

ZU4 Post Tensioning and Foundation Repair

L2953 Rev. A 03/12

Index:

English.....	1-7	Portuguese.....	43-49
Français.....	8-14	Finnish.....	50-56
Deutsch.....	15-21	Norwegian.....	57-63
Italiano.....	22-28	Swedish.....	64-70
Español.....	29-35	中文.....	71-76
Nederlands.....	36-42	日本語.....	77-83

Repair Parts Sheets for this product are available from the Enerpac web site at www.enerpac.com, or from your nearest Authorized Enerpac Service Center or Enerpac Sales office.

1.0 IMPORTANT RECEIVING INSTRUCTIONS

Visually inspect all components for shipping damage. Shipping damage is not covered by warranty. If shipping damage is found, notify carrier at once. The carrier is responsible for all repair and replacement costs resulting from damage in shipment.

SAFETY FIRST

2.0 SAFETY ISSUES



Read all instructions, warnings and cautions carefully. Follow all safety precautions to avoid personal injury or property damage during system operation. Enerpac cannot be responsible for damage or injury resulting from unsafe product use, lack of maintenance or incorrect product and/or system operation. Contact Enerpac when in doubt as to the safety precautions and operations. If you have never been trained on high-pressure hydraulic safety, consult your distribution or service center for a free Enerpac Hydraulic safety course.

Failure to comply with the following cautions and warnings could cause equipment damage and personal injury.

A **CAUTION** is used to indicate correct operating or maintenance procedures and practices to prevent damage to, or destruction of equipment or other property.

A **WARNING** indicates a potential danger that requires correct procedures or practices to avoid personal injury.

A **DANGER** is only used when your action or lack of action may cause serious injury or even death.



WARNING: Wear proper personal protective gear when operating hydraulic equipment.



WARNING: Stay clear of loads supported by hydraulics. A cylinder, when used as a load lifting device, should never be used as a load holding device. After the load has been raised or lowered, it must always be blocked mechanically.



WARNING: USE ONLY RIGID PIECES TO HOLD LOADS. Carefully select steel or wood blocks that are capable of supporting the load. Never use a hydraulic cylinder as a shim or spacer in any lifting or pressing application.



DANGER: To avoid personal injury keep hands and feet away from cylinder and workpiece during operation.



WARNING: Do not exceed equipment ratings. Never attempt to lift a load weighing more than the capacity of the cylinder. Overloading causes equipment failure and possible personal injury. The cylinders are designed for a max. pressure of 700 bar [10,000 psi]. Do not connect a jack or cylinder to a pump with a higher pressure rating.



Never set the relief valve to a higher pressure than the maximum rated pressure of the pump. Higher settings may result in equipment damage and/or personal injury.



WARNING: The system operating pressure must not exceed the pressure rating of the lowest rated component in the system. Install pressure gauges in the system to monitor operating pressure. It is your window to what is happening in the system.



CAUTION: Avoid damaging hydraulic hose. Avoid sharp bends and kinks when routing hydraulic hoses. Using a bent or kinked hose will cause severe back-pressure. Sharp bends and kinks will internally damage the hose leading to premature hose failure.



Do not drop heavy objects on hose. A sharp impact may cause internal damage to hose wire strands. Applying pressure to a damaged hose may cause it to rupture.



IMPORTANT: Do not lift hydraulic equipment by the hoses or swivel couplers. Use the carrying handle or other means of safe transport.



CAUTION: Keep hydraulic equipment away from flames and heat. Excessive heat will soften packings and seals, resulting in fluid leaks. Heat also weakens hose materials and packings. For optimum performance do not expose equipment to temperatures of 65°C [150°F] or higher. Protect hoses and cylinders from weld spatter.



DANGER: Do not handle pressurized hoses. Escaping oil under pressure can penetrate the skin, causing serious injury. If oil is injected under the skin, see a doctor immediately.



WARNING: Only use hydraulic cylinders in a coupled system. Never use a cylinder with unconnected couplers. If the cylinder becomes extremely overloaded, components can fail catastrophically causing severe personal injury.



WARNING: BE SURE SETUP IS STABLE BEFORE LIFTING LOAD. Cylinders should be placed on a flat surface that can support the load. Where applicable, use a cylinder base for added stability. Do not weld or otherwise modify the cylinder to attach a base or other support.



