

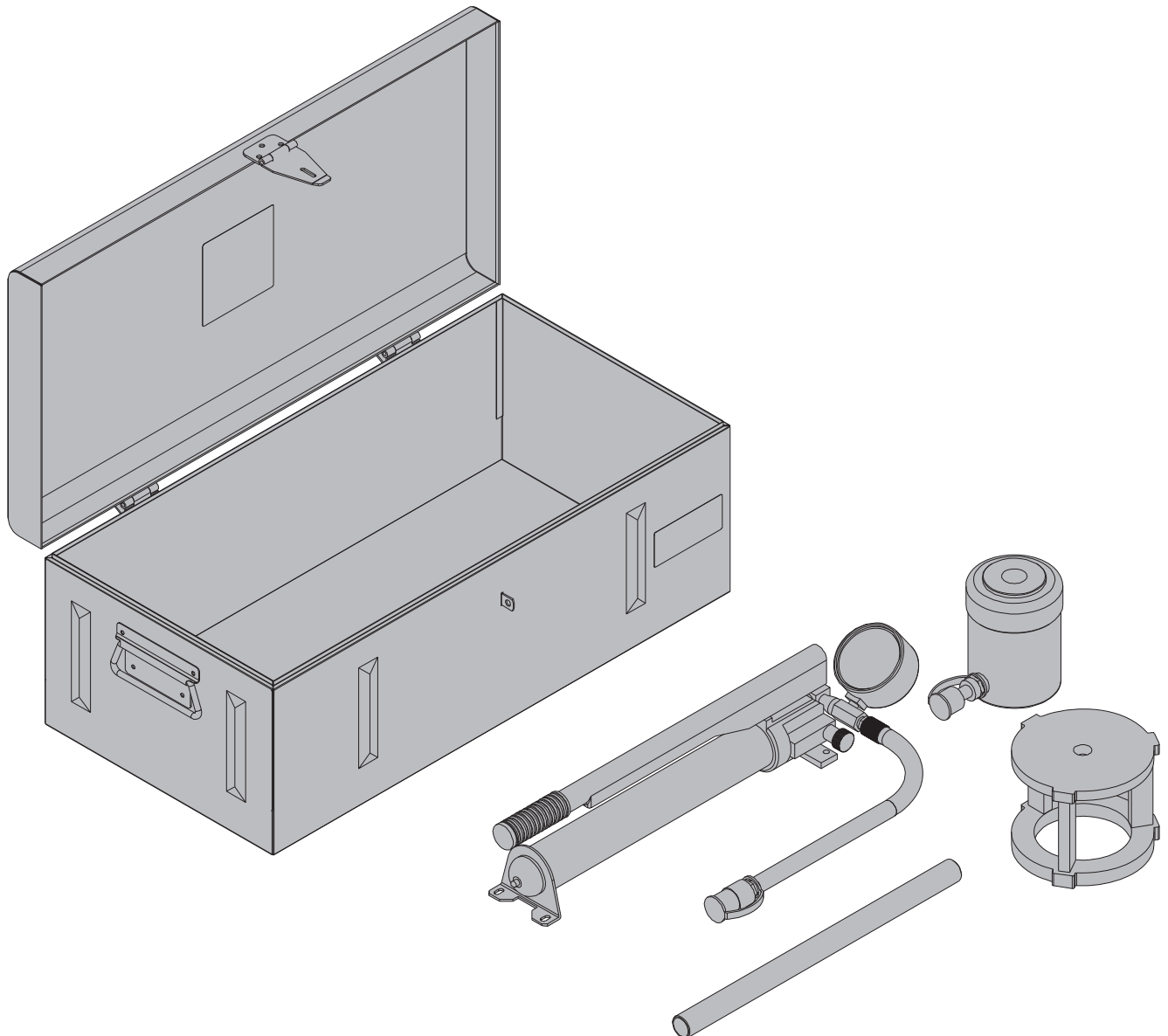
The Formwork Experts.

# Tensioning instrument 300kN / Tensioning instrument B

Art.n°: 581815000, 580570000

## Original Operating Instructions

Please retain for future reference





62072 (See P159)  
62087 (See P55)  
64122 (See P55)  
64215 (See P59)  
64372 (See P55)  
66463 (See P59)  
64662 (See P157)  
64663 (See P157)  
201338-TID (See P12)

P12 SERIES  
P19 SERIES  
P23 SERIES  
P30F SERIES  
P55 SERIES  
P59 SERIES  
P59F SERIES  
P157 SERIES  
P157D SERIES

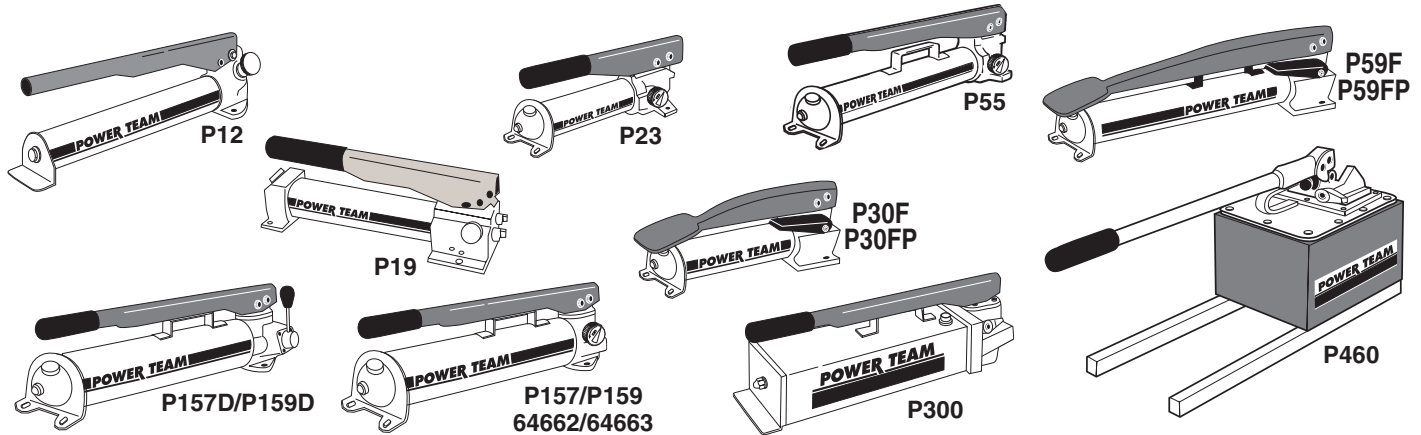
P159 SERIES  
P159D SERIES  
P300 SERIES  
P300D SERIES  
P460 SERIES  
YM-01 (See P19)

