Operating Instructions for:
PA60APF5 Infinity Series

SPX Bolting Systems
Unit 4, Wansbeck Business Park
Rotary Parkway
Ashington
Northumberland NE63 8QW

Tel: +44 (0) 1670 850580
Fax: +44 (0) 1670 850655

spxboltingsystems.com

CE

Original Instructions

Infinity Series
Infinite Stage Pump (ISP) Rotary Air Motor, Hydraulic Pump Model B

Form No. 1000577
Rev. 0 February 1, 2012

Form No. 1000577
Rev. 0 February 1, 2012

Table of Contents

Description

The Infinity Series, Infinite Stage Pump (ISP) hydraulic pumps are designed to have a maximum 690 bar (10,000 psi) at a flow rate of 2,000 cc/min (120 cu. in/min). All pumps come fully assembled, less, fluid, and ready for work.

Infinity Series Air/Hydraulic Pumps

Infinite Stage Pump (ISP) air/ hydraulic pump series:

- starts under full load
- is designed for continuous duty operation
- has an external pressure adjustment
- calibrated pressure gauge
- sealed hydraulic reservoir
- modular pumping cartridges
- 103 bar (1,500 psi) return side relief protection
- weight is (with fluid) 36.3 kg (80 lbs)

Figure 1. PA60APF5FP

Figure 2. PA60APF5FPR

Figure 1. PA60APF5FMPR

Control Valves

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

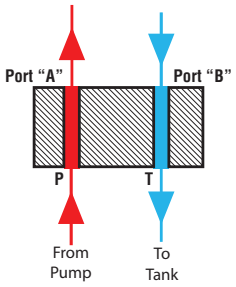
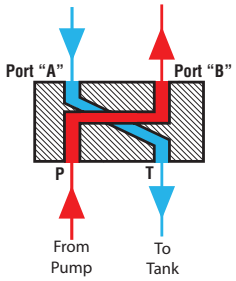
	Valve Function	Use with Cylinder Type	Valve No.
PA60APF5FP **PA60APF5FMP** **PA60APF5FPR** **PA60APF5FMPR**	**Run**  **Stop** 	Torque Wrench	3000529 4-Way 2-Position
		Diagrams	

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

Form No. 1000577
Rev. 0 February 1, 2012

Air-Driven Motor

WARNING:

- **Install a shut-off valve or quick disconnect in the air line to the motor. Close the shut-off valve before connecting the air line to the pump.**
- **Read, understand, and follow the instruction manual for the air motor.**
- **Disconnect the air supply and relieve pressure when the pump is not in use or when disconnecting any connection in the hydraulic system.**
- **The control circuit must comply with local directives and standards.**

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.**
- **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**

Form No. 1000577
Rev. 0 February 1, 2012

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.**
- **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.**
- **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.**
- **When the cylinder is not in use, keep the piston rod fully retracted.**
- **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 (237 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 debris in the hydraulic fluid 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 hydraulic fluid to 44.5–50.8 mm (1.75–2.00 in.) from the cover plate. Replace the filler cap.

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.

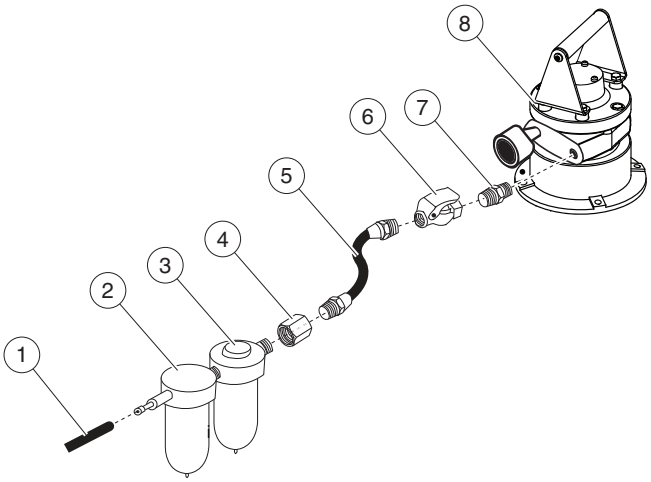
IMPORTANT: Sealant tape or non hardening sealer tape can be used to seal hydraulic connections if only one layer of tape is used. Apply tape carefully, two threads back, to prevent it from being pinched by the coupler and broken off inside the system. Loose pieces of sealant could travel through the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

Rotary Air Motor

The air supply must be minimum 1.4 M^3/min. (49 CFM) and 5.5 bar (80 psi), with 700 bar (1,000 psi) the maximum.

