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## PQ120 Series Pump





# Table of Contents

Description . . . . .	4
Control Valves . . . . .	5
Safety Symbols and Definitions . . . . .	7
Safety Precautions . . . . .	7
Initial Setup . . . . .	11
Operating Instructions . . . . .	16
Performance Specifications . . . . .	18
General Maintenance . . . . .	19
Troubleshooting Guide . . . . .	22
Power Team Facilities . . . . .	27

# Description

*The PQ120 series hydraulic pumps are designed to have a maximum of 690 bar (10,000 psi) at a flow rate of 1966 cc/min (120 cu. in/min). A pump can be valved for use with either single- or double-acting cylinders. All pumps come fully assembled, less fluid, and ready for work.*

## PQ120 Series Pump

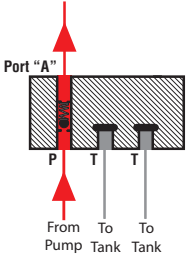
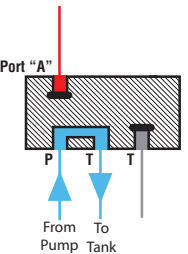
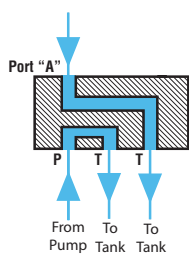
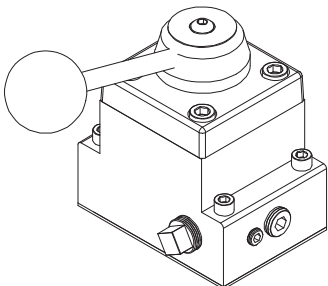
Pump prewired at factory with a 2.2kW (3hp), 460 volt, 60 Hz. 3 Phase motor. The PQ120 series also available in 230V 60 Hz or 220/380V 50 Hz.

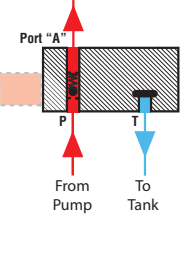
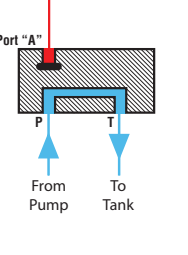
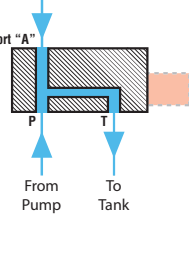
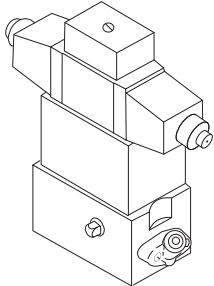


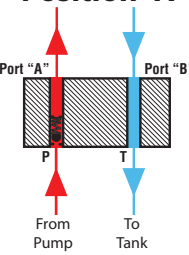
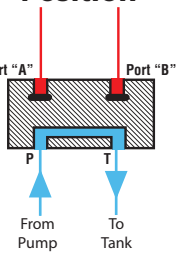
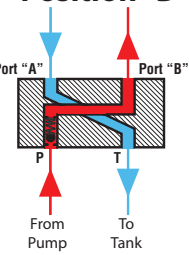
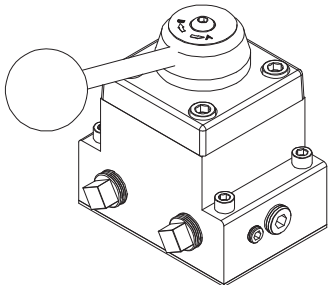
**Figure 1. PQ120 Series Pump**

# Control Valves

Max. Capacity: 690 bar (10,000 psi)

PQ1203	Valve Function	Use with Cylinder Type	Valve No.
	<p><b>POSITION "A"</b></p>  <p><b>CENTER POSITION</b></p>  <p><b>RELEASE POSITION</b></p> 	Single-acting	9520 3-way, 3-position, pump mounted, manual detented
	<b>Diagram</b>		
			

PQ1203S	Valve Function	Use with Cylinder Type	Valve No.
	<p><b>Solenoid "B" ON (Advance)</b></p>  <p><b>Solenoid "A/B" OFF (Hold)</b></p>  <p><b>Solenoid "A" ON (Return)</b></p> 	Single-acting	9599 3-way, 3-position, pump mounted, solenoid operated
	<b>Diagram</b>		
			

PQ1204	Valve Function	Use with Cylinder Type	Valve No.
	<p><b>Position "A"</b></p>  <p><b>Center Position</b></p>  <p><b>Position "B"</b></p> 	Single- and double-acting	9506 4-way, 3-position, pump mounted, manually operated
	<b>Diagram</b>		
			

# Control Valves continued

	Valve Function	Use with Cylinder Type	Valve No.
PQ1204S	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Solenoid "A"</b> <b>ON</b></p> <p>From Pump To Tank</p> </div> <div style="text-align: center;"> <p><b>Solenoid "A/B"</b> <b>OFF</b></p> <p>From Pump To Tank</p> </div> <div style="text-align: center;"> <p><b>Solenoid "B"</b> <b>ON</b></p> <p>From Pump To Tank</p> </div> </div>	Single- and double-acting	9512 4-way, 3-position, pump mounted, solenoid operated
		<b>Diagram</b>	

**Table 1. Pump Configurations**

# Safety Symbols and Definitions

The safety signal word designates the degree or level of hazard seriousness.



