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## ELECTRIC TWO-STAGE HYDRAULIC PUMP

Read and carefully follow these instructions. Most problems with new equipment are caused by improper operation or installation. Warning statements must be carefully observed to help prevent personal injury.

### SAFETY PRECAUTIONS



**WARNING:** To help avoid personal injury,

#### Hydraulic Hose

- Before operating the pump, all hose connections must be tightened with the proper tools. Do not overtighten. Connections should only be tightened securely and leak-free. Overtightening can cause premature thread failure or high pressure fittings to split at pressures lower than their rated capacities.
- Should a hydraulic hose ever rupture, burst, or need to be disconnected, immediately shut off the pump and shift the control valve twice to release all pressure. Never attempt to grasp a leaking pressurized hose with your hands. The force of escaping hydraulic fluid could cause serious injury.
- Do not subject the hose to potential hazard such as fire, sharp surfaces, extreme heat or cold, or heavy impact. Do not allow the hose to kink, twist, curl, or bend so tightly that the oil flow within the hose is blocked or reduced. Periodically inspect the hose for wear because any of these conditions can damage the hose and result in personal injury.
- Do not use the hose to move attached equipment. Stress may damage the hose and cause personal injury.
- Hose material and coupler seals must be compatible with the hydraulic fluid used. Hoses also must not come in contact with corrosive materials such as creosote-impregnated objects and some paints. Consult the manufacturer before painting a hose. Never paint the couplers. Hose deterioration due to corrosive materials can result in personal injury.

#### Pump

- Do not exceed the PSI hydraulic pressure rating noted on the pump nameplate or tamper with the internal high pressure relief valve. Creating pressure beyond rated capacities can result in personal injury.
- Before replenishing the oil level, retract the system to prevent overfilling the pump reservoir. An overfill can cause personal injury due to excess reservoir pressure created when cylinders are retracted.

#### Cylinder

- Do not exceed rated capacities of the cylinders. Excess pressure can result in personal injury.
- Do not set poorly-balanced or off-center loads on a cylinder. The load can tip and cause personal injury.



## WARNING Continued

### Power Supply (Electric)

- Do not use an ungrounded (two-prong) extension cord with this unit.
- Avoid any condition that could create an electrical hazard.
- Any electrical work must be done by a qualified electrician.
- If the power cord is damaged or wiring is exposed, replace or repair immediately.
- Changing the voltage on jet motors is a complicated and, if not done correctly, dangerous procedure. Consult the manufacturer for specific information before attempting any rewiring. Rewiring voids CSA approval.
- Disconnect the power supply before removing the electrical box cover or performing repairs or maintenance.
- All voltages must be wired for CCW rotation when viewed from the lead end (top) of the motor.
- The line voltage must be the same as the voltage for which the pump is wired. (Ex: 110/115 volt pump plugged into 110/115 volt power source.)
- Check the total amperage draw for the electrical circuit you will be using. (Ex: Do not plug a motor or motors that may draw 25 amps into a 20 amp fused electrical circuit.)
- Do not attempt to increase the power line capacity by replacing a fuse with another fuse of higher value. Overheating of the power line and the possibility of a fire can result.
- To rewire a motor from one voltage to another, or to change the type of flow control valve (manual or solenoid), consult the electrical schematic section in the Parts List #100353.

## OPERATING PROCEDURE

### Filling the Reservoir

**NOTE:** This pump has been shipped without oil in the reservoir. A high grade hydraulic oil has been shipped with the pump, but if additional oil is required, use only Power Team hydraulic fluids.

1. Clean the area around the filler cap to remove all dust and grit. Any foreign material in the oil can damage the polished surfaces and precision-fit components of this pump.
2. Retract all cylinders to the return position.
3. Remove the filler cap, and insert a clean funnel with a filter. Fill the reservoir with hydraulic oil to within 1" of the cover plate. Replace the filler cap.
4. Cycle the pump (with the cylinders attached) several times. Retract the cylinders, and check the oil level in the pump reservoir.