## SINGLE-STAGE AND TWO-STAGE HYDRAULIC HAND PUMP

Max. Pressure: See Pump Data Plate

**Definition:** A hydraulic hand pump delivers hydraulic fluid under pressure by directly applied manual effort.

*Note: Illustrations depict general pump configurations.*



For Use With	Order No.	Volume & Pressure					Handle or Foot Lever Effort		Reservoir				Product Weight		
		Stage	Volume per Stroke		Maximum Pressure		lbs.	kg	Type	Oil Capacity		Usable Oil Capacity		lbs.	kg.
			In. <sup>3</sup>	cm <sup>3</sup>	psi	bar				In. <sup>3</sup>	cm <sup>3</sup>	In. <sup>3</sup>	cm <sup>3</sup>		
Single-Acting Cylinders (Pump includes 2-Way Valve)	P12	1	0.069	1.1	10000	700	75	34.0	A	12	197	9	148	5.7	2.6
	P19	1	0.305	5	325	22	8.5	3.8	B	24.4	400	20	328	6.6	3
		2	0.091	1.5	10000	700	98.5	44.7							
	P23	1	0.160	2.6	3000	200	70	31.8	B	23.8	390	20.3	333	12.0	5.4
	P30F	1	0.216	3.5	325	22	125	56.7	B	31	508	27	443	10.0	4.5
		2	0.054	0.9	10000	700									
	P30FP	1	0.216	3.5	325	22	125	56.7	B	31	508	27	443	10.0	4.5
		pop-off	0.054	0.9	10000	700									
	P55	1	0.160	2.6	10000	700	145	65.8	B	55	901	45	738	15.8	7.2
		2	0.160	2.6	10000	700									
	P59	1	0.662	10.8	325	22	145	65.8	B	55	901	45	738	17.2	7.8
		2	0.160	2.6	10000	700									
	P59F	1	0.550	9.0	325	22	120	54.5	B	55	901	45	738	14.0	6.4
		2	0.130	2.1	10000	700									
P59FP	1	0.550	9.0	325	22	145	65.8	B	55	901	45	738	14.0	6.4	
	pop-off	0.130	2.1	10000	700										
P157	1	0.650	10.7	1400	97	140	63.5	B	152	2491	137	2245	26.0	11.8	
	2	0.160	2.6	10000	700										
P159	1	2.600	42.6	325	22	140	63.5	B	152	2491	137	2245	26.0	11.8	
	2	0.160	2.6	10000	700										
P300	1	2.600	42.6	325	22	140	63.5	C	1.5 gal.	5.7 l	310	5081	55.3	25.1	
	2	0.160	2.6	10000	700										
P460	1	7.350	120.5	325	22	90	40.8	D	2.5 gal.	9.5 l	460	7539	54.9	24.9	
	2	0.294	4.6	10000	700										
Double-Acting Cylinders	P157D	1	0.650	10.7	1400	97	140	63.5	B	152	2491	137	2245	28.8	13.1
		2	0.160	2.6	10000	700									
P159D	1	2.600	42.6	325	22	140	63.5	B	152	2491	137	2245	27.9	12.7	
	2	0.160	2.6	10000	700										
P300D	1	2.600	42.6	325	22	140	63.5	C	1.5 gal.	5.7 l	310	5081	57.0	25.9	
	2	0.160	2.6	10000	700										
P460D	1	7.350	120.5	325	22	90	40.8	D	2.5 gal.	9.5 l	460	7539	57.9	26.3	
	2	0.294	4.6	10000	700										

3/8 NPTF oil port(s) on all pumps

Table 1

## SAFETY EXPLANATIONS

Two safety symbols are used to identify any action or lack of action that can cause personal injury. Your reading and understanding of these safety symbols is very important.



**DANGER** - Danger is used only when your action or lack of action will cause serious human injury or death.



**WARNING** - Warning is used to describe any action or lack of action where a serious injury can occur.

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

### Pictogram Definition



Do not remove this component. For service only. Pressure must be released.



**WARNING:** It is the operator's responsibility to read and understand the following safety statements,

- Only qualified operators should install, operate, adjust, maintain, clean, repair, or transport this machinery.
- These components are designed for general use in normal environments. These components are not specifically designed for lifting and moving people, agri-food machinery, certain types of mobile machinery or special work environments such as: explosive, flammable or corrosive. Only the user can decide the suitability of this machinery in these conditions or extreme environments. Power Team will supply information necessary to help make these decisions.
- Do not use equipment if damaged, altered, or in poor condition.
- All safety decals must be replaced when unreadable.

These instructions are intended for end-user application needs. Most problems with new equipment are caused by improper operation or installation. Detailed service repair instructions or parts lists can be obtained from your nearest Power Team facility.

## SAFETY PRECAUTIONS



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

- Before operating the pump, all hose connections must be tightened with the proper tools. Do not overtighten. Connections need only be tightened securely and leak-free. Overtightening may 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 any potential hazard such as fire, extreme heat or cold, sharp surfaces, heavy impact. 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 result in personal injury.
- Do not use the hose to move attached equipment. Stress may damage the hose and cause personal injury.
- Hose material and coupler seals must be compatible with the hydraulic fluid used. Hoses also must not come in contact with corrosive materials such as creosote-impregnated objects and some paints. Consult the manufacturer before painting a hose. Never paint the couplers. Hose deterioration due to corrosive materials may result in personal injury.
- All components in the hydraulic system must match the maximum pressure rating of the pump.

### Pump

- Do not exceed the PSI rating noted on the pump nameplate or tamper with internal high pressure relief valve. Creating pressure beyond rated capacities may result in personal injury.
- Before adding hydraulic fluid, retract the system to prevent overfilling the pump reservoir. An overflow may cause personal injury due to excess reservoir pressure created when cylinders are retracted.
- The load must be under operator control at all times.
- Do not connect pump to hydraulic system powered by another pump.