**DANGER:** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



**WARNING:** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



**CAUTION:** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

**CAUTION:** Used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

**IMPORTANT:** Important is used when action or lack of action can cause equipment failure, either immediate or over a long period of time.

## Safety Precautions



### WARNING:



- The following procedures must be performed by qualified, trained personnel who are familiar with this equipment. Operators must read and understand all safety precautions and operating instructions included with the pump. If the operator cannot read these instructions, operating instructions and safety precautions must be read and discussed in the operator's native language.

- These products are designed for general use in normal environments. These products are not designed for lifting and moving people, agri-food machinery, certain types of mobile machinery, or in special work environments such as: explosive, flammable, or corrosive. Only the user can decide the suitability of this product in these conditions or extreme environments. Power Team will supply information necessary to help make these decisions. Consult your nearest Power Team facility.



- Safety glasses must be worn at all time by the operator and anyone within sight of the unit. Additional personal protection equipment may include: face shield, goggles, gloves, apron, hard hat, safety shoes, and hearing protection.



- The owner of this tool must ensure that safety-related decals are installed, maintained, and replaced if they become hard to read.



- Shut OFF the motor before opening any connections in the system.
- The guide cannot cover every hazard or situation so always do the job with SAFETY FIRST.

### Pump



### WARNING:

- Do not exceed the 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.
- Retract the system before adding fluid to prevent overfilling the pump reservoir. An overfill can cause personal injury due to excess reservoir pressure created when cylinders are retracted.
- The load must be under operator control at all times.

## Safety Precautions continued

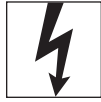
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- Do not connect pump to hydraulic system powered by another pump.

### Electric-Driven Motor



#### WARNING:



- Electrical work must be performed and tested by a qualified electrician per local directives and standards.
- Disconnect the pump from the power supply and relieve pressure before removing the motor case cover or performing maintenance or repair.
- Check the total amperage draw for the electrical circuit you will be using. *For example: Do not connect a pump that may draw 25 amps to a 20 amp fused electrical circuit.*
- Never use an ungrounded power supply with this unit.
- Changing the voltage is an involved and, if incorrectly performed, hazardous procedure. Consult the manufacturer for specific information before attempting rewiring.
- Wire pump motors for counterclockwise rotation when viewed from the shaft end of the motor.



- Do not attempt to increase the power line capacity by replacing a fuse with another fuse of higher value. Overheating the power line may result in fire.
- Exposing electric pumps to rain or water could result in an electrical hazard.
- Avoid conditions that can cause damage to the power cord, such as abrasion, crushing, sharp cutting edges, or corrosive environment. Damage to the power cord can cause an electrical hazard.

### Hoses



#### WARNING:



- Before operating the pump, tighten all hose connections using the correct tools. Do not overtighten. Connections should be only secure 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 rupture, burst, or need to be disconnected, immediately shut off the pump and shift the control valve twice to release 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, heavy impact, or extreme heat or cold. Do not allow the hose to kink, twist, curl, or bend so tightly that the fluid flow within the hose is blocked or reduced. Periodically inspect the hose for wear, because any of these conditions can damage the hose and possibly result in personal injury.
- Do not use the hose to move attached equipment. Stress can damage the hose and possibly 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 material 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 may result in personal injury.



## Safety Precautions continued

- Avoid straight line tubing connections in short runs. Straight line runs do not provide for expansion and contraction due to pressure and/or temperature changes. See diagrams in Set-up section of this form.
- Eliminate stress in the tube lines. Long tubing runs should be supported by brackets or clips. Tubes through bulkheads must have bulkhead fittings. This makes easy removal possible and helps support the tubing.
- Carefully inspect all hoses and fittings prior to use. Before each use, check entire hose for cuts, leaks, abrasion or bulging of cover, or damage or movement of couplings. If any of these conditions exist, replace the hose immediately. NEVER attempt to repair the hose.