Avoid situations where loads are not directly centered on the cylinder plunger. Off-center loads produce considerable strain on cylinders and plungers. In addition, the load may slip or fall, causing potentially dangerous results.



Distribute the load evenly across the entire saddle surface. Always use a saddle to protect the plunger.



IMPORTANT: Hydraulic equipment must only be serviced by a qualified hydraulic technician. For repair service, contact the Authorized ENERPAC Service Center in your area. To protect your warranty, use only ENERPAC oil.



WARNING: Immediately replace worn or damaged parts by genuine ENERPAC parts. Standard grade parts will break causing personal injury and property damage. ENERPAC parts are designed to fit properly and withstand high loads.



WARNING: Do not use electric pumps in an explosive atmosphere. Adhere to all local and national electrical codes. A qualified electrician must do installation and modification.



WARNING: Start the pump with the valve in the neutral position to prevent accidental cylinder operation. Keep hands clear of moving parts and pressurized hoses.



WARNING: These pumps have internal factory adjusted relief valves, which must not be repaired or adjusted except by an Authorized Enerpac Service Center.

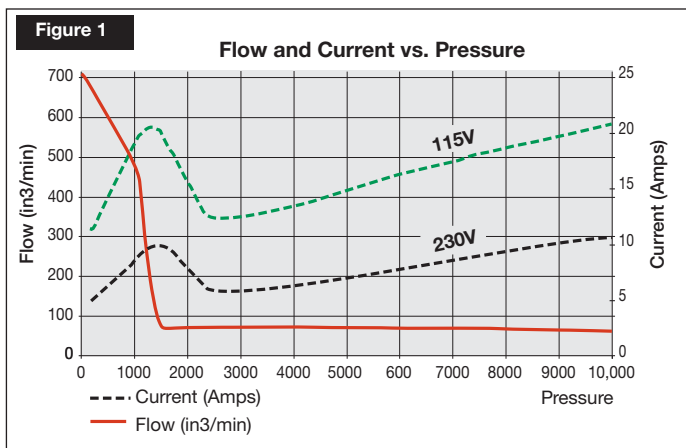


CAUTION: To prevent damage to pump electric motor, check specifications. Use of incorrect power source will damage the motor.

3.0 SPECIFICATIONS

3.1 Performance Chart (See Performance Chart below)

3.2 Flow Charts (See Figure 1)



4.0 INSTALLATION

Install or position the pump to ensure that air flow around the motor and pump is unobstructed. Keep the motor clean to ensure maximum cooling during operation.

4.1 Oil Fill Plug and Reservoir Air Breather (See Figure 2)

The oil fill plug (A) is located on the left side of the pump coverplate. Before using the pump, check oil level as described in Section 4.4. Add oil if required.

A shipping plug (B) is installed on the right side of the pump coverplate. Before using the pump, replace the shipping plug (B) with the reservoir air breather (C) and adapter fitting (D). These parts are shipped loose with the pump.

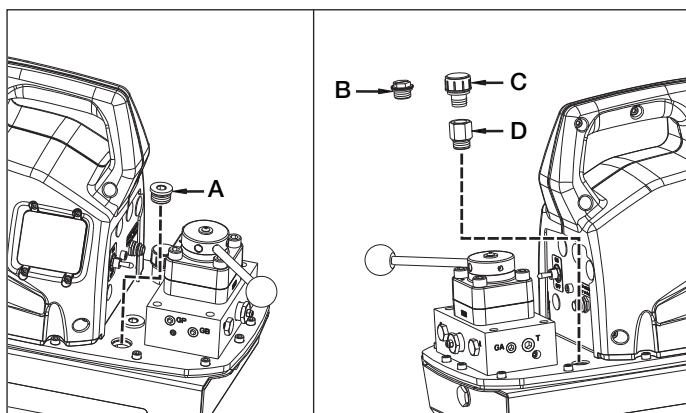


Figure 2, Oil Fill Plug and Reservoir Air Breather

4.2 Pump Mounting

Refer to Figure 3 for mounting dimensions to secure the pump to a fixed surface.

▼ ZU4 PERFORMANCE CHART

Motor Size (hp)	Output Flow Rate in ³ /min				Motor Electrical Specifications (Volts-Ph-Hz)	Sound Level (dBA)	Relief Valve Adjustment Range (psi)
	100 psi	700 psi	5,000 psi	10,000 psi			
1.7*	700	535	76	60	115-1-50/60 230-1-50/60	85-90	1,000-10,000

*Actual power consumption depends on the application. See Figure 1.

