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**IMPORTANT - READ CAREFULLY**

This manual contains important information about the correct installation, operation and maintenance of this equipment. All persons involved in the installation, operation and maintenance of this equipment must be thoroughly familiar with the contents of this manual. To safeguard against the possibility of personal injury or property damage, follow the recommendations and instructions of this manual. Keep this manual for reference.

**WARRANTY INFORMATION**

Refer to the Simplex website ([www.tksimplex.com](http://www.tksimplex.com)) for complete product warranty information.

**RECEIVING INSTRUCTIONS**

**Important!** Make sure to inspect all of the components for shipping damage. If damage is found, notify carrier at once. Shipping damage will not be covered by warranty. The carrier is responsible for all loss associated with shipping damage.

**Note:** This operation manual is intended as a technical guide only. Simplex accepts no liability for the use of or reliance on any information contained in this operation manual. All information, illustrations and specifications in this operation manual are based on the latest information available at the time of publication. Simplex reserves the right to make changes at any time without notice. Equipment operators and installers shall be responsible for ensuring that a safe working environment and safe systems of work are in place before operating the equipment.

**1.0 SAFE OPERATING PROCEDURES AND SAFETY PRECAUTIONS**

Read all DANGER, WARNING and CAUTION statements carefully. Follow any recommended safety precautions to avoid personal injury or damage to the unit. Simplex cannot be responsible for any damage or injury from unsafe use, lack of maintenance or incorrect operation. In the event any questions or concerns arise, contact Simplex or a Simplex authorized distributor for clarification.

**⚠ DANGER** Is only used when your action or lack of action may cause serious injury or even death.

**⚠ WARNING** Indicates a potential danger that requires correct procedures or practices to avoid personal injury.

**⚠ CAUTION** Is used to indicate correct operating or maintenance procedures and practices to prevent damage to, or destruction of equipment, or other property.

Failure to comply with the following safety precautions could cause equipment damage, property damage or personal injury.

**⚠ DANGER** To avoid personal injury, keep hands and feet away from cylinder and work-piece during operation.

**⚠ DANGER** Do not handle pressurized hoses. Escaping oil under pressure can penetrate the skin, causing serious injury. If oil is injected under the skin, see a doctor immediately.

**⚠ DANGER** Only use double-acting hydraulic cylinders in a coupled system. Never use a cylinder with unconnected couplers. If the cylinder becomes severely overloaded, components can fail catastrophically causing severe personal injury or death.

**⚠ WARNING** Wear proper personal protective gear when operating hydraulic equipment.

**⚠ WARNING** Stay clear of loads supported by hydraulics. A cylinder is only a load lifting device. Cylinders should never be used as a load holding device unless they are equipped with a lock nut, cribbing blocks or U-rings to provide mechanical load holding. Cylinders without these features should never be used as a load holding device. After the load has been raised or lowered, it must always be blocked mechanically.

**⚠ WARNING** Use only rigid pieces to hold loads. Carefully select steel or wood blocks that are capable of supporting the load. Never use a hydraulic cylinder as a shim or spacer in any lifting or pressing application.

**⚠ WARNING** Do not exceed equipment ratings. Never attempt to lift a load weighing more than the capacity of the cylinder. Overloading causes equipment failure and possible personal injury.

**⚠ WARNING** Refer to Section 2.0, Table 1 for the pressure rating of your pump model. Do not connect a jack or cylinder with a lower pressure rating. Never set a relief valve to a higher pressure than the maximum rated pressure of the pump. Higher settings may result in equipment damage and/or personal injury.

**⚠ WARNING** The system operating pressure must not exceed the pressure rating of the lowest rated component in the system. Install pressure gauges in the system to monitor operating pressure. It is your window to what is happening in the system.