### Cylinder



#### **DANGER:**

- Do not exceed rated capacities of the cylinders. Excess pressure may result in personal injury.
- Avoid off-center loads that could damage the cylinder and/or cause loss of the load.
- Read and understand all safety and warning decals and instructions for devices attached.
- Inspect each cylinder and coupler before each shift or usage to prevent unsafe conditions from developing.
- Do not use cylinders if they are damaged, altered or in poor condition.
- Do not use cylinders with bent or damaged couplers or damaged port threads.
- Under certain conditions, the use of an extension with a hydraulic cylinder may not be advisable and could present a dangerous condition.
- Avoid pinch points or crush points that can be created by the load or parts of the cylinder.
- To help prevent material fatigue if the cylinder is to be used in a continuous application, the load should not exceed 85% of the rated capacity or stroke.
- Cylinder must be on a stable base which is able to support the load while pushing or lifting.
- To help prevent personal injury, use shims, friction material or constraints to prevent slippage of the base or load.
- Do not set poorly-balanced or off-center loads on a cylinder.
- The load can tip or the cylinder can “kick out” and cause personal injury.
- Do not use the locking collar on a threaded piston as a stop. The threads may shear resulting in loss of the load.
- If this component is used to lift or lower loads, be certain that the load is under operator control at all times and that others are clear of the load.
- Do not drop the load.
- As the load is lifted, use blocking and cribbing to guard against a falling load.
- To help prevent personal injury, do not allow personnel to go under or work on a load before it is properly cribbed or blocked. All personnel must be clear of the load before lowering.



## Safety Precautions continued

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- **Never use extreme heat to disassemble a hydraulic cylinder or ram. Metal fatigue and/or seal damage will result and can lead to unsafe operating conditions.**

### **IMPORTANT**

- **Keep the cylinder clean at all times.**
- **While at a job site, when the cylinder is not in use, keep the piston rod fully retracted and upside down.**
- **Always use protective covers on disconnected quick couplers.**
- **When mounting cylinders or rams using the internal piston rod threads, collar threads, threaded tie rods or base mounting holes, the threads must be fully engaged. Always use SAE grade 8 or better fasteners when attaching components to cylinders or rams and tighten securely.**
- **Limiting the stroke and pressure on all cylinders will prolong their life.**

# Initial Setup

1. Remove all packing materials from the assembled unit.
2. Inspect the unit upon arrival. The carrier, not the manufacturer, is responsible for any damage resulting from shipment.

## Filling the Pump Reservoir

Most pumps are shipped without hydraulic fluid in the reservoir. Hydraulic fluid may have been shipped in a separate container, but if hydraulic fluid is needed, use only approved Power Team hydraulic fluid rated at AW 46 47 cSt @ 38°C (215 SUS @ 100°F) . If low temperature requirements are needed, use hydraulic fluid 5.1 cSt @ 100°C (451 cSt @ -40°C).

1. Clean the area around the filler cap to remove all debris. Any foreign material in the fluid 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 fluid to within 25 mm (1 in.) of the cover plate. Replace the filler cap.
4. Cycle the pump (with the cylinders attached) several times. Retract the cylinders, and check the fluid level in the pump reservoir.

## Hydraulic Connections

1. Clean the areas around the fluid ports of the pump and cylinders.
2. Inspect all threads and fittings for signs of wear or damage, replace as needed.
3. Clean all hose ends, couplers or union ends.
4. Remove the thread protectors from the hydraulic fluid outlets.
5. Connect the hose assembly to the hydraulic fluid outlet, and couple the hose to the cylinder.



**CAUTION:** To prevent personal injury from leaking hydraulic fluid, seal all hydraulic connections with a high-quality, non-hardening, pipe thread sealant.



**IMPORTANT:** Sealant tape or non hardening sealer tape can be used to seal hydraulic connections if only one layer of tape is used. Apply tape carefully, two threads back, to prevent it from being pinched by the coupler and broken off inside the system. Loose pieces of sealant could travel through the system and obstruct the flow of fluid or cause jamming of precision-fit parts.

## Electric Motor Operation

The electric motor is wired for 220/380 or 230/460 volts, 50/60Hz. Some motors can be rewired. Consult Power Team technical support.