### Hydraulic Connections

1. Clean all the areas around the oil ports of the pump and cylinder.
2. Inspect all threads and fittings for signs of wear or damage, and replace as needed.
3. Clean all hose ends, couplers, or union ends.
4. Remove the thread protectors from the hydraulic oil outlets.
5. Connect the hose assembly to the hydraulic oil outlet, and couple the hose to the cylinder. **NOTE: Seal all hydraulic connections with a high grade, non-hardening thread sealant, such as Power Team HTS6.** Teflon tape can be used to seal hydraulic connections if only one layer of tape is used. Apply carefully, two threads back, to prevent the tape from being pinched by the coupler and broken off inside the pipe end. Any loose pieces of tape could travel through the system and obstruct the flow of oil or cause jamming of precision fit parts.

## Electrical Connections

**WARNING**

- To help avoid personal injury, all electrical work must be done by a qualified electrician.
- Disconnect the power supply before removing the electrical box cover.
- All voltages must be wired for counterclockwise (CCW) rotation viewed from the lead end of the motor.

**WARNING**

To help avoid personal injury, all electrical work must be done by a qualified electrician.

**North American & International Color Codes**

Conductors	North American	International
Line .....	Black.....	Brown
Neutral .....	White .....	Blue
Ground .....	Green .....	Green/Yellow

1. This pump has been assembled with a three-phase 60 cycle motor that can be wired for 230 or 460 volts. The pump is wired at the factory for 460 volts and is not supplied with a power cord or plug. This pump may also be ordered with a 50 cycle, 220 or 380 volt motor that is wired at the factory for either voltage and is not supplied with a power cord or a plug.
2. When installing a power supply, use a 14 gauge, 4 strand copper electrical cable. Refer to Figure 1 for the correct wire locations. If the armature of the motor turns in a clockwise (CW) rotation, reverse the location of any two of the three power supply leads.
3. The line voltage must be compatible with the amperage draw required by the pump. Provide wiring as required. To change the voltage of the motor, refer to the diagram on the motor nameplate or to the electrical schematic in Parts List #100353.

**WARNING**

Changing the voltage on this unit is an involved and potentially hazardous procedure if performed incorrectly. If assistance is required, consult the Power Team Technical Service Department 1-800-477-8326.

4. Consult the electrical schematic in Parts List #100353 when wiring a solenoid valve into the electrical system.
5. When overheating occurs, the thermal overload will kick out. To start the pump again when the unit has cooled, place the valve in neutral, press the Reset (red) button on the magnetic starter, and push the Start button on the pump end panel.
6. If a power outage should occur while using the pump, when power has been restored the pump will need to be started again. Place the valve in the neutral position, and push the start button on the pump end panel.

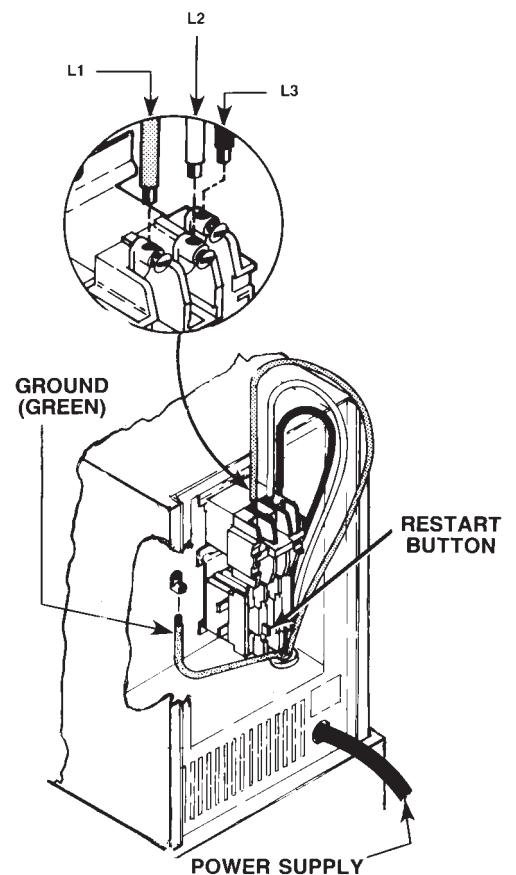
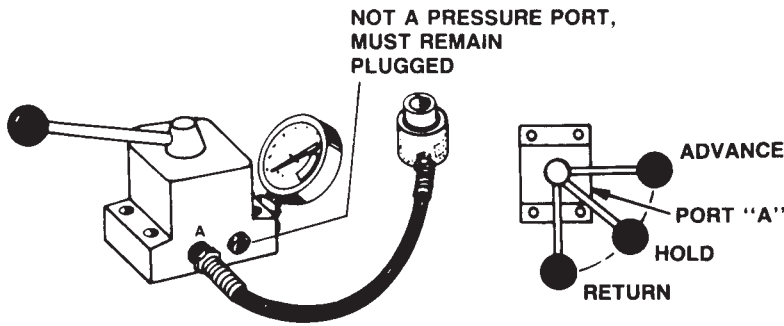