**⚠ CAUTION** Avoid damaging hydraulic hose. Avoid sharp bends and kinks when routing hydraulic hoses. Using a bent or kinked hose will cause severe back-pressure. Sharp bends and kinks will internally damage the hose, leading to premature hose failure. Do not drop heavy objects on hose. A sharp impact may cause internal damage to hose wire strands. Applying pressure to a damaged hose may cause it to rupture.

**⚠ WARNING** Keep hydraulic equipment away from flames and heat. Excessive heat will soften seals, resulting in fluid leaks. Heat also weakens hose materials. For optimum performance do not expose equipment to temperatures of 170°F [65°C] or higher. Protect hoses and cylinders from weld spatter.

**IMPORTANT** Do not lift hydraulic equipment by the hose or swivel couplers. Use the carrying handle or other means of safe transport.

## 2.0 PRODUCT DATA

| Table 1 - Technical Specifications |       |                 |     |            |     |                       |     |           |     |                     |      |        |      |
|------------------------------------|-------|-----------------|-----|------------|-----|-----------------------|-----|-----------|-----|---------------------|------|--------|------|
| Model                              | Speed | Pressure Rating |     |            |     | Oil Volume Per Stroke |     |           |     | Usable Oil Capacity |      | Weight |      |
|                                    |       | 1st Stage       |     | 2nd Stage* |     | 1st Stage             |     | 2nd Stage |     | cu in               | cc   | lb     | kg   |
|                                    |       | psi             | bar | psi        | bar | cu in                 | cc  | cu in     | cc  |                     |      |        |      |
| P20                                | 2     | 250             | 17  | 2,850      | 197 | 0.79                  | 13  | 0.17      | 2.8 | 15.3                | 250  | 14     | 6.4  |
| P22                                | 2     | 250             | 17  | 10,000     | 700 | 0.43                  | 7   | 0.06      | 1.0 | 17.1                | 280  | 12     | 5.4  |
| P30                                | 2     | 250             | 17  | 3,000      | 207 | 0.85                  | 14  | 0.15      | 2.5 | 24.4                | 400  | 9      | 4.0  |
| P32                                | 2     | 250             | 17  | 10,000     | 700 | 0.43                  | 7   | 0.06      | 1.0 | 24.4                | 400  | 9      | 4.0  |
| P41                                | 1     | 10,000          | 700 | ---        | --- | 0.20                  | 3.3 | ---       | --- | 39.7                | 650  | 16     | 7.3  |
| P41A                               | 1     | 10,000          | 700 | ---        | --- | 0.16                  | 2.6 | ---       | --- | 40.0                | 655  | 13     | 5.9  |
| P42                                | 2     | 250             | 17  | 10,000     | 700 | 0.79                  | 13  | 0.17      | 2.8 | 39.1                | 640  | 18     | 8.2  |
| P71                                | 1     | 10,000          | 700 | ---        | --- | 0.15                  | 2.5 | ---       | --- | 49.4                | 810  | 10     | 4.5  |
| P71V                               | 1     | 10,000          | 700 | ---        | --- | 0.15                  | 2.5 | ---       | --- | 49.4                | 810  | 10     | 4.5  |
| P72                                | 2     | 250             | 17  | 10,000     | 700 | 0.85                  | 14  | 0.15      | 2.5 | 49.4                | 810  | 12     | 5.4  |
| P82                                | 2     | 300             | 21  | 10,000     | 700 | 0.79                  | 13  | 0.17      | 2.8 | 109.8               | 1800 | 25     | 11.3 |
| P82A                               | 2     | 350             | 24  | 10,000     | 700 | 0.98                  | 16  | 0.15      | 2.5 | 134.3               | 2200 | 26     | 11.8 |
| P140                               | 2     | 400             | 28  | 10,000     | 700 | 2.81                  | 46  | 0.24      | 4.0 | 175.1               | 2870 | 31     | 14.0 |
| P140D                              | 2     | 400             | 28  | 10,000     | 700 | 2.81                  | 46  | 0.24      | 4.0 | 175.1               | 2870 | 34     | 15.4 |
| P143                               | 2     | 400             | 28  | 10,000     | 700 | 2.81                  | 46  | 0.24      | 4.0 | 158.7               | 2600 | 28     | 12.7 |
| P143D                              | 2     | 400             | 28  | 10,000     | 700 | 2.81                  | 46  | 0.24      | 4.0 | 158.7               | 2600 | 32     | 14.5 |
| P230                               | 2     | 400             | 28  | 10,000     | 700 | 7.69                  | 126 | 0.30      | 4.9 | 230.1               | 3770 | 37     | 16.8 |
| P230D                              | 2     | 400             | 28  | 10,000     | 700 | 7.69                  | 126 | 0.30      | 4.9 | 230.0               | 3770 | 41     | 18.6 |
| P300                               | 2     | 400             | 28  | 10,000     | 700 | 2.81                  | 46  | 0.24      | 4.0 | 299.0               | 4900 | 39     | 17.7 |
| P300D                              | 2     | 400             | 28  | 10,000     | 700 | 2.81                  | 46  | 0.24      | 4.0 | 299.0               | 4900 | 45     | 20.4 |
| P301                               | 2     | 400             | 28  | 10,000     | 700 | 2.81                  | 46  | 0.24      | 4.0 | 271.6               | 4450 | 40     | 18.1 |
| P301D                              | 2     | 400             | 28  | 10,000     | 700 | 2.81                  | 46  | 0.24      | 4.0 | 271.6               | 4450 | 43     | 19.5 |
| P461                               | 2     | 400             | 28  | 10,000     | 700 | 7.69                  | 126 | 0.30      | 4.9 | 397.0               | 6500 | 44     | 20.0 |
| P461D                              | 2     | 400             | 28  | 10,000     | 700 | 7.69                  | 126 | 0.30      | 4.9 | 397.0               | 6500 | 46     | 20.8 |