1. Verify the valve is in the neutral or hold position.
2. Connect the motor to a power supply.

### Caution:

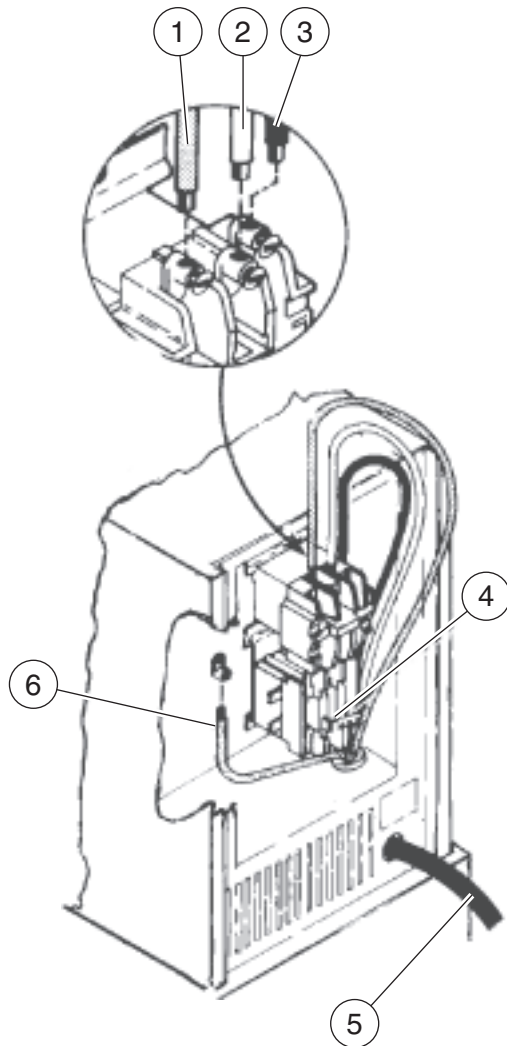
- **The correct voltage is required for the pump to operate. Verify the voltage rating on the pump motor name plate matches the outlet or power source you are using. Low voltage may cause: an overheated motor; a motor that fails to start under load; motor surging when trying to start; or a stalled motor before maximum pressure is reached.**
- **Check the voltage at the motor with the pump running at full pressure.**
- **Never run the motor on long, light gauge extension cords. Refer to Table 2. Minimum Recommended Gauge Table.**

## Initial Setup continued

AMPS at Maximum Hyd. Pressure	Electrical Cord Size AWG (mm <sup>2</sup> ) 3.2 Volt Drop Length of Electrical Cord							
	mm <sup>2</sup>				AWG			
	0-8 m	8-15 m	15-30 m	30-46 m	0-25 ft	25-50 ft	50-100 ft	100-150 ft
6	0.75	1	1.5	2.5	18	16	14	12
10	0.75	1.5	2.5	4	18	14	12	10
14	1	2.5	4	6	16	12	10	8
18	1.5	2.5	6	6	14	12	8	8
22	1.5	4	6	10	14	10	8	6
26	2.5	4	6	10	12	10	8	6
30	2.5	4	10	16	12	10	6	4

**Table 2. Minimum Recommended Gauge Table**

3. Start the pump and shift as required.
4. Turn off the pump when not in use.
5. 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.
6. When installing a power supply, use a 14 gauge, 4 strand copper electrical cable. Refer to Figure 2 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.
7. 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 latest electrical schematic in Parts List shipped with the unit or available online at <http://www.powerteam.com>.



Item	Description
1	L1
2	L2
3	L3
4	Restart Button
5	Power Supply
6	Ground (green)

**Figure 2. Power Supply**

**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.**

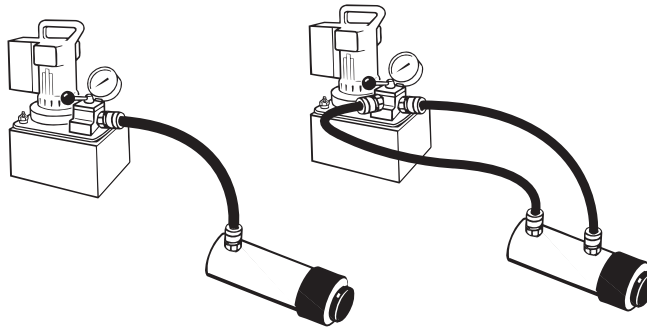
8. Consult the electrical schematic in Parts List when wiring a solenoid valve into the electrical system.
9. When overheating occurs, the thermal overload will kick out. To start the pump again when the unit has cooled, place the valve in neutral, press the Reset (red) button on the magnetic starter,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

## Initial Setup continued

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### Bleeding Air from the System

After all connections are made, the hydraulic system must be bled of any trapped air. See Figure 3. With no load on the system and the pump vented and positioned higher than the hydraulic device, cycle the system several times. Check the reservoir fluid level and fill to proper level with Power Team hydraulic fluid as necessary. If there is a problem contact the Power Team.



**Figure 3. System Bleeding**

**IMPORTANT:** Some spring return cylinders or rams have a cavity in the rod that forms an air pocket. This type of cylinder or ram should be bled when positioned upside-down or lying on its side with the port facing upward.