### Cylinder

- Do not exceed rated capacities of the cylinders. Excess pressure may result in personal injury.
- Do not set poorly-balanced or off-center loads on a cylinder. The load may tip and cause personal injury.
- Stay clear of lifted loads and keep others away.
- Extensions are not recommended for lifting applications.

## SET-UP

### Hydraulic Connections

**IMPORTANT:** Seal all hydraulic connections with a high grade, nonhardening thread sealant. Teflon tape may also be used to seal hydraulic connections if only one layer of tape is used. Apply the tape carefully, two threads back, to prevent it from being pinched by the coupler and broken off inside the pipe end. Any loose pieces of tape could travel through the system and obstruct the flow of fluid or cause jamming of precision-fit parts.

1. Clean all areas around the fluid ports of the pump and cylinder. Clean all hose ends, couplers, and union ends. Remove thread protectors from the hydraulic fluid outlets, and connect the hose assembly. Couple hose to cylinder.
2. The use of a hydraulic pressure or tonnage gauge (not included) is strongly recommended. Remove the pipe plug from the gauge port of the valve, thread the gauge into this port and seal as noted above.



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

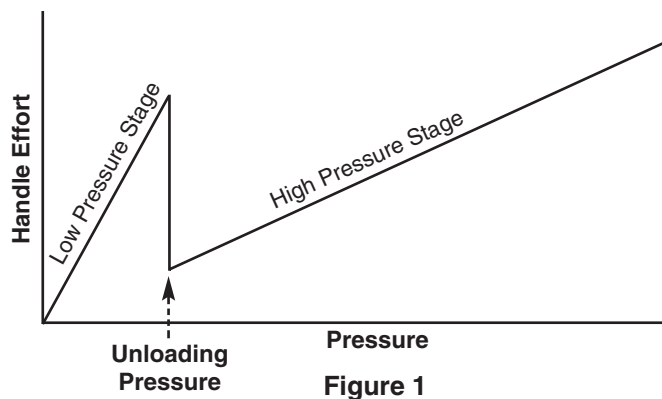
- The gauge must have the same pressure rating as the pump and cylinder. Personal injury can result if the wrong gauge is used.
- Release hydraulic pressure **BEFORE** removing or tightening hose couplings.

## OPERATION

The P460 can be operated only in the horizontal position. All other hand pumps can be operated in a horizontal position or in a vertical position with head pointing downward.

Refer to Table 1 and your pump name plate to determine your style of pump.

**IMPORTANT:** Figure 1 illustrates the *normal* drop of handle effort experienced when all (except P59) two-stage pumps shift from low pressure stage to high pressure stage.



### Two-way Valve

Pumps with a two-way valve are for use with single-acting cylinders.

1. To extend the cylinder, turn the valve knob counterclockwise to a closed (seated) position. **Note: Hand tight only!** Work the pump handle up and down to build pressure.
2. To release pressure, open the valve slowly by turning the knob clockwise to control the load.

### Four-way Valve

Pumps with a three-position, four-way valve are for use with double-acting cylinders. The hose connection for extending a cylinder can be made to either port. With the handle in the forward position, the fluid is directed to the top fluid port. To maintain (hold) pressure, stop the pumping action. When the valve handle is in the center position, fluid flow is blocked to both ports.



**WARNING:** The operator should always release the pressure slowly.

## PREVENTIVE MAINTENANCE

**IMPORTANT:** Any repair or servicing that requires dismantling the pump must be performed in a dirt-free environment by a qualified technician.



### Lubrication

Apply lubricant regularly to all pivot and rubbing points.

Use a good grade of No. 10 motor oil or grease. Do not use dry lubricants.

### Bleeding Air From the System

Air can accumulate in the hydraulic system during the initial set-up or after prolonged use, causing the cylinder to respond slowly or in an unstable manner. To remove the air:

1. Position the cylinder at a lower level than the pump, and turn the cylinder rod end down.
2. Extend and retract the cylinder several times without putting a load on the system. Air will be released into the pump reservoir. Follow the fluid level instructions for your reservoir type to release the air from the reservoir and top off the fluid supply.

### Bleeding Air From The Pump

When the pump is first put into use, or after refilling the pump's reservoir it may be necessary to bleed any trapped air from the pump. If this is not done the pump will not function properly (will not build pressure or has very spongy operation).

To bleed air from the pump, turn the pressure control knob counterclockwise (CCW) and operate the pump handle up and down approximately twenty times. Turn the pressure control knob clockwise (CW) to its full stop position. The pump should now be bled of air and ready to use.

## PREVENTIVE MAINTENANCE -CONTINUED

### Hydraulic Fluid Level

**! WARNING:** Cylinder(s) must be fully retracted before checking the fluid level. Release all system pressure before breaking any hydraulic connection in the system.

Check the hydraulic fluid level in the reservoir periodically. Use a funnel with a filter to add hydraulic fluid if needed.

Refer to Table 1 for your reservoir type.

**For models with Reservoir Type A:** Place the pump in a vertical position with the pump head facing upward. Unscrew and remove the pump head from the reservoir. The fluid level within the reservoir should come to the fluid level mark indicated on the reservoir body decal. Before replacing the pump head, visually inspect the o-ring which seals the pump head/reservoir assembly. Replace this o-ring if it is worn or damaged. Reinstall pump head to reservoir and tighten securely. Check for leaks.

**For models with Reservoir Type B:** Remove the filler cap. The fluid level should come to the bottom edge of the filler hole when the pump is level and resting horizontally on its base and the cylinders are retracted (see Figure 2).

**For models with Reservoir Type C:** Remove the filler cap. The fluid level should be 1/2 inch (12.7 mm) from the filler hole when the pump is level and resting horizontally on its base and the cylinders are retracted.

**IMPORTANT:** The pump sight gauge indicates the presence of hydraulic fluid only. It does not determine correct fluid level.

**For models with Reservoir Type D:** Remove the filler cap. The fluid level should be 1/2 inch (12.7 mm) from the cover plate when the pump is level and resting horizontally on its base and the cylinders are retracted.