**Note:** Models ending with "D" are for use with double-acting cylinders and tools.

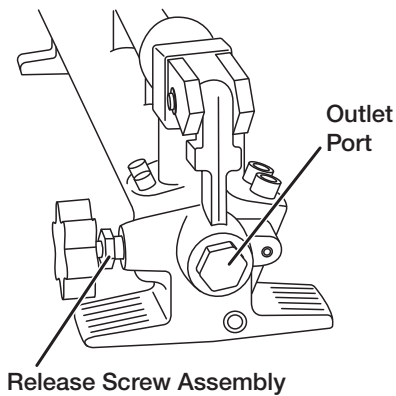
\* Maximum working pressure of pump.

**Table 2 - Reservoir Type and Operating Position**

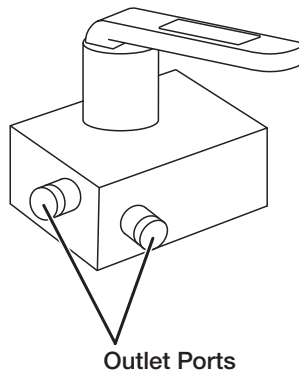
| Model | Reservoir Type: | Operating Position:    | Model | Reservoir Type: | Operating Position:    |
|-------|-----------------|------------------------|-------|-----------------|------------------------|
| P20   | Non-Vented      | Horizontal or Vertical | P140  | Non-Vented      | Horizontal or Vertical |
| P22   | Non-Vented      | Horizontal or Vertical | P140D | Non-Vented      | Horizontal or Vertical |
| P30   | Non-Vented      | Horizontal or Vertical | P143  | Non-Vented      | Horizontal or Vertical |
| P32   | Non-Vented      | Horizontal or Vertical | P143D | Non-Vented      | Horizontal or Vertical |
| P41   | Non-Vented      | Horizontal or Vertical | P230  | Vented          | Horizontal Only        |
| P41A  | Non-Vented      | Horizontal or Vertical | P230D | Vented          | Horizontal Only        |
| P42   | Non-Vented      | Horizontal or Vertical | P300  | Non-Vented      | Horizontal or Vertical |
| P71   | Non-Vented      | Horizontal or Vertical | P300D | Non-Vented      | Horizontal or Vertical |
| P71V  | Non-Vented      | Horizontal or Vertical | P301  | Vented          | Horizontal Only        |
| P72   | Non-Vented      | Horizontal or Vertical | P301D | Vented          | Horizontal Only        |
| P82   | Non-Vented      | Horizontal or Vertical | P461  | Vented          | Horizontal Only        |
| P82A  | Vented          | Horizontal Only        | P461D | Vented          | Horizontal Only        |

