

**Material Safety Data Sheet
AW Hydraulic Oil ISO 46**

HMIS (US):	Health Hazard	1
	Fire Hazard	1
	Reactivity	0
	Personal Protection	8
NFPA (USA):	Health Hazard	1
	Fire Hazard	1
	Reactivity	0
	Specific Hazard	none
Rating	0	Insignificant
	1	Slight
	2	Moderate
	3	High
	4	Extreme

Section 16. Other Informations

Prepared by: SPX Fluid Power
5885 11th Street
Rockford, IL 61109, USA
Phone: 815-874-5556
Fax: 815-874-7886

Date of preparation: November, 2007

The information presented herein has been compiled from source considered to be dependable and accurate to the best of SPX Fluid Power knowledge; however, SPX Fluid Power makes no warranty whatsoever, expressed or implied, of Merchantability or Fitness for the Particular Purpose, regarding the accuracy of such data or the results to be obtained from the user thereof. SPX Fluid Power assumes no responsibility for the injury to recipient or to the third persons or for any damage to any property and recipient assumes all such risks.

Rev. 2

ANDERSON®

ANDERSON®

**SERVICE AND OPERATION MANUAL
PW115/230V-HD HYDRAULIC POWER PUMP**

**ELECTRIC
TWO-STAGE HYDRAULIC PUMP**

NOTE: Read and carefully follow these instructions. Most problems with new equipment are caused by improper operation or installation.

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 hose under pressure 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 can 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.

**HUBBELL®
Power Systems**





WARNING (cont'd)

Pump

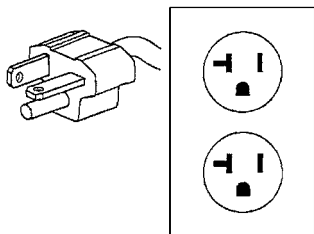
- Do not exceed the PSI hydraulic pressure rating noted on the pump nameplate or tamper with the internal high pressure relief valve. Creating pressure beyond rated capacities can result in personal injury.
- Before replenishing the oil level, retract the system to prevent overfilling the pump reservoir.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

Power Supply (Electric)

- IMPORTANT:** In order to meet certain electrical safety requirements, pumps in this series wired for 115 Volt AC 60 Hz are required to contain a 20 AMP plug as shown to the right. Plug unit into the appropriate 20 AMP electrical female receptacle. Do not modify the pump power cord or plug in any way - doing so will VOID the product warranty on any electrical components.



- Do not use an ungrounded (two-prong) extension cord with this unit.
- Avoid any conditions 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.
- Disconnect the power supply before removing the motor control box cover or performing repairs or maintenance.
- Pump must be plugged into corresponding voltage power source.
- Branch circuit must be sized properly for proper operation of pump. For best performance, plug pump into a circuit rated equal to or greater than the maximum amp rating of pump.
- If branch circuit breaker or fuse opens continuously, do not attempt to increase the power line capacity by replacing a fuse or breaker with another of higher value. Overheating of the power line and possibility of a fire will result.

Material Safety Data Sheet

Material Safety Data Sheet AW Hydraulic Oil ISO 46

Section 8. Exposure Control / Personal Protection

Engineering Controls: For normal application, special ventilation is not necessary. If user's operations generate vapors or mists, use ventilation to keep contaminants below exposure limits. Make-up air should always be supplied to balance air removed by exhaust. Have eyewash station and safety-shower close to workstation.

Personal Protection:

Eyes: Eye protection should be determined based on conditions of use. If product is used in application where splashing may occur, the use of safety goggles and/or a face shield should be considered.

Hands and Body: Wear appropriate chemically protective gloves and wear appropriate clothing to prevent skin contact.

Respiratory: NIOSH approved respirators should be used when airborne contamination is above exposure limits.

Feet: Wear appropriate footwear to prevent product from coming in contact with feet and skin.

Section 9. Physical and Chemical Properties

Appearance, Physical State: Clear, Blue, Viscous Liquid

Odor: Mild petroleum

Viscosity: 41.4 - 50.6 cSt @ 40 deg C

Flash Point: >=200 deg. C (392 deg. F)

Vapor pressure: Negligible at ambient temperature and pressure

Specific Gravity: 0.875 kg/L @ 20 deg. C (68 deg. F)

Water solubility: Insoluble in water

pH: Not applicable

Section 10. Stability and Reactivity

Stability: Stable under normal handling and storage condition

Hazardous Polymerization: Will not occur at normal working conditions.