### Hydraulic Pressure Gauge (optional)

To install a hydraulic pressure gauge:

1. See Figure 4. Remove the pipe plug from the gauge port located on the side of the hydraulic valve.

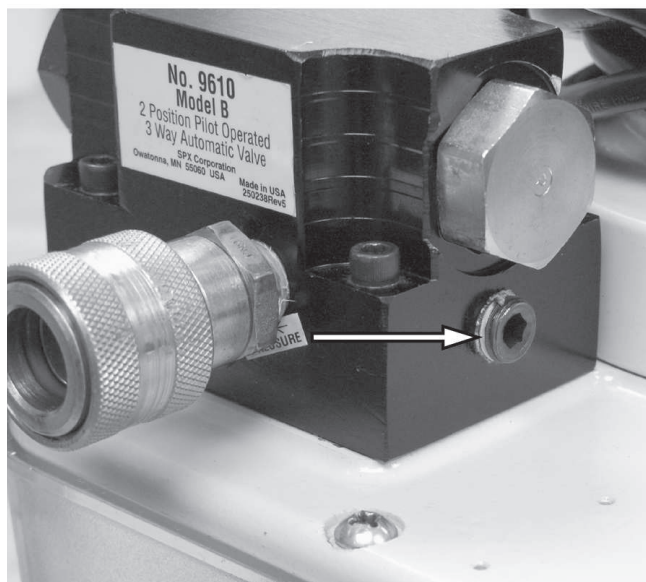


Figure 4. Gauge Port

2. See Figure 5. Install sealant tape or non hardening sealer to a 45 degree elbow (PN 9678). Install the elbow in gauge port as shown.
3. Install sealant tape or non hardening sealer to the gauge.

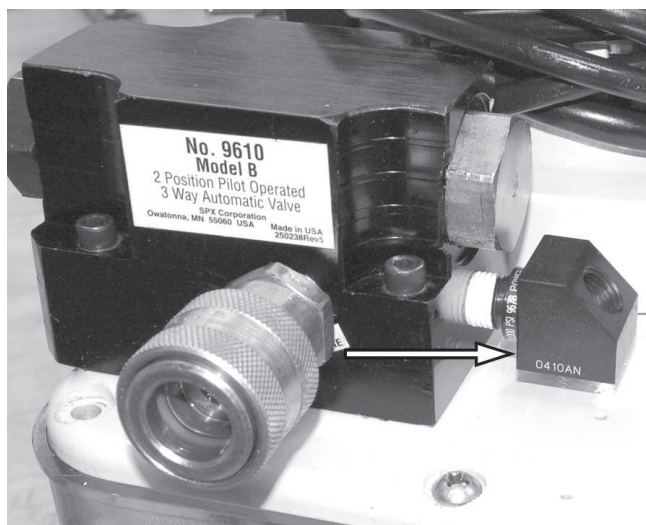


Figure 5. Elbow Installed

4. See Figure 6. Install the pressure gauge.

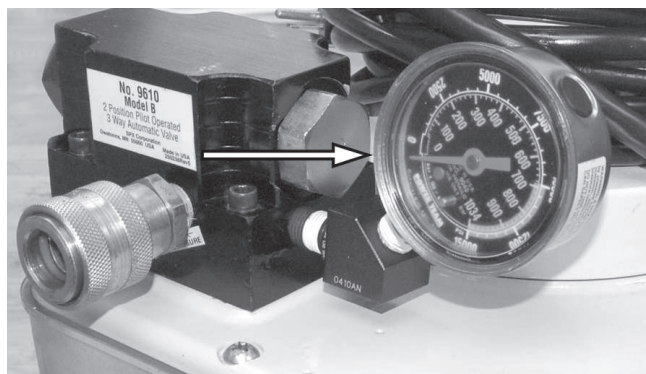


Figure 6. Gauge Installed



# Operating Instructions

## Bleeding Air from the System

1. Cycle the hydraulic system until operation is smooth and consistent.
2. Check the pump reservoir level. Add Power Team hydraulic fluid as needed.

## Operation

1. All valve and hose connections should be secure, and the reservoir should be filled to the proper hydraulic fluid level.
2. Connect the power supply.
3. With the valve in the neutral or return position, jog the pump several times using the jog switch on the pump end panel.
4. Place the switch in the run position and let the pump run at idle for two minutes.
5. 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.**

## Motor Control

See Figure 7. This remote will start and run the pump motor to advance or retract of the cylinder when released it allows the pressure to be held.

1. Press the rocker switch toward the Advance side of the switch and hold to extend the cylinder.
2. Press the rocker switch toward the Retract side of the switch and hold to retract the cylinder.
3. Release the rocker switch and the pump will stop but the system will hold.



**Figure 7. Advance-Hold-Retract Remote**

## Pressure Regulating Valve

**NOTE: For easy adjustment of the pressure regulating valve, always adjust the pressure by increasing to the desired pressure setting.**

**IMPORTANT: The pressure range is from 69-690 bar (1,000-10,000 psi) depending on the pump model.**

A pressure regulating valve can be adjusted to bypass fluid at a desired pressure setting while the pump motor continues to run.

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.