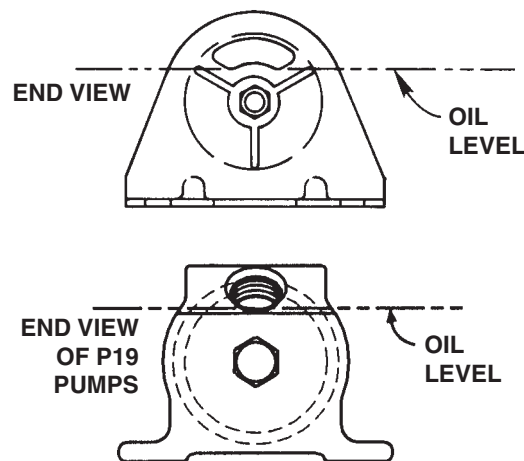


Figure 2

### Draining And Flushing The Reservoir

Drain, clean and replenish the reservoir with high-grade, approved Power Team hydraulic fluid yearly or more often if necessary. The frequency of fluid change will depend upon the general working conditions, severity of use and overall cleanliness and care given the pump.

**IMPORTANT:** Clean the exterior of the pump first. After draining and flushing the reservoir, drain and clean the other hydraulic system components (hoses, cylinders, etc.) before connecting them to the pump again. This will help prevent contaminated fluid from entering the pump.

Refer to Table 1 for your reservoir type.

#### For models with Reservoir Type A:

1. Unthread and separate the pump head from the reservoir. Drain the reservoir of the used hydraulic fluid.
2. Flush out reservoir with a small amount of clean hydraulic fluid. Clean the pump intake filter.

**IMPORTANT:** Removing the filter from the pump assembly could result in its breakage. Attempt to clean it as well as possible with it installed.

3. Refill the reservoir and reassemble the pump head to the reservoir. Tighten securely. Check for leaks.

#### For models with Reservoir Type B & C:

1. Remove the filler cap. Drain the hydraulic fluid through filler hole.
2. Remove the nut from the tie rod. Separate the reservoir from the pump body. Clean the reservoir and filter.

**IMPORTANT:** Removing the filter from the pump assembly could result in its breakage. Attempt to clean it as well as possible with it installed.

3. Reassemble and fill the reservoir with Power Team hydraulic fluid. Replace the filler cap.

#### For models with Reservoir Type D:

1. Remove the ten screws fastening the reservoir cover to the reservoir, and lift the pump and valve assemblies off.
2. Drain all hydraulic fluid and flush reservoir with a small amount of clean hydraulic fluid.
3. Remove the pump assembly filter, rinse it clean, and reassemble.
4. Refill the reservoir with Power Team hydraulic fluid. Place the pump and valve assembly (with gasket) on the reservoir, and thread the ten screws. Tighten securely and evenly.

## TROUBLESHOOTING GUIDE



**WARNING:** To help prevent personal injury, always release pump pressure and disconnect hoses(s) from pump before making repairs.

Refer to the appropriate pump parts list during trouble-shooting. Repairs must be performed in a dirt-free environment by qualified personnel familiar with this equipment.

PROBLEM	CAUSE	SOLUTION
<b>Pump losing pressure</b>	<ol style="list-style-type: none"> <li>1. System components leaking</li> <li>2. Directional control valve leaks or not adjusted properly</li> <li>3. Fluid leaking past outlet check seat(s)</li> </ol>	<ol style="list-style-type: none"> <li>1. Repair or replace as necessary</li> <li>2.* Reseat, repair, or replace directional control assembly and correctly adjust</li> <li>3.* Check for dirt. Reseat pump body and/or replace poppet(s) or ball(s)</li> </ol>
<b>Handle rises after each stroke</b>	<ol style="list-style-type: none"> <li>1. Fluid leaking past outlet check seat(s)</li> </ol>	<ol style="list-style-type: none"> <li>1.* Check for dirt. Reseat pump body and/or replace poppet(s) or ball(s)</li> </ol>
<b>Pump not delivering fluid</b>	<ol style="list-style-type: none"> <li>1. Low fluid level in reservoir</li> <li>2. Intake filter is dirty</li> <li>3. Seats worn and not seating properly</li> </ol>	<ol style="list-style-type: none"> <li>1. Check fluid level per instructions</li> <li>2. Remove reservoir and clean</li> <li>3.* Repair seats or replace pump body</li> </ol>
<b>Pump does not reach full pressure</b>	<ol style="list-style-type: none"> <li>1. Low fluid level in reservoir</li> <li>2. System components leaking</li> <li>3. Directional control valve leaks or not adjusted properly</li> <li>4. Improperly adjusted relief valve</li> <li>5. Fluid leaking past inlet or outlet checks or high pressure piston seal damaged</li> </ol>	<ol style="list-style-type: none"> <li>1. Check fluid level per instructions</li> <li>2. Repair or replace as necessary</li> <li>3.* Reseat, repair, or replace directional control assembly and correctly adjust</li> <li>4.* Readjust</li> <li>5.* Reseat or repair inlet or outlet checks or replace high pressure piston seal</li> </ol>
<b>Pump handle can be pushed down (slowly) without raising the load</b>	<ol style="list-style-type: none"> <li>1. Inlet checks are not seating</li> <li>2. Damaged piston assembly or piston seals leaking</li> </ol>	<ol style="list-style-type: none"> <li>1.* Check for dirt and/or reseat valve seats</li> <li>2.* Replace piston assembly and/or piston seals</li> </ol>
<b>Pump handle operates with a spongy action</b>	<ol style="list-style-type: none"> <li>1. Air trapped in system</li> <li>2. Too much fluid in reservoir</li> </ol>	<ol style="list-style-type: none"> <li>1. Position cylinder lower than pump. Extend and return cylinder several times. Follow bleeding instructions.</li> <li>2. Check fluid level per instructions</li> </ol>
<b>Pump handle effort drops significantly after some pressure has been obtained</b>	<ol style="list-style-type: none"> <li>1. This is normal operation on most two-stage hand pumps</li> </ol>	

\*Power Team recommends these hand pump repairs be performed by an Authorized Hydraulic Service Center.

## POWER TEAM FACILITIES



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## HYDRAULIC CYLINDERS

All cylinders are marked with maximum pressure setting

**NOTE:** For a detailed parts list or to locate a Power Team Authorized Hydraulic Service Center, contact your nearest Power Team facility. A list of all Power Team facilities is located at the end of this document.

### DEFINITIONS

**Authorized** - appointed by a duly constituted administrative or regulatory authority.

**Authorized Service Center** - independent service facility designated by the manufacturer to repair and test products.

**Cylinders, Rams, and Jacks** - used to apply force in a linear motion through the use of hydraulic fluid under pressure confined in a pressure vessel (body) with moveable pressure vessel (piston).