**Hand Pump Hydraulic Connections**

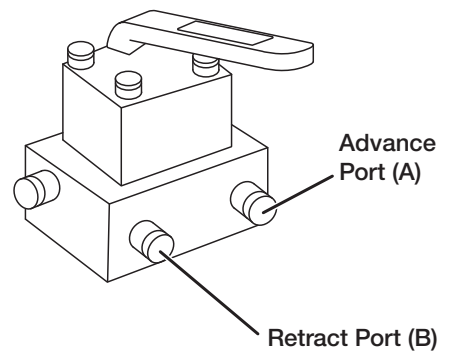
Models P20, P22, P30, P32, P41, P41A, P42, P71, P71V, P72, P82 & P82A



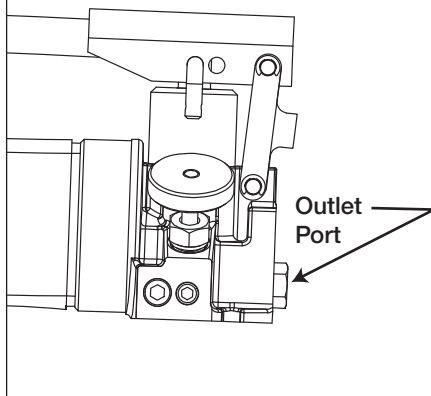
Models P230 & P461



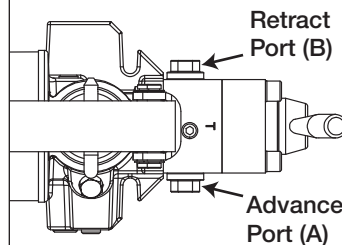
Models P230D & P461D



Models P140, P143, P300 & P301



Models P140D & P143D, P300D & P301D



## 3.0 INSTALLATION

### 3.1 Hydraulic Connections

1. Remove shipping plug(s) from pump outlet port(s) and discard.
2. All hand pumps have 3/8" NPTF threaded port(s). Use 1 1/2 wraps of Teflon tape (or suitable thread sealant) on hose fitting, leaving the first complete thread free of tape to ensure that tape does not enter into hydraulic system, causing damage.
3. Install a pressure gauge in-line from the pump for added safety and better control.
4. Connect the hydraulic hose(s) to your cylinder or tool. After making connections, refer to Section 4.6 for correct air removal procedure.
  - a. For single-acting cylinders, connect one hose from the pump outlet port to the cylinder advance/retract port.
  - b. For double-acting cylinders, use two hoses. Connect the first hose from the pump advance port (A) to the cylinder advance port. Connect the second hose from the pump retract port (B) to the cylinder retract port.

**⚠ WARNING** One or more shipping plugs are used to prevent residual oil from leaking out of port(s) during shipment. Do not operate pump with the shipping plug(s) installed. Oil may be expelled if pump is operated with plug(s) installed.

### 3.2 Pump Venting

The pump will have either a vented or non-vented style reservoir. Refer to Table 2 to determine the type of reservoir used on your pump.

### 3.3 Reservoir Vent (Models P82A, P230, P230D, P301, P301D, P461 & P461D)

- Vented reservoirs are equipped with a vent screw or vent petcock.
- The reservoir vent must be opened to allow pump operation. If the vent is blocked or closed, the pump will not function properly or will be inoperative.
- Turn the vent screw or petcock counterclockwise to open the vent. To close the vent, turn the vent screw or petcock clockwise.