Incompatible Substances / Conditions to Avoid:

Reactive with oxidizing agents and acids.

Decomposition Products: Combustion can yield carbon, nitrogen, sulfur, phosphorus, and zinc oxides.

Section 11. Toxicological Information

Routes of entry: Skin and eye contact, inhalation, ingestion.

Acute Lethality: Based on toxicity of components.

Acute oral toxicity (LD50): >2000 mg/kg rat.

Chronic or Other Toxic Effects.

Derma Route: Prolonged or repeated contact may cause skin irritation characterized by dermatitis or oil acne.

Inhalation Route: Negligible breathing hazard at normal temperature. Elevated temperatures or mechanical action may form vapors, mists or fumes.

Inhalation of oil mists or vapors from hot oil may cause irritation of the upper respiratory track.

Oral Route: Low toxicity.

Eye Irritation / Inflammation: Repeated or prolonged contact may cause irritation but not permanent damage.

Immunotoxicity: Not available.

Skin Sensitization: Not expected to be skin sensitizer.

Respiratory Tract Sensitization: Not expected to be respiratory tract sensitizers.

Carcinogenicity: This product is not known to contain any chemicals at reportable quantities that are listed as carcinogens by NTP, IARC, OSHA.

Other Considerations: No additional remark.

Section 12. Ecological Information

Environmental Fate: Not available.

Persistence / Bioaccumulation Potential: Not available.

BOD5 and COD: Not available.

Product of Biodegradation: Not available.

Additional Remarks: No additional remarks.

Section 13. Disposal Considerations

Waste Disposal: Spent/used waste oil may meet the requirements of a hazardous waste. Consult your local or regional authorities. Preferred waste management priorities are: (1) recycle or reprocess, (2) incinerate with energy recovery, (3) disposal at licensed waste disposal facility. Ensure that disposal or reprocessing is in compliance with government requirements and local disposal regulations.

Section 14. Transport Information

TDG Classification: Not controlled under TDG (Canada).

DOT Shipping Description: Not classified as hazardous.

Special Provisions for Transport: Not applicable

Section 15. Regulatory Information

This product is acceptable for use under the provisions of WHMIS-CPR. All components of this formulation are listed on the CEPA-DSL. (Domestic Substances List).

All components of this formulation are listed on the US EPA-TSCA Inventory.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

This product is not known to contain any chemicals at reportable quantities that are listed on the SARA 313 and 40 CFR 372.

This product is not controlled under the HCS.

Material Safety Data Sheet
AW Hydraulic Oil ISO 46
Section 1. Chemical Product and Company Identification.

Product Name: **AW Hydraulic Oil ISO 46**
 Code / Part Number: 9636, 9637, 9638, 9616, 11360, 9647
 Manufacturer: SPX Fluid Power
 5885 11th Street
 Rockford, IL 61109, USA
 Phone: 815-874-5556

CHEMTREC 24 Hr. Emergency Number: 800-424-9300

Material Use: The product designed for use in heavy duty Hydraulic fluid applications.

Validated on January, 2007

Section 2. Composition and Information on Ingredients.

Name: Hydrotreated or severely refined base oil and proprietary additives CAS#: Mixture % (V/V): 100
 Exposure Limits:
 TLV-TWA (8 hr): 5mg/cubic m (oil mist)
 STLE: 10 mg/cubic m (oil mist)
 Manufacturer Recommendation: Not applicable
 Other Exposure Limits: Consult local, state, provincial or territorial authorities for acceptable exposure limits.

Section 3. Hazardous Identification.

Potential health effects: Not irritating to slight irritation to skin and eyes with no permanent damage. Relatively non-toxic via ingestion. This product has a low vapor pressure and is not expected to present an inhalation exposure at ambient conditions. At high temperatures or mechanical actions may produce vapors or mists. Inhalation may cause irritation of the breathing passages. See section 11.

Section 4. First Aid Measures

Eye contact: Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Seek medical attention.

Skin Contact: Remove contaminated clothing – launder before reuse. Wash contaminated skin with running water and non-abrasive soap. Get medical attention if irritation develops or if product is injected under pressure into or under the skin.