**Designated** - selected by the employer or employer's representative as being qualified to perform specific duties.

**Extension** - a device to increase the cylinder's, ram's or jack's retracted length.

**Load** - the total weight or force to be overcome by the cylinder, ram or jack.

**Qualified** - a person who, by possession of a recognized degree, certificate, professional standing or who by extensive knowledge, training and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter or work, or who is filled or suited for a given purpose or function. Competent.

**Operator** - a person qualified to operate or use a device or machine.

**Rated Capacity** - the maximum load for which the cylinder, ram, or jack is designed and built.

**Service, Normal** - cylinders, rams or jacks used under controlled or known consistent loads at less than 85% of rated capacity except for isolated instances.

**Service, Severe** - cylinders, rams or jacks used under conditions not rated as normal service.

**Travel** - linear extending or retracting movement of the cylinder, ram or jack.

### SAFETY EXPLANATIONS

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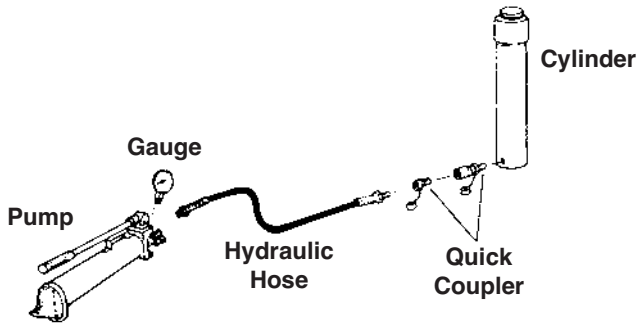
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## SINGLE-ACTING HYDRAULIC SYSTEMS

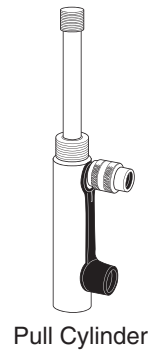
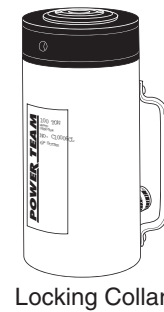
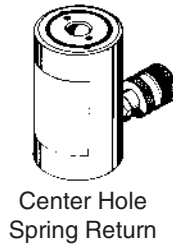
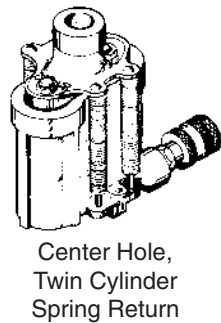
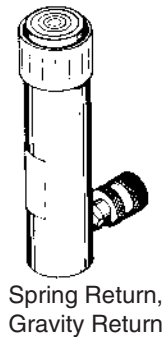
A basic single-acting hydraulic system consists of a manual or power pump that moves the hydraulic fluid, a hydraulic hose that carries the fluid, and a cylinder or ram that the fluid moves to do a job.

### TYPICAL INSTALLATION



Since the single-acting cylinders have only one hose going to the cylinder, the cylinder can only apply force to extend (pull cylinders retract) its rod. The return stroke is accomplished by gravity or spring force.

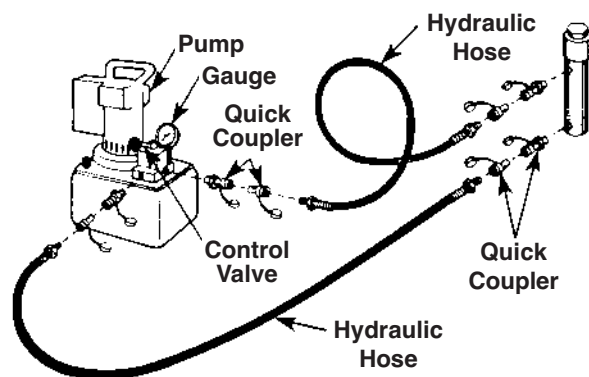
### VARIOUS TYPES OF SINGLE-ACTING CYLINDERS



## DOUBLE-ACTING HYDRAULIC SYSTEMS

A basic double-acting hydraulic system consists of a pump (which moves the hydraulic fluid), a double-acting cylinder or ram (to do the work), a hydraulic hose (which routes the fluid to the advance cylinder or ram port), a second hydraulic hose (which routes the fluid to the retract cylinder or ram port), and a control valve which can change the direction of the hydraulic fluid.

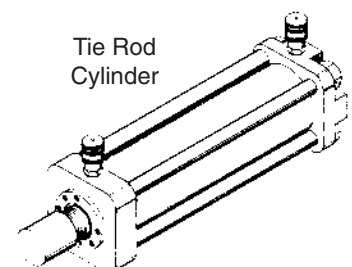
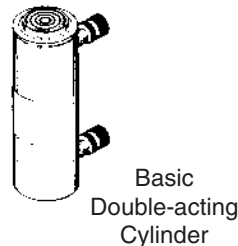
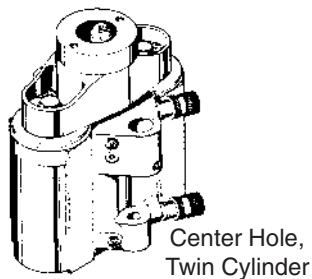
### TYPICAL INSTALLATION



A double-acting cylinder or ram can be either extended or retracted hydraulically.

Most double-acting cylinders or rams are classed as "differential cylinders" because of the different sized areas that the hydraulic fluid pushes against during the extend and retract strokes. Because of this difference, the extend stroke can exert more force than the retract stroke.

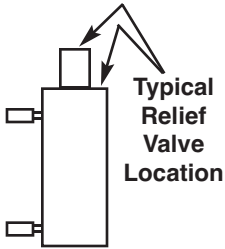
### VARIOUS TYPES OF DOUBLE-ACTING CYLINDERS



**NOTE:** The capacity of a hydraulic system is determined by the effective area of the cylinder and the system pressure.