	1-2 Gal. (4-8 L) in. (mm)	2.5 Gal. (10 L) in. (mm)	5 Gal. (20 L) in. (mm)	10 Gal. (40 L) in. (mm)
A	3.75 (95)	11.0 (279)	15.6 (396)	18.9 (480)
B	9.00 (229)	12.0 (305)	12.0 (305)	12.0 (305)
C	tapped holes, M8 x 1.25 0.25 (6) deep	.34 (8.6) diameter through holes		

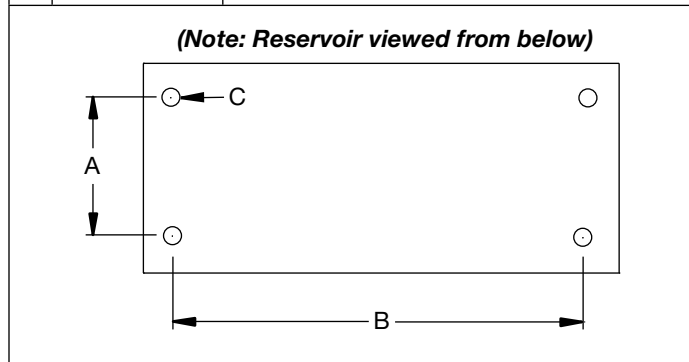


Figure 3, Dimensions

4.3 Electrical Connections

THE PUMP IS FACTORY EQUIPPED WITH THE COMMON ELECTRICAL PLUG FOR A GIVEN VOLTAGE, ALTERING THE PLUG TYPE SHOULD ONLY BE DONE BY A QUALIFIED ELECTRICIAN, ADHERING TO ALL APPLICABLE LOCAL AND NATIONAL CODES.

1. The disconnect and line circuit protection to be provided by customer. Line circuit protection to be 115% of motor full load current at maximum pressure of application (see Figure 1).
2. For more information, refer to pump name plate for power rating.

4.4 Oil Level

Check the pump oil level prior to start-up. If oil level is low, remove the oil fill plug (A) from the cover plate (see Figure 2) and add oil as required. The reservoir is full when the oil level is as shown in Figure 4.

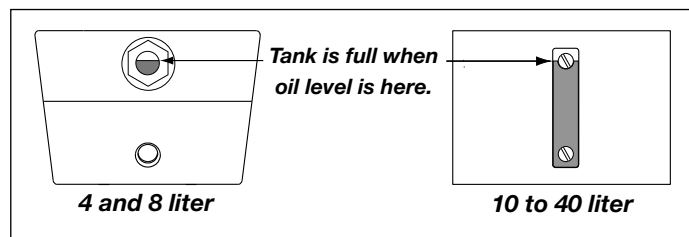


Figure 4, Sight Glass

IMPORTANT: Add oil only when all system components are fully retracted, or the system will contain more oil than the reservoir can hold. Use only Enerpac HF oil.

4.5 Hydraulic Connections

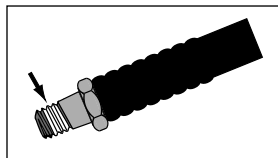


Figure 5

Apply 1-1/2 wraps of Teflon tape or other suitable sealant to the hydraulic hose fitting, leaving the first complete thread free of tape or sealant as shown in Figure 5.

Thread hose(s) into outlet port(s) of the valve (see valve body for port identification).

Advance hose to valve port "A".

Retract hose to valve port "B" (if applicable).

Gauge to valve port "GA", "GB", or "GP".

("GA" measures "A" port pressure, "GB" measures "B" port pressure, "GP" measures pump pressure down stream of system check).

5.0 OPERATION

1. Check the oil level of pump and add oil if necessary.
2. Make sure that the reservoir air breather has been installed. (see section 4.1)
3.
 - Model VM22 only: Place valve handle in the retract position.
 - Models VM33M and VM43M: Place valve handle in the neutral position.
 - Model VM43-LPS only: Place valve handle in the neutral/hold position.
4. Connect unit to power.
5. For valve and motor operation instructions, see sections 5.1 – 5.3.

NOTE: Oil flow is controlled by a manual valve. The motor is controlled by a switch on the pump, or by a pendant.