Figure 1

Valve Operation



**Neutral (Hold):**

**3-Way Manual Valve**

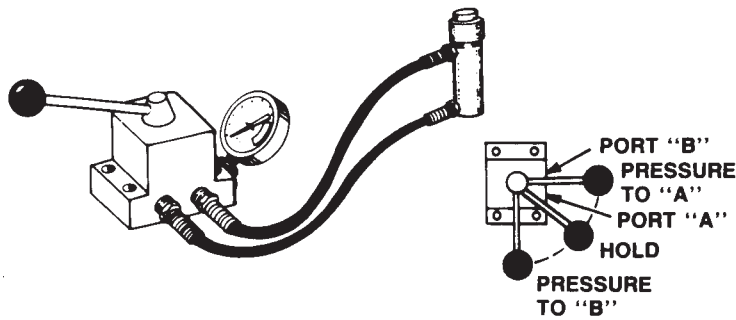
Pressure to tank - cylinder port blocked.

**Advance:**

Pressure to cylinder port "A."

**Return:**

Pressure and cylinder port to tank. Pressure holds without loss when shifted from cylinder port to "hold" position.



**Neutral (Hold):**

**4-Way Manual Valve**

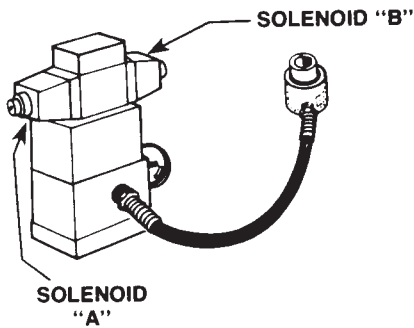
Pressure to tank, ports "A" and "B" blocked.

**Position "A":**

Pressure to port "A", port "B" to tank.

**Position "B":**

Pressure to "B", port "A" to tank. Pressure holds without loss when shifted from either cylinder port to "hold" position.



**Neutral (Hold):**

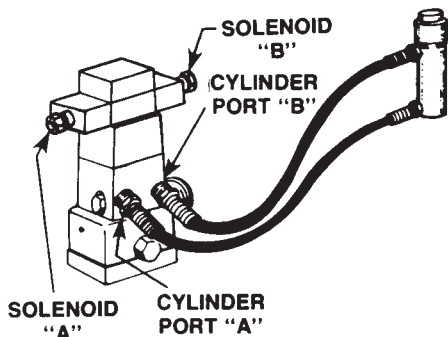
**3-Way Solenoid Valve**

When both solenoids are deenergized, oil from the pump is directed back to tank, and oil from cylinder is checked in the cylinder.

**Advance:** When solenoid "B" is energized, oil from the pump is directed through the pressure port to the cylinder.

**Return:**

When solenoid "A" is energized, oil from the pump and from the cylinder is directed back to tank. Pressure holds without loss when shifted from the cylinder port to the neutral "hold" position.



**Neutral (Hold):**

**4-Way Solenoid Valve**

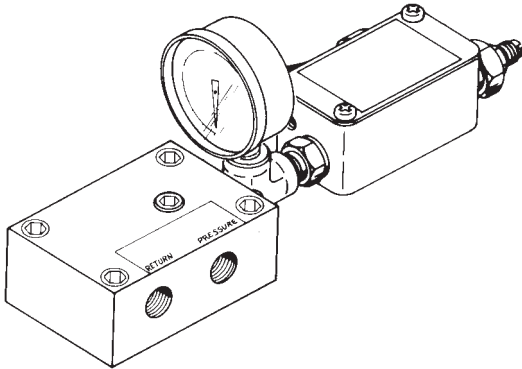
When both solenoids are deenergized, oil from the pump circulates at free flow from the pressure port to the tank. Both cylinder ports are blocked.