Inhalation: Remove to fresh air. Get medical attention if breathing difficulty persists. If victim is not breathing, perform artificial respiration.

Ingestion: DO NOT induce vomiting. Seek medical attention.

Section 5. Fire-Fighting Measures

Flammability: May be combustive at high temperature.

Flash point: >=200 deg C (392 deg F) (COC)

Flammable Limits: Not available
 Auto-Ignition Temperature: Not available
 Fire Hazard in Presence of Various Substances: Low fire hazard. This material must be heated before ignition will occur.
 Explosion Hazards in Presence of Various Substances: Do not cut, weld, drill or pressurize empty container. Containers may explode in heat of fire. Products of Combustion: various oxides of carbon, nitrogen, sulfur, smoke and irritating vapors from incomplete combustion.
 Fire Fighting Media Instructions: NAERG96, Guide 171, Substances (low to moderate hazard). If tank, rail car or tank is involved in fire, ISOLATE for 800 meters (0.5 mile) in all directions. Shut off fuel to fire if it is possible to do without hazard. If it is not possible, withdraw from area and let fire burn out under controlled conditions. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. Cool containing vessels with water spray in order to prevent pressure build-up, auto ignition or explosion.
 Small Fire: use DRY chemicals, foam, water spray or CO2.
 Large Fire: use water spray, fog or foam. For small outdoor fires, portable fire extinguishers may be used. For all indoor fires and significant outdoor fires self-contained breathing apparatus is required. Respiratory and eye protection are required for fire fighting personnel.

Section 6. Accidental Release Measures

Material Release or Spill: NAERG96, Guide 171, Substances (low to moderate hazard). ELIMINATE ALL IGNITION SOURCES. Avoid contact. Stop leak if without risk. Contain spill. Absorb with inert absorbents. Place used absorbent in closed metal containers for later disposal or burn absorbent in suitable combustion chamber. DO NOT FLUSH TO SEWERS, STREAMS OR OTHER BODIES OF WATER. Check with applicable jurisdiction for specific disposal requirements of spilled materials and empty containers. Notify the appropriate authorities immediately.

Section 7. Handling and Storage

Handling: Avoid inhalation and skin contact especially when handling used oil. Keep away from sources of ignition. Do not reuse empty containers without commercial reconditioning. Practice good personal hygiene. Wash hands after handling oil and before eating. Launder work clothes frequently. Discard saturated leather goods.

Storage: Store in tightly closed containers in cool, dry, isolated, well-ventilated area, and away from incompatibles.

OPERATING PROCEDURE

Filling the Reservoir

NOTE: The pump has been shipped without oil in the reservoir. A high-quality, approved hydraulic oil has been shipped with the pump in a separate container. If additional oil is required, use an approved hydraulic oil only.

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

Electrical Hook-up and Operation


WARNING

To help avoid personal injury:

- All electrical work must be done by a qualified electrician.
- Disconnect the power supply before removing motor casing cover or performing repairs or maintenance.
- All voltages must be wired for counterclockwise rotation when viewed from the lead end of the motor.
- Changing the voltage on this unit is an involved, and if properly performed, hazardous procedure. Consult the manufacturer for specific information before attempting any rewiring.

1. The electric motor is a single phase, 60 cycle and can be wired at 115 or 230 volts.

OPERATING INSTRUCTIONS

Hydraulic Connections

1. Clean all the areas around the oil ports of the pump and cylinder(s).
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 outlets, and couple the hose to the cylinder.

IMPORTANT: Seal all external pipe connections with a high-quality, non-hardening thread sealant. Teflon tape can be used to seal hydraulic connections if only one layer of tape is used. Apply the tape carefully, two breads back, to prevent it from being pinched by the coupler and broken off inside the system. Any loose pieces of tape could travel through the system and obstruct the flow of oil or cause jamming of precision-fit parts.

Pump Operation

When operating the pump for the first time:

1. All valve and hose connections should be secure, and the reservoir should be filled to the proper level. Connect the power supply.
2. Activate the pump, and advance the cylinder(s) by pushing the UP button on the remote control switch. The motor shuts off when the UP button is released, and system pressure is held. Press the DOWN button or shift the manual valve to allow the cylinder(s) to retract.
3. Refer to the section titled "Bleeding Air from the System."
4. Check the oil level in the reservoir and add oil if necessary. The reservoir oil level should be within 1" of the pump cover plate.

