High Pressure Equipment Company

Standard Operating and Maintenance Instructions for Pumping System Model PS-150

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Standard Operating and Maintenance Instructions for Pumping System Model PS-150:

Description:

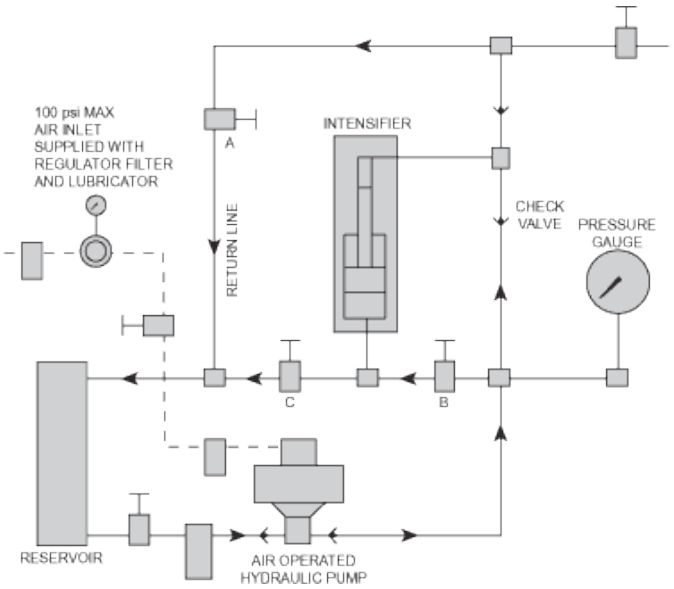
The Model PS-150 Pumping System is designed for generating hydraulic pressure up to 150,000 psi by means of an air operated hydraulic pump and an intensifier. This system is complete and ready to operate requiring only the connection of an air supply of approximately 80 psi.

Standard Features:

The steel console is 26" wide, 24" deep, 40" high and includes manual valves, air regulator, filter and lubricator, air gauge, high pressure gauge, reservoir, oil filter, pump (0-16,000 psi), related high pressure tubing and fittings.

The 0-20,000 psi pressure gauge is connected to the low pressure side of the intensifier which has a ratio of 10:1. Pressure on the high pressure side of the intensifier is thus determined by multiplying the gauge reading by 10. A small variation must be allowed for friction from the intensifier packing.

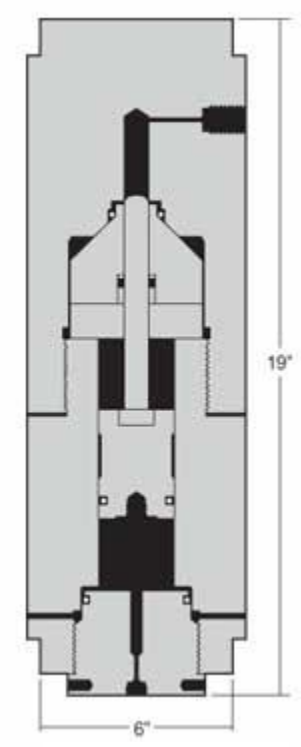
The air operated hydraulic pump pressurizes the system to 16,000 psi with valves “A” and “B” closed and the intensifier piston is automatically positioned to the low pressure end of its stroke. With valves “A” and “C” closed, valve “B” is opened to allow the pump to pressurize the low pressure end of the intensifier. The fluid in the high pressure end of the intensifier is thus pressurized with a 10:1 ratio. If the intensifier reaches the end of its stroke before the desired pressure is achieved, the intensifier may be recycled. The intensifier output is approximately 1.2 cubic inches per stroke.



The 150,000 psi Hydraulic Intensifier is designed with a ratio of areas on the two pistons of 10:1. Consequently, pressures up to 150,000 psi can be achieved by using a commercially available lower pressure (15,000 psi) pump.

Material of construction for the pressure containing parts is 4340 alloy steel (or equivalent) properly heat treated for use at elevated pressures. Only non-corrosive type fluids should be used. The high pressure packing is housed in a separate removable stuffing box. This design permits improved concentricity and facilitates close tolerance machining of the packing area. Capacity per stroke at the high pressure end is 1.2 cubic inches. Capacity at the low pressure end is 12.6 cubic inches per stroke. Piston travel is 4 inches. Weight is approximately 150 pounds.