5.1 MANUAL VALVE OPERATION

VM22

(See Figure 6)

1. Advance
2. Retract

Pump Motor Switch =
Toggle Motor On or Off.

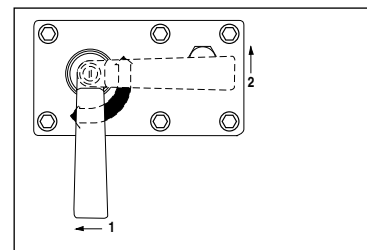


Figure 6

VM33M, VM43M,

(See Figure 7)

1. Advance
2. Retract
3. Neutral

Pump Motor Switch =
Toggle Motor On or Off

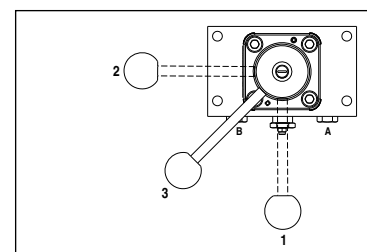


Figure 7

VM43-LPS

(See Figure 8)

1. Advance/Stressing
2. Retract/Seating
3. Neutral/Hold

Pump Motor Switch =
Toggle Motor On or Off

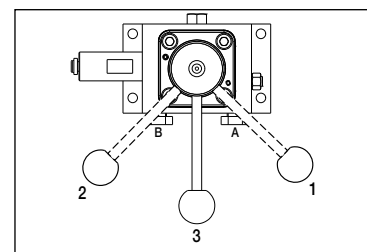


Figure 8

NOTE: Handle position for VM33M, VM43M and VM43-LPS can be changed if desired.

5.2 Pump Motor Switch (See Figure 9)

Switch positions:

1. ON = Motor On.
 2. OFF = Motor Off. Pendant button disabled.
 3. REMOTE = Motor controlled by pendant.
- Circuit Breaker: If tripped, press button to reset.

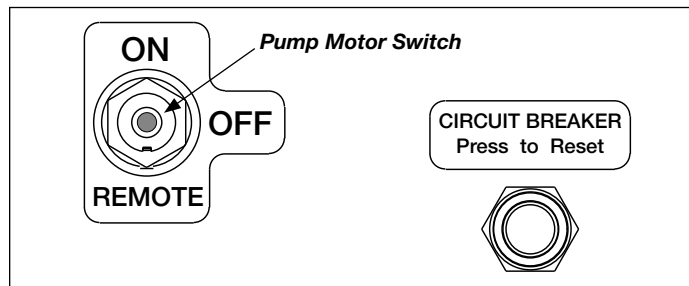


Figure 9, Pump Control Panel

5.3 Pendant Operation (See Figure 10)

Pendant On-Off Button:

1. Button depressed = Momentary Motor On.
2. Button released = Motor Off.

Pump motor switch must be in REMOTE position to enable pendant operation.

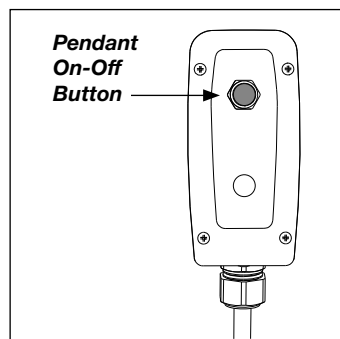


Figure 10, Pendant

5.4 Relief Valve Adjustment

The valve assembly is equipped with a user-adjustable relief valve. Adjust pressure as described for your valve model:

VM22 Only

1. Install a 0-15,000 psi [0-1,035 bar] gauge in the "A" port (see Figure 11).
2. Loosen the relief valve locknut to permit adjustment of set screw.
3. Rotate the control valve handle to the retract ("2") position (see Figure 6 for valve positions).
4. Start the pump and allow the oil to warm.
5. Rotate the control valve handle to the advance ("1") position. Allow pressure to build.
6. To increase pressure: SLOWLY turn the relief valve set screw clockwise until pressure increases to the desired setting.
NOTE: An internal check valve in the manifold will prevent the pressure from dropping when the set screw is turned counter-clockwise. To lower the pressure setting, follow steps 7a through 7e.
7. To decrease pressure:
 - a. Be sure the pump is running.
 - b. Rotate the control valve handle to the retract ("2") position to relieve pressure on the "A" port.
 - c. Turn the relief valve set screw counter-clockwise one turn.