**Solenoid "A" Energized:**

Pressure to cylinder port "A".  
Cylinder port "B" to tank.

**Solenoid "B" Energized:**

Pressure to cylinder port "B".  
Cylinder port "A" to tank.  
Pressure holds without loss when shifted from either cylinder port to the neutral "hold" position.



### Manifold/Pressure Switch Combination

When the pressure switch setting is reached, the switch shuts off the motor. Once the pressure falls 300 PSI below desired system pressure, the switch reactivates the motor to sustain pressure.

Turn adjusting screw clockwise to increase pressure. Turn adjusting screw counterclockwise to decrease pressure. Refer to the section titled "Adjusting the Pressure Switch" for further information.

### Pump Operation

1. All valve and hose connections should be secure, and the reservoir should be filled to the proper oil level. Connect the power supply.
2. With the valve in the neutral or return position, jog the pump several times using the jog switch on the pump end panel.
3. Place the switch in the run position and let the pump run at idle for two minutes.
4. Cycle the pump and cylinder several times to eliminate air from the system.

**NOTE: If using a large double-acting cylinder, after eliminating the air from the system and with the cylinder in the retracted position, refill the pump reservoir to 1" from the pump cover plate.**

### Pressure Regulating Valve

A pressure regulating valve can be adjusted to bypass oil at a desired pressure setting while the pump motor continues to run. **IMPORTANT: For easy adjustment of the pressure regulating valve, always adjust the pressure by INCREASING it to a desired pressure setting. The pressure range for this unit is from 1000 PSI to 10,000 PSI.**

1. Loosen the locknut on the pressure regulating valve, and turn the adjusting screw a few turns counterclockwise (CCW) to decrease the pressure setting to a lower than desired pressure.
2. Connect the pump power supply, and place the hydraulic control valve in the advance position. Place the motor control toggle switch in the run position, and push the start button.
3. Slowly turn the adjusting screw in a clockwise (CW) direction to gradually increase the pressure setting. When the desired pressure setting is reached, lock the adjusting screw into position by tightening the locknut.

## OPTIONAL ACCESSORIES

### Pressure Regulating Switch

A pressure switch can be adjusted to stop the pump motor at a desired pressure setting, and restart the motor when the pressure falls below that setting.

It is recommended that a pressure switch be used with a pressure regulating valve to insure accuracy when setting a maximum PSI level. A pressure switch alone will break the motor's energy supply at a selected setting, but the hydraulic pump will continue building pressure as it slows to a stop. **The pressure regulating valve should be set first at the desired maximum pressure.** Then, with the pump running at that pressure, back the pressure switch out until the motor stops. As a result, the pressure limit requirement can be held to approximately 300 PSI.

### Adjusting the Pressure Switch Setting

1. Connect the pump power supply, and place the control valve in the advance position. Set the motor control toggle switch on run.
2. Loosen the Locknut on the pressure switch. Slowly turn the pressure switch adjusting screw in a counterclockwise (CCW) direction, decreasing the pressure switch setting until the pump motor shuts off. Tighten the locknut to lock the adjusting screw. See Figure 2.
3. Release the hydraulic pressure. Move the control valve to advance again and check the pressure setting. It may be necessary to make a second adjustment.