1. Use of an air filter/lubricator is recommended but not supplied. Air motors could be shipped with the hand control valve installed. See Figure 3 for a typical air supply connection with air filter/ lubricator assembly.

   If the pump is operated on a continuous duty cycle, or at maximum speeds for extended periods, install an automatic air line oiler in the air inlet line as close to the pumping unit as possible. Set the oiler to feed 1–3 drops of SAE No. 10 oil per minute into the system (one drop for every 1.4–2.1 M^3/min. (49–75 CFM) of air), or refer to the air motor manufacturer's instructions.
2. See Figure 3. Place the valve in the neutral or hold position.
3. See Figure 3. Couple the air motor to the air supply, and turn on the air supply valve (if provided).
4. See Figure 3. Open (or turn on) the air supply control valve at the pump (hold-to-run hand control is provided).
5. See Figure 3. Shift the pump as necessary.
6. Turn off the pump when not in use.
7. Start the pump and inspect for leaks or loose connections.
8. Operate the hydraulically driven device several times until it operates smoothly and consistently throughout the cycle.
9. Allow the pump to build pressure in the system. Stop pump and check each hose, fitting, and other system components for fluid leakage. If leakage is found, correct the problem and retest.
10. Turn off pump and check hydraulic fluid level. Add hydraulic fluid if needed.



Item	Description
1	Air Supply
2	Filter
3	Lubricator
4	Coupler
5	Hose
6	Hand Control
7	Reducing Valve
8	Air Motor

Figure 3. Typical Air System

Bleeding Air from the System

After all connections are made, the hydraulic system must be bled of any trapped air. See Figure 5. 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.

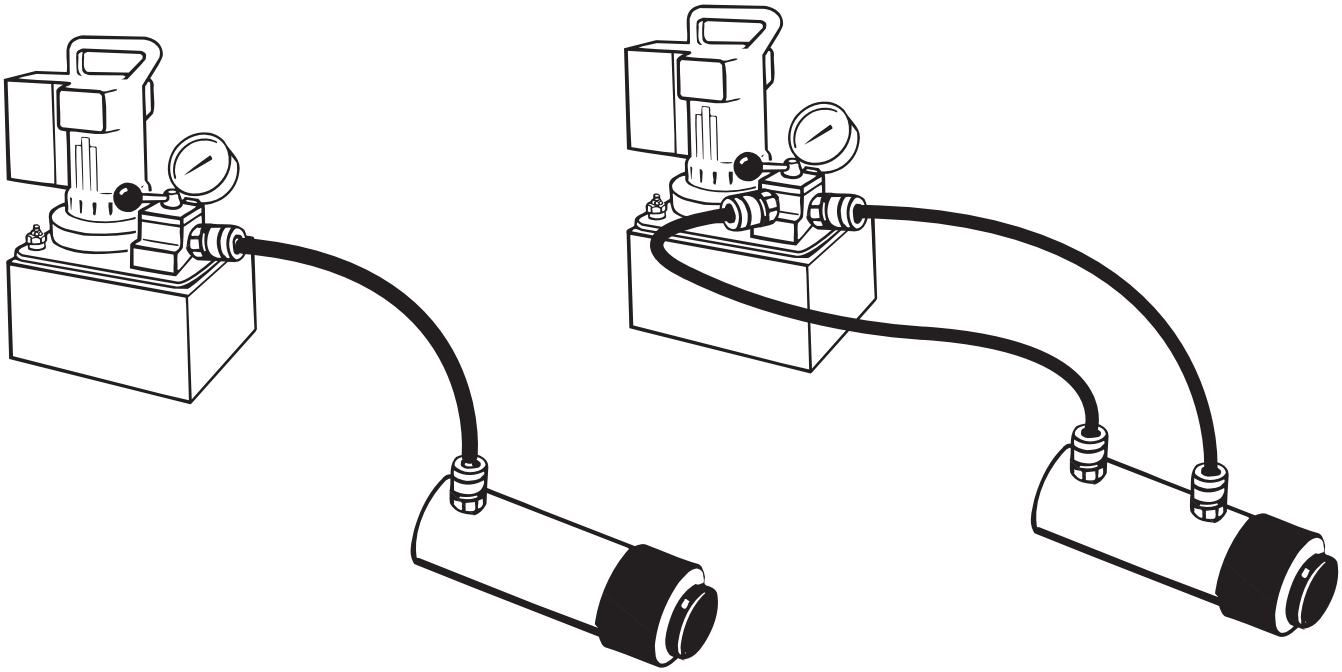


Figure 5. System Bleeding

IMPORTANT: Some spring return cylinders or rams have a cavity in the rod which 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.