- d. Rotate the control valve handle to the advance ("1") position.
 - e. SLOWLY turn the relief valve set screw clockwise until pressure increases to the desired setting.
8. When the desired pressure setting is reached, lock the set screw with the locknut. DO NOT overtighten.
 9. Before turning off pump, rotate the control valve handle to the retract ("2") position to relieve pressure at the "A" port. Check that gauge indicates zero (0) psi.
 10. Stop the pump.

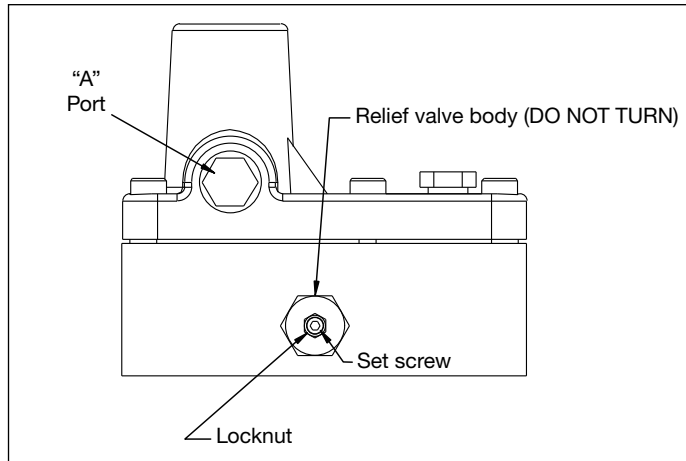


Figure 11, Relief Valve - VM22

VM33M and VM43M Only

1. Install a 0-15,000 psi [0-1,035 bar] gauge in the "A" port (see Figure 12).
2. VM43M Only: Install a 3/8" pipe plug in the "B" port and torque to 25 ft-lbs [33 Nm].
3. Loosen the relief valve locknut to permit adjustment of set screw.
4. Rotate the control valve handle to the neutral ("3") position (see Figure 7 for valve positions).
5. Start the pump and allow the oil to warm.
6. Rotate the control valve handle to the advance ("1") position. Allow pressure to build.
7. To increase pressure: SLOWLY turn the relief valve set screw clockwise until pressure increases to the desired setting.
NOTE: An internal check valve in the manifold will prevent the pressure from dropping when the set screw is turned counter-clockwise. To lower the pressure setting, follow steps 8a through 8e.
8. To decrease pressure:
 - a. Be sure the pump is running.
 - b. Rotate the control valve handle to the neutral ("3") position to relieve pressure on the "A" port.
 - c. Turn the relief valve set screw counter-clockwise one turn.
 - d. Rotate the control valve handle to the advance ("1") position.
 - e. SLOWLY turn the relief valve set screw clockwise until "A" port pressure increases to the desired setting.
9. When the desired pressure setting is reached, lock the set screw with the locknut. DO NOT overtighten.
10. Before turning off pump, rotate the control valve handle momentarily to the retract ("2") position to relieve pressure at the "A" port. Then, rotate the handle to the neutral ("3") position. Check that gauge indicates zero (0) psi.
11. Stop the pump.

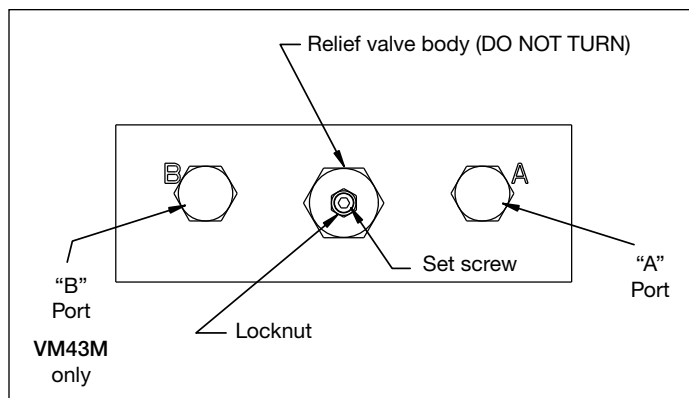


Figure 12, Relief Valve - VM33M and VM43M

VM43-LPS Only

1. Install a 0-15,000 psi [0-1,035 bar] gauge in the "A" port (see Figure 13).
2. Install a 3/8" pipe plug in the "B" port and torque to 25 ft-lbs [33 Nm].
3. Loosen the relief valve locknut to permit adjustment of set screw.
4. Rotate the control valve handle to the neutral/hold ("3") position (see Figure 8 for valve positions).
5. Start the pump and allow the oil to warm.
6. Rotate the control valve handle to the advance/stressing ("1") position. Allow pressure to build.