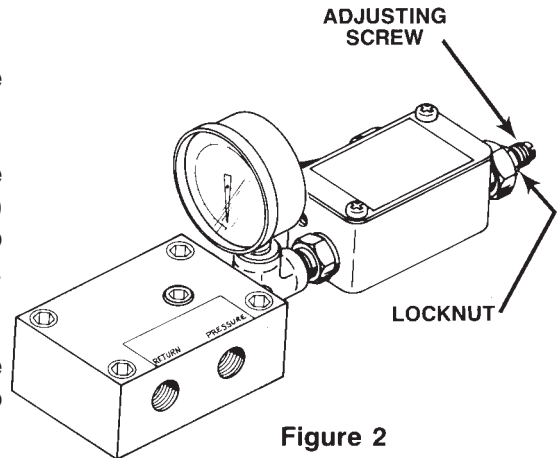


Figure 2

### Hydraulic Gauge

1. Remove the pipe plug from the gauge port located on the side of the hydraulic valve.
2. Thread the gauge into the gauge port.
3. All connections must be secure. Apply a small amount of pipe thread sealant, such as Power Team HTS6 or teflon tape on all pipe thread connections to insure proper sealing. **DO NOT OVERTIGHTEN PIPE CONNECTIONS!**

## PREVENTIVE MAINTENANCE

**WARNING: ALWAYS disconnect the pump from the power supply before attempting any maintenance or repair procedures. Repairs and maintenance should be performed in a dust-free environment by a qualified technician.**

### Bleeding Air from the System

This pump is equipped with a self-priming bleed valve that should eliminate the need to manually prime the pump itself. However, air can accumulate within the hydraulic system during normal use causing the cylinder to respond slowly or behave in an unstable manner.

1. Position the cylinder at a lower level than the pump to allow air to be released through the breather-hole in the pump reservoir.
2. Run the system through several cycles of extending and retracting the cylinder free of any load. **NOTE: Some spring return rams have a cavity in the rod that can cause an air pocket. Position this type of cylinder upside down or lying on its side with the port facing upward.**

### Hydraulic Fluid Level

1. Check the oil level in the reservoir after each 10 hours of use. The oil should be 1" from the pump cover plate when all cylinders are retracted.
2. Drain, flush, and refill the reservoir after approximately every 300 hours of use with Power Team hydraulic oil. The frequency of oil changes will depend upon the general working conditions, severity of use, and the overall cleanliness and care given the pump.

### Draining and Flushing the Reservoir

1. Clean the pump exterior before the pump interior is removed from the reservoir.
2. Remove the fourteen screws that hold the motor and pump assembly to the reservoir. **IMPORTANT: Do not damage the gasket or bump the filter or hydraulic pressure regulating valves when lifting the pump assembly off the reservoir.**
3. After disposing of the used hydraulic fluid, clean the inside of the reservoir with a suitable flushing oil. Rinse the filter clean.
4. Place the pump and motor assembly back onto the reservoir, and secure it with four of the machine screws assembled on opposite corners of the housing.

**IMPORTANT: The flow control valve MUST be in the neutral position for the following step. If the pump is equipped with a valve that has only an advance or retract position, place the valve in the advance position and connect a hose to the advance port on the valve. Place the other end of the hose into the oil filler plug hole.**

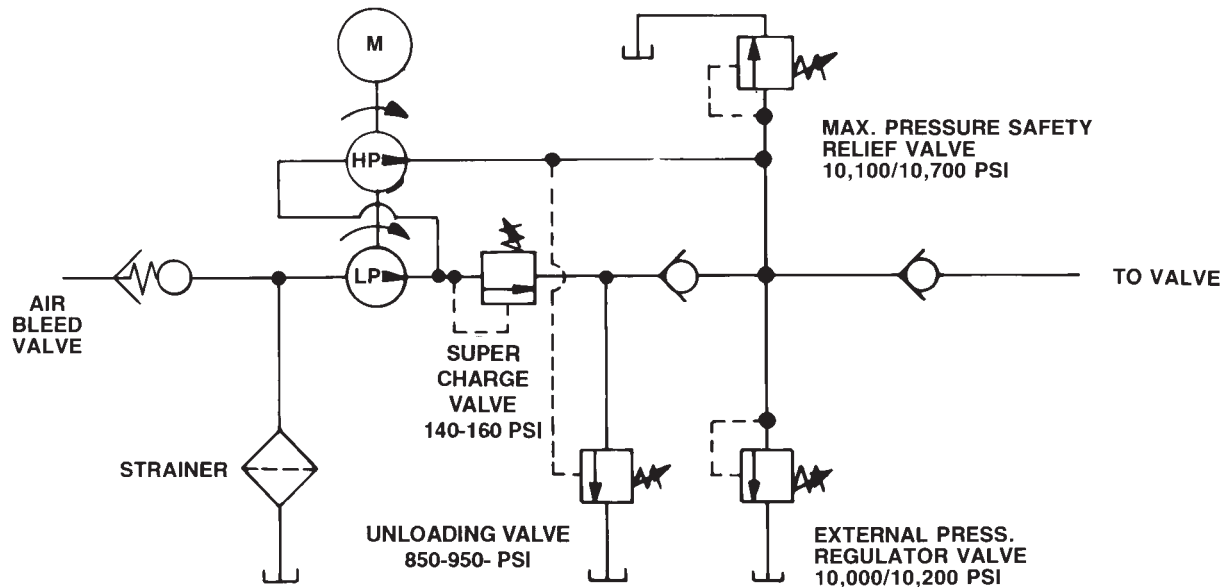
5. Run the pump for several minutes. Disconnect the motor and pump assembly, and drain and clean the inside of the reservoir.
6. Fill the reservoir with Power Team hydraulic oil. Place the pump and motor assembly (with gasket) on the reservoir with the fourteen machine screws. Tighten the machine screws securely and evenly.