Form No. 1000577
Rev. 0 February 1, 2012

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.

Air Motor Operation

Connect the air supply line. The remote hand control has two momentary push buttons, advance and retract, with spring offset to hold. Press push buttons accordingly.

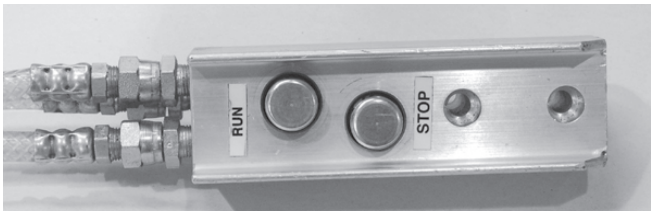


Figure 6. Air Pendant Control

Adjusting the Pressure Regulating Valve

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

1. The pump must be completely connected.
2. See Figure 7. Turn adjustment knob counter-clockwise to decrease the setting to a lower than desired pressure.
3. Using the pendant, operate the pump motor to apply pressure to the system.
4. Slowly turn the adjusting knob in a clockwise direction. This gradually increases the pressure setting until the desired pressure is reached.

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

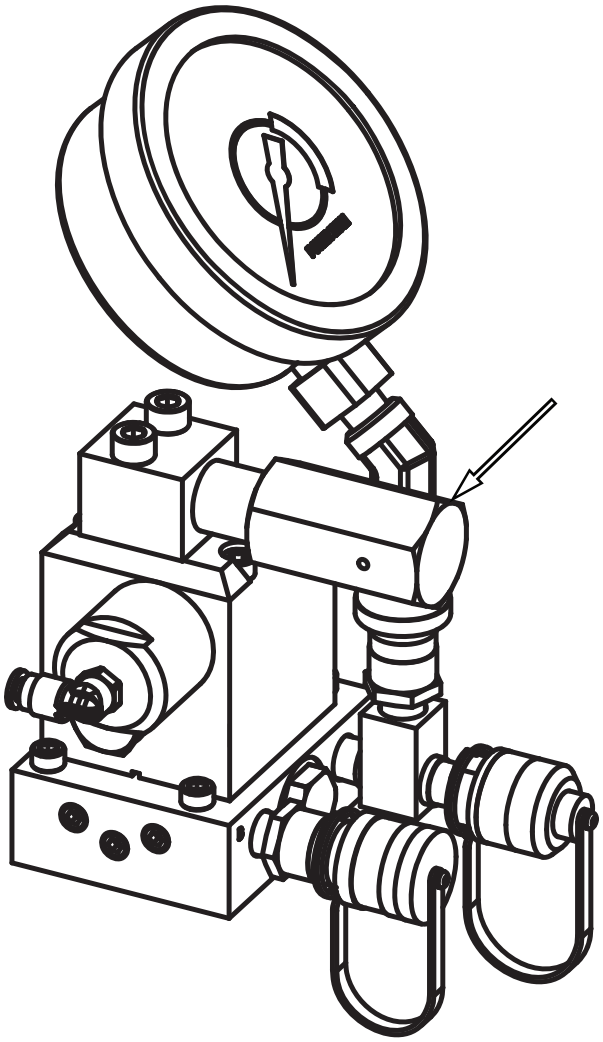


Figure 7. Adjustment Knob

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	FLUID DELIVERY** (CU.IN./MIN @)			
	BAR (750 PSI)	BAR (2500 PSI)	BAR (5000 PSI)	BAR (10,000 PSI)
@ 7 bar (100 cfm)	9.4 L/min (575 cu. in./min)	3.8 L/min (233 cu. in./min)	1.9 L/min (155 cu. in./min)	0.9 L/min (57 cu.in./min)
@ 6 bar (90 cfm)	9.3 L/min (567 cu. in./min)	3.7 L/min (225 cu. in./min)	1.8 L/min (111 cu. in./min)	0.9 L/min (55 cu. in./min)
@ 5.5 bar (80 cfm)	8.9 L/min (541 cu. in./min)	3.4 L/min (211 cu. in./min)	1.7 L/m (102 cu. in./min)	0.8 L/min (46 cu. in./min)
**Maximum Hydraulic Pressure Output 690 bar (10,000 psi) Sound Level 75 dB A				