NOTE: Use a 5mm Allen wrench to adjust the relief valve set screw.

7. To increase pressure: With the pump running, SLOWLY turn the relief valve set screw clockwise until "A" port pressure increases to the desired setting.

NOTE: A pilot-operated check valve in the locking valve block will prevent the pressure from dropping when the set screw is turned counter-clockwise. To lower the pressure setting, follow the procedure in steps 8a through 8e.

8. To decrease pressure:
 - a. Be sure the pump is running.
 - b. Rotate the control valve handle to the retract/seating ("2") position momentarily. This will activate the pilot-operated check valve and relieve pressure at the "A" port. Then, rotate the handle to the neutral/hold ("3") position.
 - c. Turn the relief valve set screw counter-clockwise one turn.
 - d. Rotate the control valve handle to the advance/stressing ("1") position.
 - e. SLOWLY turn the relief valve set screw clockwise until "A" port pressure increases to the desired setting.
9. When the desired pressure setting is reached, lock the set screw with the locknut. DO NOT overtighten.
10. Before turning off pump, rotate the control valve handle momentarily to the retract/seating ("2") position to relieve pressure at the "A" port. Then, rotate the handle to the neutral/hold ("3") position. Check that "A" port gauge indicates zero (0) psi.
11. Stop the pump.

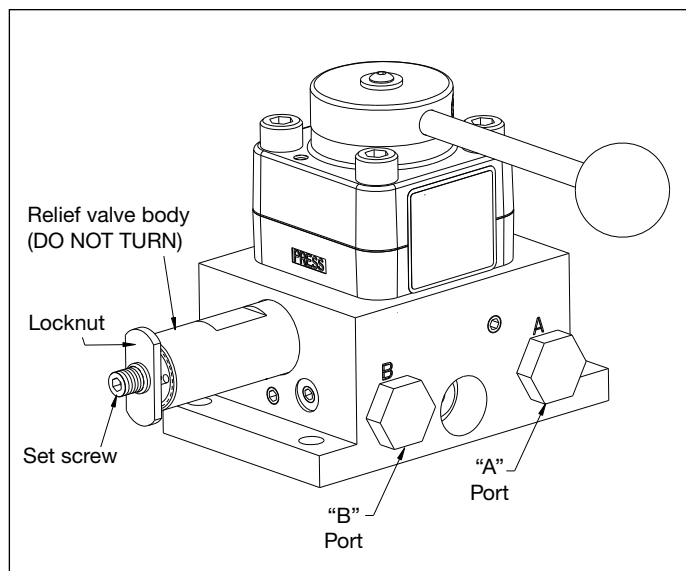


Figure 13, Relief Valve - VM43-LPS

6.0 MAINTENANCE

Frequently inspect all system components for leaks or damage. Repair or replace damaged components. Electrical components, for example, the power-cord, may only be repaired or replaced by a qualified electrician, adhering to all applicable local and national codes.

6.1 Check Oil Level

Check the oil level of the pump prior to start-up, and add oil, if necessary, by removing the oil fill plug. Always be sure cylinders are fully retracted before adding oil to the reservoir. See figures 2 and 4.

6.2 Change Oil and Clean Reservoir

Enerpac HF oil is a crisp blue color. Frequently check oil condition for contamination by comparing pump oil to new Enerpac oil. As a general rule, completely drain and clean the reservoir every 250 hours, or more frequently if used in dirty environments.

NOTE: This procedure requires that you remove the pump from the reservoir. Work on a clean bench and dispose of used oil according to local codes.

1. Remove the drain plug and drain all oil from the reservoir. Clean and reinstall the drain plug.
2. Unscrew the 13 bolts holding the coverplate to the reservoir and lift the pump unit out of the reservoir. Be careful not to damage the filter screen.
3. Thoroughly clean the reservoir and reservoir magnet (if equipped) with a suitable cleaning agent.
4. Remove the pick-up filter screen for cleaning. (Do not pull on the screen or the bottom of the intake to avoid possible damage.) Clean the screen with solvent and a soft brush. Reinstall.
5. Reassemble the pump and reservoir, installing a new reservoir gasket.
6. Fill the reservoir with clean Enerpac hydraulic oil. The reservoir is full when oil level is as shown in Figure 4.