### 3.4 Pump Positioning

Pumps with vented reservoirs must be operated in the horizontal position only. Pumps with non-vented reservoirs can be operated in either the horizontal or vertical position. Refer to Table 2 in Section 2.0 of this manual for additional information.

**Note:** When using a non-vented pump in the vertical position it is important to place the unit with the pump head facing down towards the earth and the pump handle facing upwards towards the sky.

## 4.0 OPERATION

### 4.1 Before Using the Pump:

1. Check all system fittings and connections to be sure they are tight and leak free.
2. Check oil level in reservoir before operating pump. Refer to instructions in Section 5.1.

**⚠ CAUTION** Never add extensions to pump handle. Extensions cause unstable pump operation.

**⚠ WARNING** Always keep your body to the side of the pump, away from the line of force of the handle.

**Note:** To reduce handle effort at high pressure, take short strokes. Maximum leverage is obtained in the last 5° of stroke.

**Note:** When operating a non-vented pump in the vertical position, the hose end must be pointed down, or the pump will pick up air and will not build pressure properly.

### 4.2 Using Two-Speed Pumps (Models P20, P22, P30, P32, P42, P72, P82, P82A, P140, P143, P140D, P143D, P230, P230D, P300, P301, P300D, P301D, P461 & P461D)

These pumps provide 2-stage flow. Under no-load, the pump operates in the high flow first stage for rapid advance. When the load is contacted, the pump automatically transfers over to the second stage for building pressure.

**Note:** Models P140, P143, P140D, P143D, P230, P230D, P300, P301, P300D, P301D, P461 and P461D: when pump pressure reaches approximately 580 psi [40 bar], you must momentarily stop pumping and raise the handle to shift to the high pressure stage. After the pump shifts, pumping will require less effort.

### 4.3 Single-Acting Applications with Release Valve (Models P20, P22, P30, P32, P41, P41A, P42, P71, P71V, P72, P82, P82A, P140, P143, P300 & P301)

1. Close release valve by turning clockwise, as shown in Figure 1.

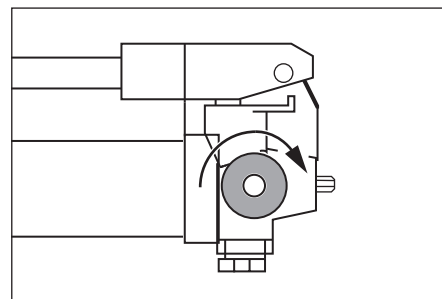


Figure 1

**⚠ CAUTION** Close release valve - **HAND TIGHT ONLY**. Using tools on release valve can damage it and cause the pump to malfunction.

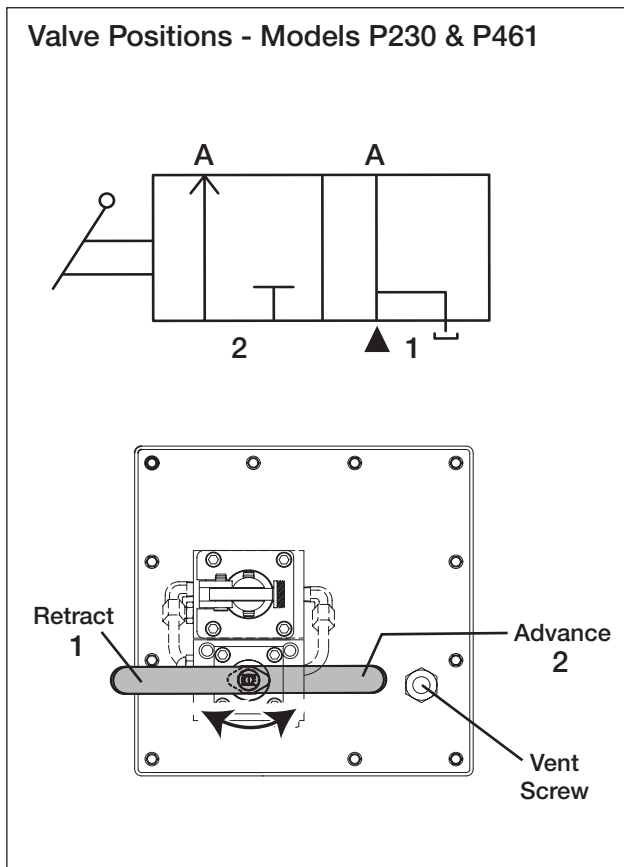
2. Operate pump handle to deliver hydraulic power to system. Pressure will be maintained until release valve is opened.