## SAFETY PRECAUTIONS


**DANGER**

- A double-acting cylinder or ram must have both hoses and all couplers securely connected to both ports. If one of the two ports is restricted or becomes disconnected, pressure will build and the cylinder, hose or coupler can burst, possibly causing serious injury or death.
  - When extending double-acting cylinders or rams, the retract port must not be restricted. A restricted retract port will prevent pressure from being released and the cylinder can burst, possibly causing serious injury or death.
  - DO NOT attempt to adjust or service the rod end relief valve on a double-acting cylinder or ram. If oil leakage is detected from this relief valve, discontinue use of the cylinder or ram immediately and contact your nearest Authorized Hydraulic Service Center. If improperly adjusted, the cylinder or ram could develop excessive pressure and cause the cylinder, hose or couplers to burst which could cause serious injury or death.
- 
- When extending a cylinder or ram under load, always insure that the coupler(s) or port thread(s) has (have) not been damaged or do(es) not come in contact with any rigid obstruction. If this condition does occur, the coupler's attaching threads may become stripped or pulled from the cylinder or ram resulting in the instantaneous release of high pressure hydraulic fluid, flying objects, and loss of the load. All of these possible results could cause serious injury or death.
  - When using a center-hole cylinder or ram, always support the base against a rigid, flat surface at least 75% as large as the cylinder or ram base. Failure to do so can damage the center standpipe resulting in the instantaneous release of high pressure hydraulic fluid and loss of load which can possibly cause serious injury or death.
  - Avoid off-center loads which could damage the cylinder or ram and/or cause loss of the load, possibly causing serious injury or death.
  - Control the load at all times. Do not drop the load. Especially on locking collar cylinders or rams because the threads may shear and cause loss of the load.
  - Properly rated adapters must be installed and used correctly for each application.
  - Cylinders with weep hole stroke limiters will expel high pressure oil through the bleed hole to the atmosphere if extended beyond the visual maximum stroke indication. If this occurs, seals must be replaced.


**WARNING**

- All WARNING statements must be carefully observed to help prevent personal injury.

**Hydraulic Hoses and Fluid Transmission Lines**

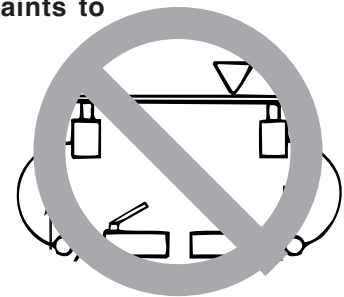
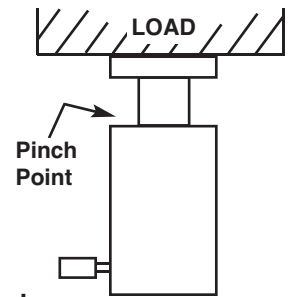
- Avoid straight line tubing connections in short runs. Straight line runs do not provide for expansion and contraction due to pressure and/or temperature changes. See diagrams in Set-up section of this form.
- Eliminate stress in the tube lines. Long tubing runs should be supported by brackets or clips. Tubes through bulkheads must have bulkhead fittings. This makes easy removal possible and helps support the tubing.
- 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.

## SAFETY PRECAUTIONS (CONTINUED)

- Should a hydraulic hose ever rupture, burst, or need to be disconnected, immediately shut off the pump and release all pressure. Never attempt to grasp a leaking pressurized hose with your hands. The force of escaping hydraulic fluid could cause serious injury.
- Do not subject the hose to potential hazard such as fire, sharp surfaces, extreme heat or cold, or heavy impact. Do not allow the hose to kink, twist, curl, crush, cut, 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.
- 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.
- 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 materials such as creosote-impregnated objects and some paints. Hose deterioration due to corrosive materials can result in personal injury. Consult the manufacturer before painting a hose. Never paint a coupler.

### Cylinder

- The user must be a qualified operator familiar with the correct operation, maintenance, and use of the cylinder(s). Lack of knowledge in any of these areas can lead to personal injury.
- Read and understand all safety and warning decals and instructions.
- Use only approved accessories and approved hydraulic fluid. Hoses, seals and all components used in a system must be compatible with the hydraulic fluid used.
- Do not exceed the rated capacities of the cylinders. Excess pressure can result in personal injury.
- 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.
- The RT1004 cylinder has an internal stroke limiting device which may be damaged by sudden movement of the piston rods. If damage is suspected, have the stroke limiting plunger and spring inspected/replaced by a qualified person.
- 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
- Do not create an uneven fulcrum and lever condition or overload condition where force exerted by one cylinder on a lever will intensify downward force on a pressure-checked cylinder at the other end of the lever. *For example: If straightening an axle as illustrated, when cylinder A extends, and uneven fulcrum and lever condition will intensify force downward on pressure-checked cylinder B. The pressure created in cylinder B will be increased to dangerously high levels.*
- 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.



## SAFETY PRECAUTIONS (CONTINUED)

- 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.
- 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.
- Use extreme caution when disassembling a spring return cylinder. All springs can store energy which can be released suddenly and cause personal injury. Mechanically restrain the gland nut or end cap when disassembling any compressed or extended cylinders which have an internally compressed spring. Consult the parts list to determine the type of spring loading. Observe all warnings and cautions.
- The guide cannot cover every hazard or situation so always do the job with SAFETY FIRST.

### 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.
- Use an approved, high-grade pipe thread sealant to seal all hydraulic connections. Teflon tape can be used if only one layer of tape is used and it is applied carefully (two threads back) to prevent the tape from being pinched by the coupler and broken off inside the pipe end. Any loose pieces of tape could travel through the system and obstruct the flow of fluid or cause jamming of precision-fit parts.
- 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 on spring return cylinders will prolong spring life.
- Limiting the stroke and pressure on all cylinders will prolong their life.

## INTRODUCTION

These instructions are written to help you, the user, more effectively use and maintain your single-acting or double-acting cylinders and rams. If any questions, please call your nearest Power Team facility (see listing).

**NOTE: For a detailed parts list or to locate a Power Team Authorized Hydraulic Service Center, contact your nearest Power Team facility. A list of all Power Team facilities is located at the end of this document.**

Some of the information included in these instructions was selected from A.N.S.I. B30.1 and applies to the construction, installation, operation, inspection and maintenance of hydraulic cylinders. It is strongly recommended that you read A.N.S.I. B30.1 to answer any questions not covered in these instructions. The complete A.N.S.I. B30.1 standard which contains additional information can be obtained at a nominal cost from the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th, New York, New York 10017.

An inspection checklist (Form No. 105503) is available on request from your nearest Power Team facility.