PRESSURE REGULATING CONTROL ADJUSTMENTS

(NOTE: These options are not on all pump models.)

Adjusting the Pressure Regulating Valve

The pressure regulating valve can be adjusted to bypass oil at a given pressure while the pump 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 1,000 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 completely. Place the motor control 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.

RECOMMENDED MINIMUM WIRE SIZE-AWG (mm²) OF EXTENSION CORDS FOR ELECTRIC PUMPS

Current At Full Load (Amps)	Cord Size AWG (mm ²) 3.2 Volt Drop			
	Length of Cord			
	0-25 feet (0-8 m)	25-50 feet (8-15 m)	50-100 feet (15-30 m)	100-150 feet (30-45 m)
6	18 (.82)	16 (1.33)	14 (2.09)	12 (3.32)
8	18 (.82)	16 (1.33)	12 (3.32)	10 (5.37)
10	18 (.82)	14 (2.09)	12 (3.32)	10 (5.37)
12	16 (1.33)	14 (2.09)	10 (5.37)	8 (8.37)
14	16 (1.33)	12 (3.32)	10 (5.37)	8 (8.37)
16	16 (1.33)	12 (3.32)	10 (5.37)	8 (8.37)
18	14 (2.09)	12 (3.32)	8 (8.37)	8 (8.37)
20	14 (2.09)	12 (3.32)	8 (8.37)	6 (13.30)
22	14 (2.09)	10 (5.37)	8 (8.37)	6 (13.30)
24	14 (2.09)	10 (5.37)	8 (8.37)	6 (13.30)
26	12 (3.32)	10 (5.37)	8 (8.37)	6 (13.30)
28	12 (3.32)	10 (5.37)	6 (13.30)	4 (21.29)
30	12 (3.32)	10 (5.37)	6 (13.30)	4 (21.29)

PROBLEM	CAUSE	SOLUTION
Cylinder(s) will not retract.	<ol style="list-style-type: none"> 1. Check the system pressure; if the pressure is zero, the solenoid valve is releasing pressure and the problem may be in the cylinder, (mechanical linkage connected to cylinders), or quick-disconnect couplings. 2. Defective valve. 	<ol style="list-style-type: none"> 1. 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. 2. Check valve operation and inspect parts. Replace if necessary.
Pump delivers excess oil pressure.	<ol style="list-style-type: none"> 1. Check pressure gauge. 2. Relief valve not properly set. 	<ol style="list-style-type: none"> 1. Calibrate gauge. 2. Reset the relief valve.
Automatic valve will not build full pressure.	<ol style="list-style-type: none"> 1. Unloading pressure is too low. 2. Defective or oversize seat on automatic valve. 	<ol style="list-style-type: none"> 1. Increase unloading pressure. 2. Replace ball and seat.

Pressure Regulating Valve

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 is adjusted at a setting slightly above the pressure switch setting to compensate by releasing the pressure developed by the hydraulic pump as it "coasts" to a stop. As a result, the pressure limit requirement can be held to approximately 300 PSI.

Adjusting the Pressure Switch Setting

1. 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.
2. Release the hydraulic pressure. Run the pump to check the pressure setting and automatic shutoff of the motor. It may be necessary to make a second fine adjustment.

PREVENTIVE MAINTENANCE



WARNING

To help avoid personal injury:

- Disconnect the pump from the power source before performing maintenance or repair procedures.
- Maintenance and repairs must be performed in a dust-free area by a qualified technician.

Bleeding Air from the System

Upon initial start up or after prolonged use, air can accumulate within the hydraulic system. This entrapped air can cause the system to respond slowly or behave in an unstable manner. To remove the air, loosen a fitting that is situated higher than the rest of the fittings in the system. Run the pump until a steady flow of oil free of suspended air bubbles is observed. Tighten the fitting.

Inspecting the Hydraulic Fluid Level

Check the oil level in the reservoir periodically. The oil level should come to within 1" of the pump cover plate with all cylinders retracted. Drain, clean and replenish the reservoir with a high-quality, approved hydraulic oil yearly or more often if necessary. The frequency of oil change will depend upon the general working conditions, severity of use and overall cleanliness and care given the pump.