## Pressure Regulating Switch

A pressure switch can be adjusted to stop the pump motor at a desired pressure setting, and restart the

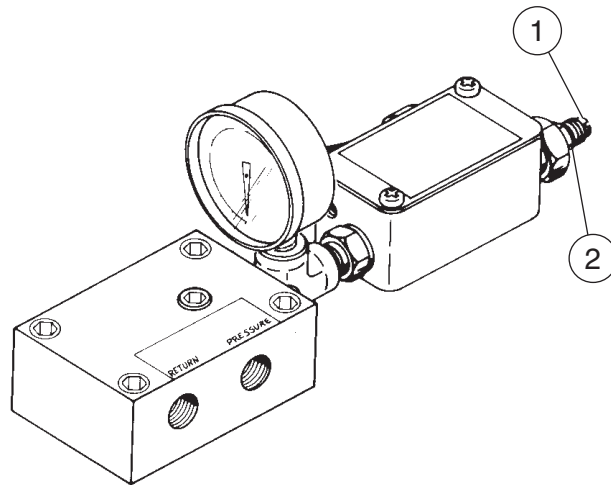


motor when the pressure falls below that setting.

It is recommended that a pressure switch be used with a pressure regulating valve to insure accuracy when setting a maximum bar (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 20 bar (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.
3. See Figure 8. 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.



Item	Description
1	Adjusting Screw
2	Locknut

**Figure 8. Manifold Pressure Switch**

# Performance Specifications

The information in the following charts can be used as a basis to determine if the system is performing as expected during operation.

Pump	RPM	Amp Draw at 690 bar (10,000 psi) (230V)	Amp Draw at 690 bar (10,000 psi) (460V)	dBa at Idle and 690 bar (10,000 psi)
PQ120	1,425–1,725	10.5	5.3	73–78

**Table 3 Drive Unit Requirements**

Pump	Max. Pressure Output bar (psi)	Fluid Delivery** (cu. in./min. @)					
		0 bar (0 psi)	7 bar (100 psi)	50 bar (700 psi)	70 bar (1,000 psi)	345 bar (5,000 psi)	690 bar (10,000 psi)
PQ120	690 bar (10,000 psi)	775	430	190	160	130	120

\*\* Typical delivery. Actual flow varies with field conditions.

**Table 4 Fluid Pressure Chart**

# General Maintenance

## WARNING:



- **Disconnect the unit from the power supply before performing maintenance or repair procedures.**
- **Repairs and maintenance are to be performed in a dust-free area by a qualified technician.**

## System Evaluation

The components of your hydraulic system — cylinders, pumps, hoses, and couplings — all must be:

- Rated for the same maximum operating pressure.
- Correctly connected.
- Compatible with the hydraulic fluid used.

A system that does not meet these requirements can fail, possibly resulting in serious injury. If you are in doubt about the components of your hydraulic system, contact Power Team Technical Support.

## Inspection

Keep a dated and signed inspection record of the equipment. Before each use, the operator or other designated personnel should visually inspect for the following conditions:

- Cracked or damaged cylinder.
- Excessive wear, bending, damage, or insufficient thread engagement.
- Leaking hydraulic fluid.
- Scored or damaged piston rod.
- Incorrectly functioning or damaged heads and caps.
- Loose bolts or cap screws.
- Damaged or incorrectly assembled accessory equipment.
- Modified, welded, or altered equipment.
- Bent or damaged couplers or port threads.

## Periodic Cleaning

 **WARNING: Contamination of the hydraulic fluid could cause the valve to malfunction. Loss of the load or personal injury could result.**

Establish a routine to keep the hydraulic system as free from debris as possible.

- Seal unused couplers with dust covers.
- Keep hose connections free of debris. Equipment attached to a cylinder must be kept clean.
- Keep the breather-hole in the filler cap clean and unobstructed.
- Use only Power Team hydraulic fluid. Replace hydraulic fluid as recommended, or sooner if the fluid becomes contaminated. Never exceed 300 hours of use between fluid changes.

## Hydraulic Fluid Level

1. Check the hydraulic fluid level in the reservoir after each 10 hours of use. The hydraulic fluid should be 25 mm (1 in.) 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 fluid. The frequency of hydraulic fluid changes will depend upon the general working conditions, severity of use, and the overall cleanliness and care given the pump.