## SYSTEM EVALUATION

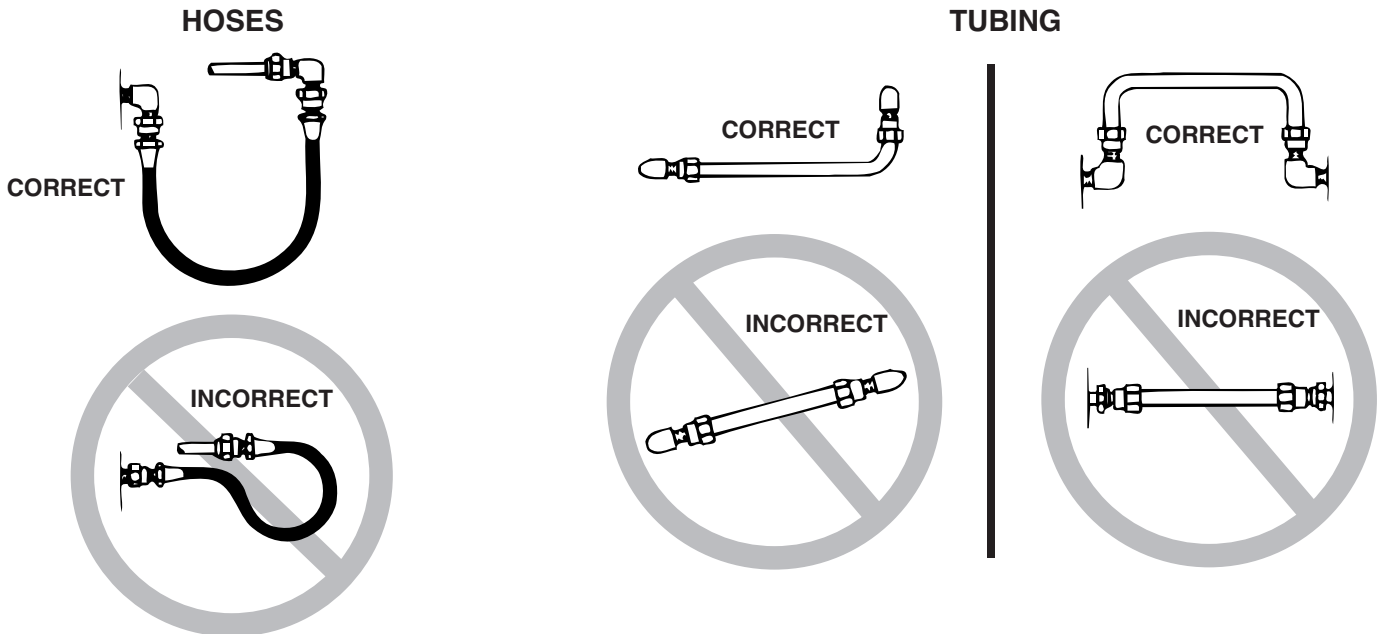
Your cylinder, hose(s), couplings and pump all must be rated for the same maximum operating pressure, correctly connected and compatible with the hydraulic fluid used. An improperly matched system can cause the system to fail and possibly cause serious injury. If you are in doubt, consult your nearest Power Team facility.

## SET-UP

### HYDRAULIC CONNECTIONS

Remove the thread protectors or dust covers from the hydraulic ports if applicable. Clean the areas around the fluid ports of the pump and cylinder. Inspect all threads and fittings for signs of wear or damage, and replace as needed. Clean all hose ends, couplers and union ends. Connect all hose assemblies to the pump and cylinder. Use an approved, high-grade pipe sealant (such as Power Team HTS50) to seal all hydraulic connections. Tighten securely and leak-free but do not overtighten.

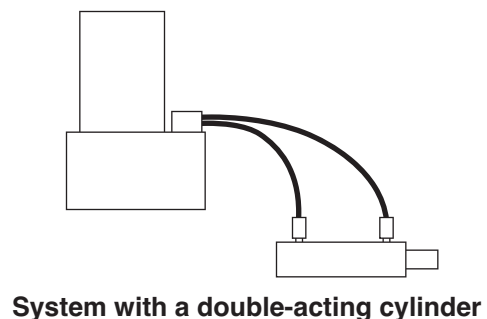
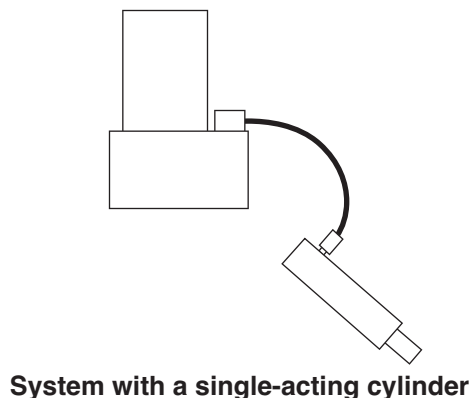
Hydraulic lines and fittings can act as restrictors as the cylinder or ram retracts. The restricting or slowing of the fluid flow causes back pressure that slows the cylinder's or ram's return. Return speed also varies because of the application, condition of the cylinder or ram, inside diameter of hose or fitting, length of the hose, and the temperature and viscosity of the hydraulic fluid.



### BLEEDING THE SYSTEM

After all connections are made, the hydraulic system must be bled of any trapped air. Refer to the diagrams below.

With no load on the system and the pump vented and positioned higher than the cylinder or ram, cycle the system several times. If you are in doubt about venting your pump, read the operating instructions for your pump. Check the reservoir for possible low fluid level and fill to proper level with approved, compatible hydraulic fluid as necessary.



**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.

## SET-UP (CONTINUED)

### INSPECTION

Before each use, visually inspect for the following items:

1. Cracked or damaged cylinder
2. Excessive wear, bending, damage, or insufficient thread engagement
3. Leaking hydraulic fluid
4. Scored or damaged piston rod
5. Improperly functioning swivel heads and caps
6. Loose bolts
7. Damaged or improperly assembled accessory equipment
8. Modified, welded, or altered equipment
9. Bent or damaged couplers or port threads

**Preventive Maintenance** (yearly or sooner, if the cylinder or ram condition suggests damage) - Visual examination by the operator or other designated personnel with a dated and signed equipment record.