Maintenance Cleaning

1. Keep the outer surface of the pump as free from dirt as possible.
2. Protect all unused couplers.
3. Keep all hose connections free of dirt and grime.
4. Keep the breather hole in the filler cap clean and unobstructed at all times.
5. Equipment connected to the pump must be kept clean.
6. Use only approved hydraulic fluids in this pump. Change as recommended.

Draining and Cleaning the Reservoir

IMPORTANT: Clean the pump exterior before the pump interior is removed from the reservoir.

1. Remove the screws that fasten the motor and pump assembly to the reservoir.
IMPORTANT: Lift the pump and motor off the reservoir carefully to avoid damaging the gasket or any internal components.
2. Clean the inside of the reservoir and fill half full with clean hydraulic fluid.
3. Place the pump and motor assembly back onto the reservoir and secure with two machine screws assembled on opposite corners of the housing.
IMPORTANT: Connect a hose to the pressure port on the valve. Place the other end of the hose into the oil filler hole.
4. Run the pump for several minutes. Then disconnect the motor and pump assembly, and drain and clean the inside of the reservoir.
5. Fill the reservoir with a high-quality, approved hydraulic fluid. Place the pump and motor assembly (with gasket) on the reservoir and install all the screws. Tighten securely and evenly.

Adding Oil to the Reservoir

1. Cylinder(s) must be fully retracted and the power supply disconnected when adding oil to the reservoir.
2. Clean the entire area around the filler cap before removing the cap.
3. Use a clean funnel with filter when adding oil.
4. Use only approved hydraulic fluids.

PROBLEM	CAUSE	SOLUTION
Pump builds pressure but cannot maintain pressure.	<ol style="list-style-type: none">1. Check to see if there are any external leaks. If no oil leakage is visible, the problem is internal.2. To test for a leaking control valve, lift the pump from the reservoir but keep the filter in the oil. Remove the drain line to see if the oil is leaking from the valve. If the valve is not leaking, the internal check valve could be leaking. Refer to the note concerning checking for oil leaks at the beginning of this Troubleshooting Guide.	<ol style="list-style-type: none">1. Reseal leaking pipe fittings with pipe sealant.2. Clean, reseal or replace control valve parts. If the internal check valve is leaking, the check valve must be disassembled and the seat area repaired, poppet replaced, etc.
Pump will not build full pressure.	<ol style="list-style-type: none">1. Faulty pressure gauge.2. Check for external leakage.3. Check the relief valve setting.4. Check for leaks in the solenoid valve.5. Inspect the pump for internal leakage. Check high pressure pump inlet or outlet ball checks.6. Sheared key(s).7. Automatic valve leakage.	<ol style="list-style-type: none">1. Calibrate gauge.2. Seal any faulty pipe fitting with pipe sealant.3. Lift the pump from the reservoir but keep 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 just prior to relief valve pressure.4. Clean and reseal or replace parts.5. Same procedure as above but look for leaks around the entire inner mechanism. If there are no visible leaks, the high pressure pump subassembly may be leaking. Remove all parts. Check the valve head assembly for any damage to the seat area. Clean and reseal if necessary. Inspect for damage and replace parts if necessary, then reassemble.6. Replace after checking pump cavity for broken pieces.7. Check automatic valve seat.

PROBLEM	CAUSE	SOLUTION
Pump is not delivering oil or delivers only enough oil to advance ram(s) partially or erratically.	1. Oil level too low.	1. Fill reservoir to within 1" of filler plug with all rams retracted.
	2. Loose fitting coupler to ram.	2. Check quick-disconnect couplings to rams. Inspect couplers to insure that they are completely coupled. Occasionally couplers have to be replaced because the ball check does not stay open due to wear.
	3. Air in the system.	3. Bleed the system.
	4. Air leak in suction line.	4. Check and tighten the suction line.
	5. Dirt in pump or filter plugged.	5. Pump filter should be cleaned and, if necessary, pump should be dismantled and all parts inspected and cleaned.
	6. Cold oil or oil is too heavy (Hydraulic oil is of a higher viscosity than necessary).	6. Change to lighter oil.
	7. Relief valve or low pressure unloading valve out of adjustment.	7. Readjust as needed.
	8. Reservoir capacity is too small for the size of the ram(s) used.	8. Use smaller ram(s) or larger reservoir.
	9. Defective directional valve.	9. Inspect all parts carefully and replace if necessary.
	10. Release poppet not seating in solenoid valve.	10. Disassemble, inspect, and clean pump to remove any dirt.
	11. Sheared drive shaft key(s).	11. Replace after checking pump cavity for broken pieces.
	12. Motor rotating in wrong direction.	12. Refer to electrical schematic on motor.
	13. Vacuum in reservoir.	13. Check for plugged vent in filler plug.
	14. Low pressure pump worn.	14. Repair or replace gerotor pump.