6.3 Changing the Filter Element (optional)

A return line filter may be ordered as an accessory to the pump. The filter element should be replaced every 250 hours, or more frequently in dirty environments. The filter manifold is equipped with a 25 psi (1.7 bar) bypass to prevent over pressure rupture if filter plugging occurs. Filter element replacement part number is PF-25.

6.4 Motor Brush Replacement

To prevent motor damage, the ZU4 motor brushes incorporate an automatic motor stop when one of the brush carbons wears to a length of 0.25" [6 mm]. Inspect both brushes.

1. Disconnect pump from electrical power.



DANGER: To avoid possible electrocution, pump must be completely disconnected from electrical power before brush servicing is attempted.

2. Remove both brush caps (A) by deflecting the brush cap latch (B) and gently prying outward (see Figure 14).
3. Remove motor brushes by turning black cap counter-clockwise.
4. Replace both brushes and reverse procedure to reassemble.

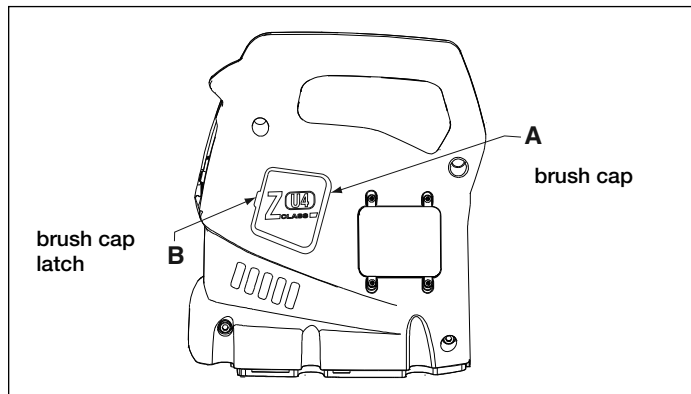


Figure 14, Brush Cap Removal

7.0 TROUBLESHOOTING (SEE TROUBLESHOOTING GUIDE)

Only qualified hydraulic technicians should service the pump or system components. A system failure may or may not be the result of a pump malfunction. To determine the cause of the problem, the complete system must be included in any diagnostic procedure.

The following information is intended to be used only as an aid in determining if a problem exists. For repair service, contact your local Authorized Enerpac Service Center.

Troubleshooting Guide		
Problem	Possible Cause	Action
Pump will not start	No power	Connect power
	Circuit breaker tripped	Push circuit breaker button
	Low voltage	Turn off other electric loads Use heavier gauge extension cord
	Motor brushes worn to end of life	See Section 6.4, <i>Motor Brush Replacement</i>
Pendant does not function	Power switch not in “remote” position	Move switch to “remote” position
	Pendant damage	Repair pendant See authorized service center
Motor stops under load	Low voltage	Turn off other electric loads Use heavier gauge extension cord
Pump fails to build pressure or less than full pressure	Low oil level	Add oil per section 4.4
	Relief valve set too low	Adjust per section 5.4
	External system leak	Inspect and repair or replace
	Internal leak in pump	See authorized service center
	Internal leak in valve	See authorized service center
	Internal leak in system component	See authorized service center
Pump builds full pressure, but load does not move	Load greater than cylinder capacity at full pressure	Reduce load or add cylinder capacity
	Flow to cylinder blocked	Check hydraulic couplers for full engagement
Cylinder drifts back on its own	External system leak	Inspect all hydraulic connections and replace or repair
	Internal leak in a system component	See authorized service center
	Non-load holding valve used	See authorized service center
Single-acting cylinder will not return	No load on a “load return” cylinder	Add load
	Return flow restricted or blocked	Check couplers for full engagement
	Locking valve used	Run motor while retracting
	Valve malfunction	See authorized service center
	Cylinder return spring broken	See authorized service center
Double-acting cylinder will not return	Return flow restricted or blocked	Check couplers for full engagement
	Locking valve used	Run motor while retracting
	Valve malfunction	See authorized service center
Pump runs hot	Advance or retract flow restricted	Check couplers for full engagement
	High ambient temperature	Install heat exchanger for hydraulic oil