### Adding Oil to the Reservoir

1. The cylinder(s) must be fully retracted, and the power supply must be disconnected when adding oil to be reservoir.
2. Clean the entire area around the filler plug. Remove the filler plug and insert a clean funnel with a filter.
3. Use only Power Team hydraulic oil (215 SSU @ 100°F). The oil level should come to within 1" of the pump cover plate with all cylinders retracted.


## TROUBLESHOOTING GUIDE

Refer to Parts List #100353 and the following hydraulic schematic when using this trouble-shooting guide.



**IMPORTANT:** Any repair work or trouble-shooting should be performed by qualified personnel familiar with this equipment. Use the proper gauges and equipment when trouble-shooting.

**NOTE:** Depending on the type of pump, it is often best to check for leaks by using a hand pump and applying pressure to the suspect area without the motor running. Watch for leaking oil and follow it back to its source.

PROBLEM	CAUSE	SOLUTION
<p><b>Motor Does Not Run</b></p> <p> <b>WARNING: Disconnect power supply before removing cover. Any electrical work should be performed by a qualified electrician.</b></p>	<ol style="list-style-type: none"> <li>1. Pump not turned to "On" position</li> <li>2. Unit is not plugged in</li> <li>3. No voltage supply</li> <li>4. Broken lead wire or defective power cord plug</li> <li>5. Defective switches</li> <li>6. Defective motor</li> <li>7. Thermal protector switch inside motor housing is open.</li> <li>8. Defective starter relay</li> </ol>	<p>Flip toggle switch to run position, push start button</p> <p>Plug in unit</p> <p>Check line voltage</p> <p>Replace defective parts</p> <p>Check switches</p> <p>Replace motor</p> <p>Wait for motor to cool before restarting</p> <p>Replace defective parts</p>
<p><b>Pump is not delivering oil or delivers only enough oil to advance cylinder(s) partially or erratically.</b></p>	<ol style="list-style-type: none"> <li>1. Oil level too low</li> <li>2. Pump needs to be primed</li> <li>3. Loose fitting coupler to cylinder</li> </ol>	<p>Fill reservoir to within 1" of filler plug with all cylinders retracted</p> <p>Prime pump</p> <p>Check quick-disconnect couplings to cylinders</p> <p>Inspect couplers to insure that they are completely coupled</p> <p>Occasionally couplers have to be replaced because the ball check does not stay open due to wear</p> <p>Bleed the system</p>