- Open release valve (turn counter-clockwise) to release pressure, allowing oil to flow back to the reservoir. Slowly open release valve to release the pressure and control the flow of oil back to the reservoir.

**Note:** The amount that the release valve is opened controls the speed of the oil returning to the pump and the retract speed of the cylinders lowering the load.

#### 4.4 Single-Acting Applications with 3-Way, 2 Position Manual Valve (Models P230 & P461)

- Shift the valve lever to the *advance* position. See Figure 2, position 2.



**Figure 2**

- Operate pump handle to deliver hydraulic power to the system. Pressure will be maintained until the valve is shifted.
- Slowly shift the valve lever to the *retract* position to release pressure and control the flow of oil back to the reservoir. See Figure 2, position 1.

The amount that the valve is opened controls the speed of oil returning to the reservoir and the retract speed of the cylinder(s) lowering the load.

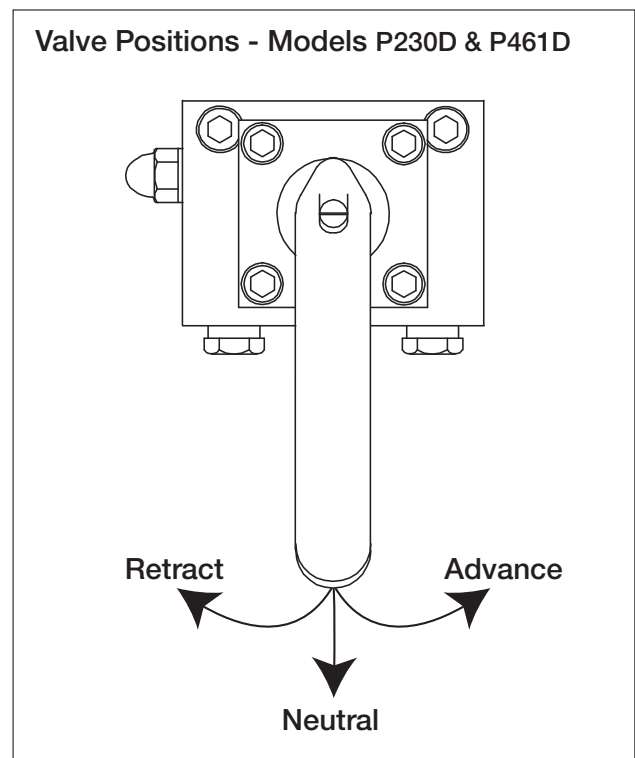
**Note:** Models P230 and P461 are equipped with a directional control valve. Inline system check valves are recommended for controlling cylinder movement under load with these pump models.

#### 4.5 Double-Acting Applications with 4-Way, 3 Position Manual Valve (Models P140D, P143D, P230D, P300D, P301D & P461D)

Pumps with 4-way control valves are designed to operate double-acting cylinders.

See Figures 3A and 3B for valve lever positions. Valve appearance and location will vary, depending on pump model.