## RAM AND CYLINDER MAINTENANCE

- Always use clean, approved hydraulic fluid and change as needed.
- Any exposed threads (male or female) must be cleaned and lubricated regularly, and protected from damage.
- If a cylinder or ram has been exposed to rain, snow, sand, grit-laden air, or any corrosive environment it must be cleaned, lubricated, and protected immediately after exposure.

### PERIODIC CLEANING

A routine should be established to keep the hydraulic system as free from dirt as possible. All unused couplers must be sealed with dust covers. All hose connections must be free of dirt and grime. Any equipment attached to the cylinder must be kept clean. Use only Power Team hydraulic fluid and change as recommended or sooner if the fluid becomes contaminated (never exceed 300 hours).

### STORAGE

#### Single-acting and Center Hole Cylinders

Single-acting and center hole cylinders and rams should be stored in a vertical position with the rod end down in a **dry**, well-protected area where they will not be exposed to corrosive vapors, dust or other harmful elements.

When a single-acting cylinder or ram has not been used for a period of three (3) months it should be connected to a pump and be fully extended and then retracted. This cycle will lubricate the cylinder walls thereby reducing the potential for rust formation on the cylinder walls.

#### Double-acting Cylinders

Double-acting cylinders and rams should be stored in a vertical position with the rod end down in a **dry**, well-protected area where they will not be exposed to corrosive vapors, dust or other harmful elements.

If a double-acting cylinder or ram has been stored for a year or more, it must be thoroughly inspected before it is used.

## TROUBLE-SHOOTING GUIDE

**IMPORTANT:**

- The following trouble-shooting and repair procedures should be performed by qualified personnel familiar with this equipment. Use the proper equipment when trouble-shooting!

**NOTE:**

- All the following statements may not apply to your particular model of cylinder or ram. Use the guide as a general reference for trouble-shooting.

PROBLEM	CAUSE	SOLUTION
<b>Erratic action</b>	<ol style="list-style-type: none"> <li>1. Air in system or pump cavitation</li> <li>2. Internal leakage in double-acting cylinders or external leakage in single-acting cylinders</li> <li>3. Cylinder sticking or binding</li> </ol>	<ol style="list-style-type: none"> <li>1. Add fluid, bleed air and check for leaks</li> <li>2. Replace worn packings. Check for excessive contamination or wear. Replace contaminated fluid as necessary.</li> <li>3. Check for dirt or leaks. Check for bent, misaligned, worn parts or defective packings.</li> </ol>
<b>Cylinder/Ram does not move</b>	<ol style="list-style-type: none"> <li>1. Loose couplers</li> <li>2. Faulty coupler</li> <li>3. Improper valve position</li> <li>4. Low or no hydraulic fluid in pump reservoir</li> <li>5. Air-locked pump</li> <li>6. Pump not operating</li> <li>7. Load is above the capacity of the system</li> <li>8. Fluid leaks out of rod end relief valve (double-acting cylinders only)</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten couplers</li> <li>2. Verify that female coupler is not locked up (ball wedged into seat). Replace both female and male couplers.</li> <li>3. Close release valve or shift to new position</li> <li>4. Fill and bleed the system</li> <li>5. Prime pump per pump operating instructions</li> <li>6. Check pump's operating instructions</li> <li>7. Use the correct equipment</li> <li>8. Make sure all couplers are fully coupled. Contact your nearest Authorized Hydraulic Service Center.</li> </ol>
<b>Cylinder/Ram extends only partially</b>	<ol style="list-style-type: none"> <li>1. Pump reservoir is low on hydraulic fluid</li> <li>2. Load is above the capacity of the system</li> <li>3. Cylinder piston rod binding</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill and bleed the system</li> <li>2. Use the correct equipment</li> <li>3. Check for dirt or leaks. Check for bent, misaligned, worn parts or defective packings.</li> </ol>
<b>Cylinder/Ram moves slower than normal</b>	<ol style="list-style-type: none"> <li>1. Loose connection or coupler</li> <li>2. Restricted hydraulic line or fitting</li> <li>3. Pump not working correctly</li> <li>4. Cylinder seals leaking</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten</li> <li>2. Clean and replace if damaged</li> <li>3. Check pump operating instructions</li> <li>4. Replace worn seals. Check for excessive contamination or wear</li> </ol>



## TROUBLE-SHOOTING GUIDE (CONTINUED)

PROBLEM	CAUSE	SOLUTION
<b>Cylinder/Ram moves but does not maintain pressure</b>	<ol style="list-style-type: none"> <li>1. Leaky connection</li> <li>2. Cylinder seals leaking</li> <li>3. Pump or valve malfunctioning</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean, reseal with thread sealant and tighten connection</li> <li>2. Replace worn seals. Check for excessive contamination or wear. Replace contaminated fluid as necessary.</li> <li>3. Check pump or valve operating instructions</li> </ol>
<b>Cylinder/Ram leaks hydraulic fluid</b>	<ol style="list-style-type: none"> <li>1. Worn or damaged seals</li> <li>2. Loose connections</li> <li>3. Rod end relief valve has activated (double-acting cylinders only)</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace worn seals. Check for excessive contamination or wear. Replace contaminated fluid as necessary.</li> <li>2. Clean, reseal with thread sealant and tighten connection</li> <li>3. Make sure all couplers are fully coupled. <ol style="list-style-type: none"> <li>a. <i>If relief valve is still leaking, do not attempt to service this component. Contact your nearest Authorized Hydraulic Service Center.</i></li> </ol> </li> </ol>
<b>Cylinder/Ram will not retract or retracts slower than normal</b>	<ol style="list-style-type: none"> <li>1. Pump release valve closed</li> <li>2. Loose couplers</li> <li>3. Blocked hydraulic lines</li> <li>4. Weak or broken retraction springs</li> <li>5. Cylinder damaged internally</li> <li>6. Pump reservoir too full</li> </ol>	<ol style="list-style-type: none"> <li>1. Open pump release valve</li> <li>2. Tighten couplers</li> <li>3. Clean and flush</li> <li>4. Send to service center for repair</li> <li>5. Send to service center for repair</li> <li>6. Drain hydraulic fluid to correct level</li> </ol>

**POWER TEAM / HYTEC FACILITIES**

**POWER TEAM**<sup>®</sup>

**HYTEC**<sup>®</sup>



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