PROBLEM	CAUSE	SOLUTION	
<p><b>Pump is not delivering oil or delivers only enough oil to advance cylinder(s) partially or erratically (cont'd)</b></p>	5. Air leak in suction line	Check and tighten the suction line	
	6. Dirt in pump, or filter plugged	Pump filter should be cleaned and if necessary, pump should be dismantled and all parts inspected and cleaned	
	7. Oil is bypassing through the double-acting cylinder	By removing the cylinder and capping the hoses, the pump and valve can be checked to see if they hold pressure	
	8. Cold oil or oil is too heavy (Hydraulic oil is of a higher viscosity than necessary)	Change to lighter oil	
	9. Relief valve or low pressure unloading valve out of adjustment	Adjust as needed	
	10. Reservoir capacity is too small for the size of the cylinder(s)	Use smaller cylinder(s) or larger reservoir	
	11. Defective directional valve	Inspect all parts carefully and replace if necessary	
	12. Sheared drive shaft key(s)	Replace	
	13. Motor rotating in wrong direction	Reverse rotation	
	<p><b>Pump builds pressure but cannot maintain pressure</b></p>	1. Check to see if there are any external leaks. If no oil leakage is visible, the problem is internal. If using a double-acting cylinder, remove it from the system to insure that the leak is not in the ram	Seal leaking pipe fittings with pipe sealant
		2. To test for a leaking valve, lift the pump from the reservoir keeping filter in the oil. By removing the drain line it is possible to see the oil leaking from the valve. If the valve is not leaking, one of the internal check valves could be leaking. Refer to the note concerning checking for oil leaks at the beginning of this trouble shooting guide.	Clean, reseal or replace valve parts If the internal check valve(s) are leaking, the pump must be dismantled and the seat areas repaired, balls replaced, etc.
		3. Check for sheared key	Replace as needed
		4. Leaking pressure switch seal	Replace as needed

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PROBLEM	CAUSE	SOLUTION
<b>Pump will not build full pressure</b>	<ol style="list-style-type: none"> <li>1. Faulty pressure gauge</li> <li>2. Check for external leakage</li>   <li>3. Check the relief valve setting; check the external pressure regulator</li>   <li>4. Look for internal leakage in double-acting cylinders</li> <li>5. Check for leaks in the valve</li> <li>6. Valve seat may be damaged. Check for oil coming out the return line (2-way valve)</li> <li>7. Valve shear seals or o-rings may be damaged. Check for oil coming out the return line (3-way, 4-way)</li> <li>8. Valve rotor lapped surface may be damaged (3-way, 4-way manual valves)</li> <li>9. Inspect the pump for internal leakage</li>   <li>10. Sheared key(s)</li> <li>11. High pressure pump inlet or outlet ball checks in the pump are leaking</li> </ol>	<p>Calibrate gauge Seal any faulty pipe fitting with pipe sealant Lift the pump from the reservoir keeping the filter immersed in oil. Note the pressure reading when the relief valve begins to open up. If functioning normally, it should start to leak off at relief valve pressure.</p> <p>Remove the cylinder from the pump. If the pump builds full pressure, the cylinder is defective. Clean and reseat parts Replace the valve seat stem or reseat pump body seat</p> <p>Replace shear seals and/or o-rings in valve section</p> <p>Lap surface or replace rotor</p> <p>Same procedure as above but look for leaks around the entire inner mechanism. If there are no visible leaks, the low-to-high pressure ball check may be leaking. Remove all parts. Check the end plate body for any damage to the seat area. Clean and reseat if necessary. Inspect the ball for damage and replace if necessary, then reassemble</p>
<b>Electric motor cuts out</b>	<ol style="list-style-type: none"> <li>1. Insufficient power supply</li> <li>2. Faulty motor and/or thermal protector</li> </ol>	<p>Replace Replace</p>
<b>Cylinders will not retract</b>	<ol style="list-style-type: none"> <li>1. Check the system pressure; if the pressure is zero, the control valve is releasing pressure and the problem may be in the cylinder(s), mechanical linkage connected to cylinder(s), mechanical linkage connected to cylinder(s), or quick-disconnect couplings</li> <li>2. Defective valve</li> </ol>	<p>Check the cylinders for broken return springs and check couplers to insure that they are completely coupled. Occasionally couplers have to be replaced because one check does not stay open in the coupled position</p> <p>Test valve operation and inspect parts. Replace if necessary</p>
<b>Pump delivers excess oil pressure</b>	<ol style="list-style-type: none"> <li>1. Relief valve not properly set</li> <li>2. Check pressure gauge</li> </ol>	<p>Adjust the relief valve Calibrate gauge</p>