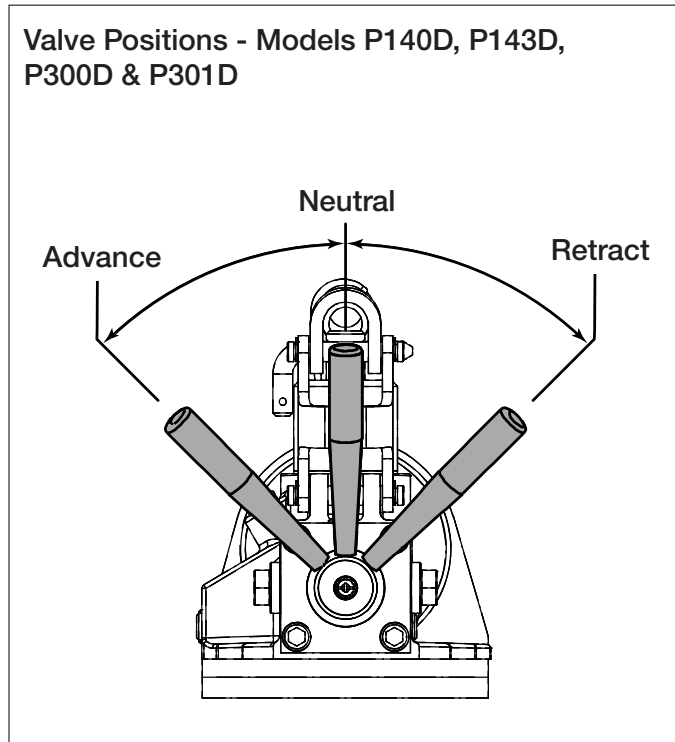
- Position lever on 4-way valve to select function as follows:
  - To Advance:** move lever to the *advance* position.
  - For Neutral:** move lever to the *neutral* position (both advance and retract ports are blocked in this position).
  - To Retract:** move lever to the *retract* position.



**Figure 3A**

2. Operate pump handle to deliver hydraulic power to the system.
3. Change valve lever positions as needed.

**⚠ WARNING** Operate a double-acting cylinder only when both hoses are connected to the pump and the cylinder. If one hose is disconnected, the circuit will become blocked and over pressurization of the hydraulic circuit could occur. Serious personal injury or damage to equipment or property could result.



**Figure 3B**

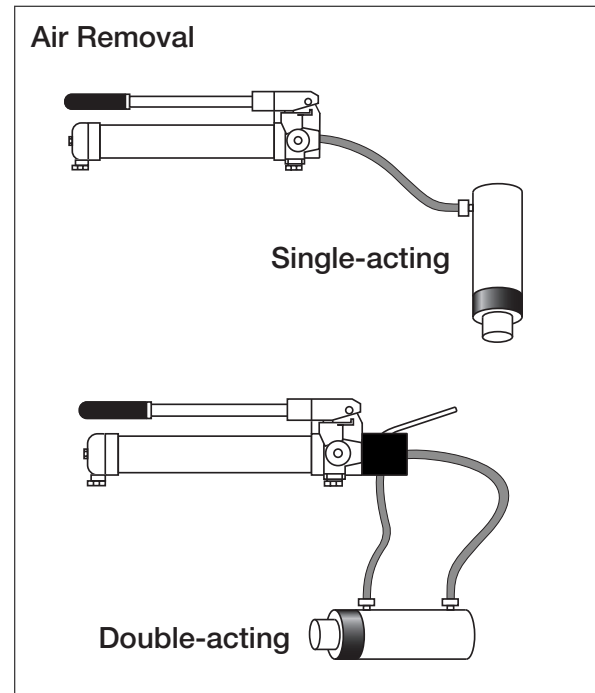
#### 4.6 Air Removal

Removing air from the hydraulic system will help the cylinder to advance and retract smoothly. Refer to the procedure in the following steps:

1. On pumps with non-vented reservoirs, loosen the oil fill plug. On pumps with vented reservoirs, loosen the vent screw or petcock.
2.
  - Single-acting pump models: Close the release valve or move the control valve lever to the *advance* position.
  - Double-acting pump models: Move the control valve lever to the *advance* position.
3. Position the hand pump at a higher elevation than the cylinder.
4. For single-acting pump models, position cylinder with the hydraulic port end located higher than the moving end. For double-acting hand pump models, position cylinder so that the hydraulic ports are facing upward. Refer to diagrams in Figure 4 for reference.