! WARNING

The force of escaping hydraulic fluid could cause serious injury. Keep hands, face, etc. clear of any hydraulic leaks.

TROUBLESHOOTING

! WARNING

To help prevent personal injury, any repair work or troubleshooting must be done by qualified personnel familiar with this equipment.

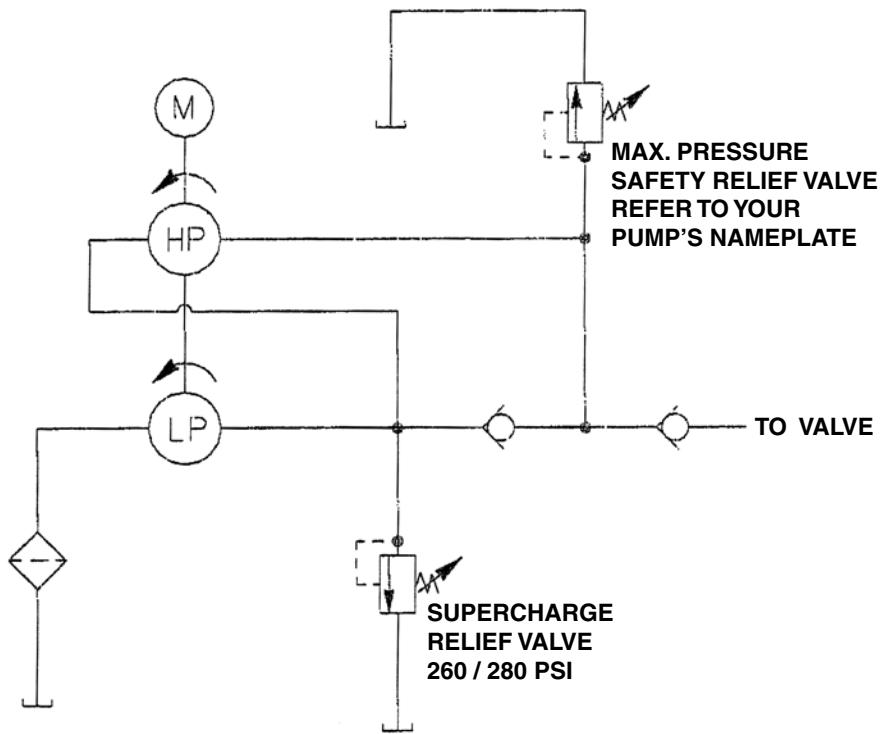
North American & International Color Codes

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

NOTE:

- Use the proper gauges and equipment when troubleshooting.
- It is 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.
- Plug the outlet ports of the pump when checking for leakage to determine if the leak is in the pump or elsewhere in the system.
- Refer to your pump's appropriate parts list and the hydraulic and electrical schematics when using this troubleshooting guide.

HYDRAULIC SCHEMATIC



PROBLEM	CAUSE	SOLUTION
Electric motor does not run.	1. Unit is not plugged in.	1. Plug in unit.
	2. No voltage supply.	2. Check line voltage. Check reset button on power panel.
	3. Broken lead wire or defective power cord plug.	3. Replace defective parts.
	4. Defective switches.	4. Replace switches.
	5. Defective started relay.	5. Replace defective parts.
	6. Defective remote switch.	6. Replace remote switch.
	7. Circuit breaker tripped because total amperage draw too high for existing circuit.	7. Add an additional circuit or use alternate circuit.
	8. Overheated motor.	8. Wait for motor to cool before restarting. Thermal protector will reset automatically, or push red reset button on tip of the motor (if so equipped).
	9. Faulty thermal protector.	9. Replace.
	10. Defective motor	10. Replace or repair motor.

! WARNING
 Disconnect power supply before removing cover. Any electrical work should be performed by a qualified electrician.