembly, spacers, and o-rings (items 6,5 & 4) from the valve block (item 11). Discard the o-rings at this time.

   Note: Keep the guide flat and concentric while lightly tapping with a small hammer. If the poppet, spacers, and o-rings seem to be stuck or jammed, gently blow shop air into the center port on the valve block to loosen.
7. Remove o-rings and glyd-rings (items 7 & 8) from the poppet assembly (item 6).

■ Poppet Assembly Procedure

Important
The poppet seats will tear the glyd-rings (items 7,8) when removed or installed onto the poppet.
The assembly procedure must be followed in exact order to insure proper assembly.
When a new poppet assembly (service part from Enerpac) is used for repair, it will have the glyd-rings installed at the factory. These units are pretested and require no further attention prior to assembly.
The glyd-ring assembly and sizing tools are required for this procedure.

1. Install the center spacer (item 5) onto the poppet.
2. Install the two seats onto the poppet with the tapered ends facing away from the center spacer (item 5).
3. Install the o-rings (item 7) onto both ends of the poppet.
4. Use the glyd-ring assembly tools (lubricate with a light grease) to push the glyd-rings (item 8) onto poppet over the o-rings.
5. Lubricate the sizing ring and slide over the glyd-rings (item 8) and leave in place for 1 minute. This will help the glyd-rings form back to their original shape.
6. The poppet assembly is now ready for reassembly into the valve.

■ Valve Assembly Procedure

Important
The four o-rings (item 4) are not reusable and must be replaced whenever the valve is serviced.
The poppet assembly is a pretested unit and must be replaced as a set.
The assembly guide (part number AT101667-5) is required for this procedure.

1. Insert the filters (item 9) into the valve block (item 11). Use a punch and insert until flush.
2. Install the solenoid core (item 13) into the valve block (item 11). Leave hand tight at this time. Do not install the coil and retaining nut at this time (items not numbered).
3. Gently clamp the valve block in a vise. Use soft jaws and make sure the solenoid end is facing down.
4. Place the bushing into the valve block bore with the grooved end facing down.
5. Insert o-ring (item 4) on top of the bushing. Tap the o-ring and bushing down using the assembly guide.
6. Insert the spacer and tap into place using the assembly guide.
7. Insert o-ring (item 4) and tap into place using the assembly guide.
8. Insert the preassembled poppet assembly (item 6) and tap into place using the assembly guide. See separate poppet assembly procedure.
9. Insert o-ring (item 4) and tap into place using the assembly guide.
10. Insert the spacer and tap into place using the assembly guide.
11. Insert o-ring (item 4) and tap into place using the assembly guide.
12. Place the bushing into the valve block bore with the grooved end facing up.
13. Install the spring (item 2).
14. Install the valve plug (item 1) and set screw (item 10). The valve plug should not be torqued at this time. Apply Loctite #222 to the set screw .

IMPORTANT: Be sure to torque the solenoid core BEFORE torquing the valve plug.

15. Torque the solenoid core (item 13) to 15-20 ft-lbs.
16. Torque the valve plug (item 1) to 32-35 ft-lbs.
17. Install the solenoid (item 13) and plastic retaining nut onto the coil and hand tighten.

continued ...

■ Spring Setting Procedure

Each valve leaves the factory with the return spring force adjusted to optimize the force balance in the valve. When any valve part is replaced (other than seals), the spring setting should be checked and adjusted if necessary.

NOTE: This procedure requires a variable voltage power supply.

IMPORTANT: After setting the spring, check for internal leakage. The procedure is on page 5.

Test Voltages For Spring Setting Procedure		
Model Number	**Rated Voltage**	**Test Voltage**
VSG2310P-12000	115 VAC	72 VAC
VSG3510P-12000	193 VDC	120 VDC

For the VSG2310P-12000 and VSG3510P-12000:

NOTE: Prior to set screw installation or adjustment, Loctite 222 or equivalent should be applied to the threads.

1. Turn the spring adjusting screw inward until solid.
2. Apply 10,000 psi to the port closest to the solenoid end (A) with ports (B) and (C) vented to atmosphere. A gauge must be installed in-line on the pressure supply side.
3. Apply 60-65% of rated voltage to the coil. See table at left.
4. Slowly back out the spring adjusting screw until the pressure drops to zero. It may start to drop slowly, then suddenly drop to zero. Be prepared for a sudden spray of oil from the open ports.

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