**Note:** Operate pump handle as required during the following steps.

5.
  - Single-acting pump models: Fully advance the cylinder. Then open the release valve or move the valve lever to the *retract* position to retract the cylinder.
  - Double-acting pump models: Fully advance the cylinder. Then move the control valve to the *retract* position and fully retract the cylinder.
6. Repeat steps 2 through 5 as necessary until all of the air is expelled from pump's hydraulic circuit and cylinder motion is smooth and responsive with each stroke of the pump handle.



**Figure 4**

#### 4.7 Pressure Relief Valve

All pumps contain a factory set relief valve to prevent over-pressurization. Do not attempt to readjust, disable or modify this valve.

### 5.0 MAINTENANCE

#### 5.1 Hydraulic Reservoir

Check oil level regularly. Drain oil and refill with Simplex hydraulic oil every 12 months. If pump is used in dirty environments, change the oil more often.

Use only genuine Simplex hydraulic oil or a comparable high quality ISO 32 hydraulic oil having the same technical characteristics.

The use of any other fluid could damage the seals or equipment and will make the product warranty null and void.

## 5.2 Oil Fill Information

**Important:** Non-vented reservoirs have a predetermined oil level that should not be exceeded. Refer to Table 1 in Section 2.0 for oil capacities. Never fill a pump beyond the maximum oil level or capacity recommended by the manufacturer.

- Non-vented hand pumps require some air in the reservoir to function properly. A non-vented reservoir should never be completely filled. If the reservoir is completely filled, a vacuum will form, preventing proper operation of the pump.
- Vented hand pumps can be filled up to the bottom of the oil fill hole. However, it is recommended to leave a small air gap to allow optimum functioning of the venting system.
- Models P230, P230D, P461 and P461D must be filled to within 1 inch [25 mm] of the top plate.

## 5.3 Adding Oil to the Pump

**⚠ WARNING** Always add oil with cylinders fully retracted (extended if pull cylinders) or the system will contain more oil than the reservoir can hold.

Add oil as described in the following steps:

1. Remove oil fill plug from reservoir.
2. Determine if your pump has a vented or non-vented reservoir. Refer to Table 2 earlier in this manual.
3. Add oil to the reservoir as required. Refer to oil fill information in Section 5.2.
4. Reinstall oil fill plug after adding oil.
5. Remove air from system if necessary, as described in Section 4.6.
6. Recheck oil level after removing air.

## 5.4 Keeping Oil Lines Clean

When coupler halves are disconnected, always install dust caps. Use every precaution to guard unit against the entrance of dirt, because foreign matter may cause pump, cylinder, or valve failure.

## 6.0 TROUBLESHOOTING

**Table 3 - Troubleshooting Guide**

| Problem  | Possible Cause                       | Solution  |
|--|--------------------------------------|---|
| Cylinder does not advance.                     | Oil level in pump reservoir is low.  | Add oil according to the maintenance instructions.  |
|  | Release valve is open (if equipped). | Close the release valve.  |
|  | Loose hydraulic coupler.             | Check that all couplers are fully tightened.  |
|  | Load is too heavy.                   | Do not attempt to lift more than rated tonnage.   |
|  | Air trapped in system.               | Remove air according to instructions.   |
|  | Cylinder plunger binding.            | Check for damage to cylinder. Have cylinder serviced by a qualified hydraulic technician. |
| Cylinder advances, but does not hold pressure. | Leaking connection.                  | Check that all connections are tight and leak free.                                       |
|  | Leaking seals.                       | Locate leak(s) and have equipment serviced by a qualified hydraulic technician.           |
|  | Internal leakage in pump.            | Have pump serviced by a qualified hydraulic technician.                                   |



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