Table 2. PA60 Pump Technical Specifications

General Maintenance

System Evaluation

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.**

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

Hand 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, or damage.
- Leaking hydraulic fluid.
- Scored or damaged piston rod.
- 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 fluid level in the reservoir after each 10 hours of use. Proper fluid level is indicated by the “fill line” when all wrenches are retracted. This is typically 44.5–50.8 mm (1.75–2.00 in.) from the top of fill hole.
2. Drain, flush, and refill the reservoir with approved, high-grade hydraulic fluid after approximately every 300 hours of use. The frequency of fluid changes will depend upon the general working conditions, severity of use, and overall cleanliness and care given the pump. Fluid should be

changed more frequently when the system is not operated regularly indoors.

Draining and Flushing the Reservoir

Clean the pump exterior before the pump interior is removed from the reservoir. Remove and discard the screws fastening 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 12.

Clean the inside of the reservoir, and fill with Power Team hydraulic fluid. Rinse the filter clean.

Place the pump and motor assembly back onto the reservoir, and secure with two machine screws assembled on opposite corners of the housing.

Refer to priming procedure. Place the hydraulic flow control valve in the neutral position. 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 fluid filler plug hole.

Run the pump for several minutes.

Disconnect the motor and pump assembly, and drain and clean the inside of the reservoir.

Fill the reservoir with Power Team hydraulic fluid.

Place the pump and motor assembly (with new gasket) on the reservoir, and thread the new screws.

Tighten screws securely and evenly.

There are roll cages and carry handles that are shown on the front page that will need to be addressed before you can remove the screws that fasten the pump assembly to the tank.....

Lubrication (Air Driven Motor Only)

If the pump is operated on a continuous duty cycle, or at maximum speeds for extended periods, install an automatic air line oiler in the air inlet line as close to the pumping unit as possible. Set the oiler to feed 1–3 drops of SAE No. 10 oil per minute into the system (one drop for every 1.4–2.1 M^3/min. (49–75 CFM) of air), or refer to the air motor manufacturer's instructions.

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.

Form No. 1000577
Rev. 0 February 1, 2012

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
Air motor does not run **To help prevent personal injury, disconnect power supply before removing components.**	1. Pump not turned ON.	*1. Push air supply button to "ON" position.*
	2. Air supply is not plugged in.	*2. Plug in unit to air supply.*
	3. No air in the supply.	*3. Check air supply.*
	4. Broken air lines or leaks in air lines.	*4. Replace defective parts.*
	5. Defective switches.	*5. Check switches.*
	6. Defective motor.	*6. Repair or replace motor.*
	7. Defective remote switch.	*7. Repair or replace remote controls.*
Pump builds pressure but cannot maintain pressure.	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 wrench, remove it from the system to ensure that the leak is not in the wrench.	*1. Seal leaking pipe fittings with pipe sealant. Internal leaks must be examined and repaired at a service center.*
	2. Leaking pressure regulator seal.	*2. Repair or replace seal.*
	3. Control valve seal or spool leaks	*3. Fluid leak at base is observed coming from small square opening. Service is required at a Power Team center.*