## General Maintenance continued

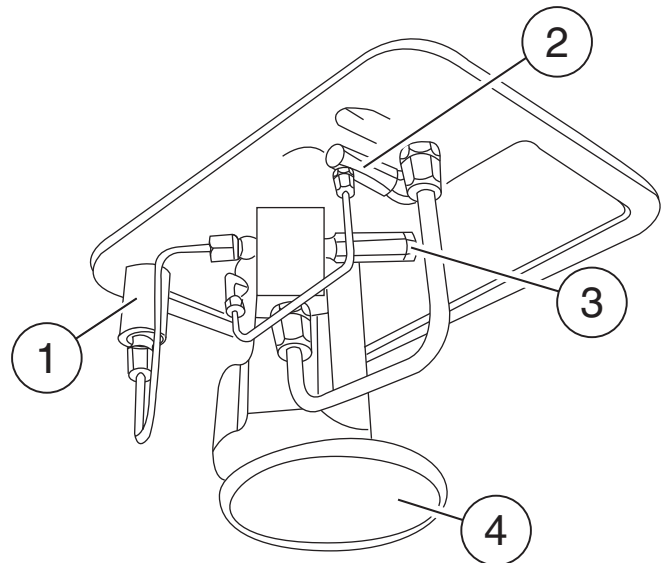
### Draining and Flushing the Reservoir

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.

**Caution: Do not damage the pump filter or pressure regulating valves when lifting the pump and motor off the reservoir. See Figure 9.**

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.



Item	Description
1	Pressure Regulating Valve
2	Accumulator (not used on all models)
3	High Pressure Relief Valve
4	Filter

**Figure 9. Pump Assembly**

**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 fluid. Place the pump and motor assembly (with gasket) on the reservoir with the fourteen machine screws. Tighten the machine screws securely and evenly.

### Adding Hydraulic Fluid to the Reservoir

1. The cylinder(s) must be fully retracted, and the power supply must be disconnected when adding hydraulic fluid 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 fluid AW 46 47 cSt @ 38°C (215 SUS @ 100°F). If low temperature requirements are needed, use hydraulic fluid 5.1 cSt @ 100°C (451 cSt @ -40°C). The fluid level should come to within 25 mm (1 in.) of the pump cover plate with all cylinders retracted.

### Sound Reduction - Electrically Powered Motor

The electrically powered hydraulic pump operates below maximum OSHA noise limitation. If further sound reduction is desired, any of the following options will help reduce the sound level.

1. Install a pressure switch to automatically shut off the motor when maximum pressure is reached (holding cycle).

2. Contact Power Team Hydraulic Technology technical support for products more suitable to your application.

### Hose Connections



**CAUTION:** To prevent personal injury from leaking hydraulic fluid, seal all hydraulic connections with a high-quality, non-hardening, pipe thread sealant.



**IMPORTANT:** Sealant tape or non-hardening sealer tape can be used to seal hydraulic connections if only one layer of tape is used. Apply tape carefully, two threads back, to prevent it from being pinched by the coupler and broken off inside the system. Loose pieces of sealant could travel through the system and obstruct the flow of fluid or cause jamming of precision-fit parts.

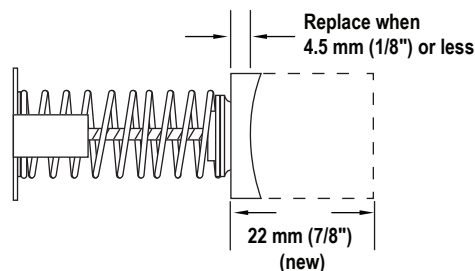
### Storage

Store the unit in a dry, well-protected area where it will not be exposed to corrosive vapors, dust, or other harmful elements. If a unit has been stored for an extended period of time, it must be thoroughly inspected before it is used.

### Checking Brushes on Universal Motors

To help prevent premature failure of the armature, check the brushes periodically:

1. Remove the metal brush cover plates.
2. Remove the brush holder caps and brush assemblies.
3. The brush assemblies must be replaced if they are 4.5 mm (1/8 in.) long or less. See Figure 10.
4. Install brush assemblies, brush holder caps, and metal brush cover plates.



**Figure 10. Brush Inspection**

# Troubleshooting Guide



## WARNING:

- Repair work or troubleshooting must be performed by qualified personnel who are familiar with this equipment.



- Disconnect the power supply before removing the electrical cover. Electrical work should be performed by a qualified electrician.



- Check for system leaks by using a hand pump to apply pressure to the suspect area. Watch for leaking fluid and follow it back to its source. Never use your hand or other body parts to check for a possible leak.

### Notes:

- For a detailed parts list or to locate a Power Team Authorized Hydraulic Service Center, contact your nearest Power Team facility.
- Plug the outlet ports of the pump when checking for leakage to determine if the leakage is in the pump, in the cylinder, or in the tool.

Problem	Cause	Solution
<b>Motor does not run.</b>	1. Pump not turned ON.	1. Flip toggle switch to run position, push start button.
	2. Unit is not plugged in.	2. Plug in unit.
	3. No voltage supply.	3. Check line voltage.
	4. Broken lead wire or defective power cord plug.	4. Replace defective parts.
	5. Defective switches.	5. Check switches.
	6. Defective motor.	6. Replace motor.
	7. Thermal protector switch inside motor housing is open.	7. Wait for motor to cool before restarting.
	8. Defective starter relay.	8. Replace defective parts.