Form No. 1000577
Rev. 0 February 1, 2012

Problem	Cause	Solution
Pump is not delivering fluid or delivers only enough fluid to advance wrench(s) partially or erratically.	1. Fluid level too low.	*1. Fill reservoir to 44.5–50.8 mm (1.75–2.00 in.) from top of filler hole with wrench retracted.*
	2. Loose-fitting coupler to wrench.	*2. Check quick-disconnect couplings to wrench. Inspect couplers to ensure 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 system.	*3. Bleed the system.*
	4. Air leak in suction line.	*4. Check and tighten suction line.*
	5. Debris in pump or filter plugged.	*5. Pump filter should be cleaned and, if necessary, pump cartridges should be dismantled and all parts inspected and cleaned.*
	6. Hydraulic fluid is bypassing through the double-acting wrench.	*6. By removing the wrench and capping the hoses, the pump and valve can be checked. Observe if pump holds pressure.*
	7. Cold hydraulic fluid or hydraulic fluid too heavy (Hydraulic fluid is of a higher viscosity than necessary).	*7. Change to a lighter hydraulic fluid.*
	8. Relief valve or low pressure unloading valve out of adjustment.	*8. Adjust as needed.*
	9. Reservoir capacity is too small for the size of the wrench(s) used.	*9. Use smaller wrench(s) or larger reservoir.*
	10. Defective directional valve.	*10. Inspect all parts carefully and replace if necessary.*
	11. Motor rotating in wrong direction.	*11. Air motor: Air line connected into wrong port.*
	12. Vacuum in reservoir.	*12. Check for plugged vent in filler plug.*
Pump delivers excess fluid pressure.	1. Faulty pressure gauge.	*1. Calibrate or replace gauge.*
	2. Relief valve not properly set.	*2. Adjust the relief valve.*

Form No. 1000577
Rev. 0 February 1, 2012

Troubleshooting Guide continued

Problem	Cause	Solution
Pump will not build full pressure.	1. Faulty pressure gauge.	*1. Calibrate or replace gauge.*
	2. External leakage.	*2. Seal faulty pipe fitting with pipe sealant. O-rings in couplers are leaking.*
	3. External pressure regulator.	*3. Replace adjustable pressure regulator valve.*
	4. Relief valve setting. Contaminate in RV check valve.	*4. Adjust the relief valve setting to 10.4 KSI to 10.8 KSI.- requires cleaning.*
	5. Internal leakage in double-acting wrench.	*5. Remove the wrench from the pump. If the pump builds full pressure, the wrench is defective.*
	6. Leaks in the flow control valve.	*6. Clean and reseat or replace parts.*
	7. Pump has internal leakage. Check high pressure pump inlet or outlet ball checks. The inlet check spring on the cartridge may be dislocated.	*7. Same procedure as above, but look for leaks around the entire inner mechanism. If there are no visible leaks, verify inlet check ball seats correctly (may require service center).*
	8. Snap ring dislocated on pump shaft.	*8. Remove motor to gain access to pump shaft snap ring. Align drive pin, compress spring and install snap ring.*
	9. Sheared key(s).	*9. Replace key.*
	10. Inadequate air pressure (air motor only).	*10. Increase air pressure.*
	11. O-ring on pilot body is compromised. (4-6 KSI max)	*11. Replace both O-rings on pilot body.*
	12. Control valve seal or spool leaks.	*12. Fluid leak at base is observed coming from small square opening. Service is required at a Power Team center.*
Wrench will not retract.	1. Check the system pressure; if the pressure is zero, the control valve is releasing pressure and the problem may be in the wrench, mechanical linkage connected to wrench(s), or quick-disconnect couplings.	*1. Check the wrench for broken return springs, and check couplers to ensure that they are completely coupled. Occasionally couplers have to be replaced because one check does not stay open in the coupled position.*
	2. Defective valve.	*2. Check valve operation and inspect parts. Replace if necessary.*
	3. Inadequate air pressure (air motor model only).	*3. Increase air pressure.*

Power Team Facilities

UNITED STATES
SPX Hydraulic Technologies
5885 11th Street
Rockford, IL 61109-3699
USA
Telephone:1-815-874-5556
FAX: 1-815-874-7853

Cust. Service/Order Entry
Tel: 1-800-541-1418
FAX: 1-800-288-7031
E-mail:
info@powerteam.com

Technical Services
Tel: 1-800-477-8326
FAX: 1-800-765-8326

CHINA
No. 1568 Hua Shan Road
International Park Center
Shanghai 200052, China
Tel: 86 (21) 2208-5888
FAX: 86 (21) 2208-5682
E-mail
infochina@powerteam.com

FAR EAST
7 Gul Circle
Singapore 629563
Singapore
Tel: (65) 6265-3343
FAX: (65) 6265-6646
E-mail:
infoasia@powerteam.com

EUROPE
Albert Thijsstraat 12
6471 WX Eygelshoven
The Netherlands
Tel: 31 (45) 5678877
FAX: 31 (45) 5678878
E-mail
infoeurope@powerteam.com

For more information, Internet address: http://www.spxboltingsystems.com

Form No. 1000577
Rev. 0 February 1, 2012