## Troubleshooting Guide continued

Problem	Cause	Solution
<b>Pump is not delivering fluid, or delivers only enough fluid to advance connected components partially or erratically or operation to slow.</b>	1. Fluid level too low.	<i>1. Fill reservoir to within 25 mm (1 in.) of filler plug with all cylinders retracted.</i>
	2. Pump needs to be primed.	<i>2. Prime pump.</i>
	3. Loose-fitting coupler to component.	<i>3. Verify quick-disconnect couplings to cylinders are completely coupled. Couplers may need to be replaced because ball check does not stay open due to wear. Bleed the system.</i>
	4. Air leak in suction line.	<i>4. Check and tighten the suction line.</i>
	5. Debris in pump, or filter plugged.	<i>5. Pump filter should be cleaned and if necessary, pump should be dismantled and all parts inspected and cleaned .</i>
	6. Fluid bypasses through the double-acting cylinder.	<i>6. Remove cylinder; cap hoses. Check pump and valve for leaks.</i>
	7. Cold fluid or fluid too heavy. (Hydraulic fluid is of a higher viscosity than necessary.)	<i>7. Drain, flush, and refill reservoir using a lighter weight fluid. Refer to General Maintenance section.</i>
	8. External relief valve or low pressure unloading valve out of adjustment.	<i>8. Refer to Adjusting the Pressure Regulating Valve.</i>
	9. Power unit/reservoir capacity is too small for the size of the cylinder(s) used.	<i>9. Use smaller cylinder(s) or larger reservoir.</i>
	10. Defective directional valve.	<i>10. Inspect all parts carefully and replace if necessary.</i>
	11. Sheared drive shaft key(s).	<i>11. Replace.</i>
	12. Motor rotating in wrong direction.	<i>12. Reverse rotation.</i>

## Troubleshooting Guide continued

Problem	Cause	Solution
<b>Pump builds pressure but cannot maintain pressure.</b>	1. Check to see if there are any external leaks. If no fluid 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.	<i>1. Seal leaking pipe fittings with pipe sealant.</i>
	2. To test for a leaking valve, lift the pump from the reservoir keeping filter in the fluid. By removing the drain line it is possible to see the fluid 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 fluid leaks at the beginning of this troubleshooting guide.	<i>2. 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.</i>
	3. Check for sheared key.	<i>3. Replace as needed.</i>
	4. Leaking pressure switch seal.	<i>4. Replace pressure switch seal.</i>



## Troubleshooting Guide continued

Problem	Cause	Solution
<b>Pump will not build full pressure.</b>	1. Faulty pressure gauge.	<i>1. Calibrate gauge.</i>
	2. Check for external leakage.	<i>2. Seal any faulty pipe fitting with pipe sealant.</i>
	3. Check the relief valve setting; check the external pressure regulator.	<i>3. Lift the pump from the reservoir keeping the filter immersed in fluid. 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. Remove the cylinder from the pump. If the pump builds full pressure, the cylinder is defective.</i>
	4. Look for internal leakage in double-acting cylinders.	<i>4. Remove cylinder from pump. If pump builds full pressure, cylinder is defective.</i>
	5. Check for leaks in the valve.	<i>5. Clean and reseal parts.</i>
	6. Valve seat may be damaged. Check for fluid coming out the return line (2-way valve).	<i>6. Replace the valve seat stem or reseal pump body seat.</i>
	7. Valve shear seals or o-rings may be damaged. Check for fluid coming out the return line (3-way, 4-way).	<i>7. Replace shear seals and/or o-rings in valve section.</i>
	8. Valve rotor lapped surface may be damaged (3-way, 4-way manual valves).	<i>8. Lap surface or replace rotor.</i>
	9. Inspect the pump for internal leakage.	<i>9. 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 reseal if necessary. Inspect the ball for damage and replace if necessary, then reassemble.</i>
	10. Sheared key(s).	<i>10. Replace.</i>
	11. High pressure pump inlet or outlet ball checks in the pump are leaking.	<i>11. Reseat or replace valve head.</i>
<b>Electric motor cuts out.</b>	1. Insufficient power supply.	<i>1. Replace.</i>
	2. Faulty motor and/or thermal protector.	<i>2. Replace.</i>

## Troubleshooting Guide continued

Problem	Cause	Solution
<b>Cylinders will not retract.</b>	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.	<i>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.</i>
	2. Defective valve.	<i>2. Test valve operation and inspect parts. Replace if necessary.</i>
<b>Pump delivers excess fluid pressure.</b>	1 Relief valve not properly set.	<i>1. Adjust the relief valve.</i>
	2. Check pressure gauge.	<i>2. Calibrate gauge.</i>

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