Standard connections are for 1/4" O.D. tubing (HF4) on the low pressure end and 3/8" O.D. x 1/16" I.D. tubing (XF6) on the high pressure end.



PS-150 Model

Installation:

The only connections required for installation of the system are an air supply and connection of the system to the pressure vessel or unit which is to be pressurized.

The air supply line is connected directly to the side of the cabinet and is for ½ in NPT pipe. A larger air supply line is recommended if the system is quite a distance from the source of air. Pressure of the air supply should be approximately 60 psi minimum.

The reservoir is built directly into the cabinet and should be filled with a suitable fluid before operation. The formulas as used by High Pressure Equipment Company are as follows for pressures up to 150,000 PSI:

1 part kerosene
2 parts hydraulic oil

The above mixtures may be purchased from High Pressure Equipment Company or other suitable fluids having a low viscosity may be used.

Operating Instructions:

The air regulator controls the output of the pump so that a given setting as shown on the small panel mounted air regulator gauge will operate the pump to a corresponding pressure. The pump will then automatically stop. Should there be any loss of pressure due to compaction of the tested material or temperature drop, the pump will automatically make up the pressure loss.

1. Open Valve "C" and the "High pressure outlet valve". Close valve "B" and the "vent valve".
2. Rotate the regulator handle in a clockwise direction until the small air regulator gauge reads approximately 60 psi. Open the air inlet valve. The pump will now begin operating and will pump to approximately 16,000 psi (Should pressures of less than 16,000 psi be desired, select a lower air inlet setting on the regulator.
3. Close valve "C" and open valve "B-. The pump will now begin pumping into the bottom of the intensifier and compressing the fluid in the top of the intensifier to increase the pressure.

   NOTE, Model PS-150 is equipped with a 20,000 psi gauge and is connected to the low pressure side of the intensifier. As the intensifier has a 10: 1 ratio. The pressure on the high pressure side of the intensifier is 10 times that shown on the gauge. This of course, does not apply when valve UB" is closed and the intensifier is being by-passed or recycled.
4. When the desired pressure is reached the air inlet valve should be closed or the air regulator handle rotated counter-clockwise thus reducing air input to the pump. If the desired pressure is not reached, the intensifier must be recycled.

Recycling:

The intensifier may be recycled by closing valve "B" and opening valve "C". The pump is then operated to force the intensifier piston downward and force the oil in the bottom of the intensifier back into the reservoir. This may require upwards to 16,000 psi to return the piston. When the piston has returned to the bottom of the intensifier valve "C" should be closed and valve "E" opened. The pumping operation may then be continued as in steps 3 and 4 above.

Venting the System:

To vent pressure from the system simply open the "vent valve". This may be done at any time and will not damage the system if opened during operation for any reason.

Use of the Air Regulator:

The air regulator controls the pressure output of the pump and also the speed at which the pump operates. The operator may wish to control the system entirely by the regulator and leave the "Air Inlet Valve" open at all times. Thus the pump may be driven relatively fast until the unit approaches the desired pressure and then slowed down and finally stopped as it reaches this point. Do not exceed 60 psi on the regulator gauge.

Position of the Intensifier Piston:

The position of the piston may be determined listening to the pump. When the piston is at either end of its stroke the pump will stall out.

Maintenance:

The air line is equipped with a filter and lubricator. The air filter is provided to filter water from the air supply. Depending upon the amount of water in the air supply, the filter bowl will fill up over a period of time. This is easily drained by opening the small drain cock on the bottom of the bowl and allowing the water to drain into a container.

The lubricator is provided in order to lubricate the air portion of the pump. This has been set at the factory for typical air flow conditions. An oil flow of approximately 3 to 5 drops per minute is recommended. This lubricator should be periodically checked and filled with a lubricating oil of approximately 150 to 200 s.s.u. @ 100 F (S.A.E. 10).

The fluid within the reservoir should be kept clean in order to provide maximum life of the pump. When this fluid becomes excessively dirty, it is easily drained through the drain plug located at the bottom of the reservoir. A filter is provided between the reservoir and the pump. It is recommended that the disposable cartridge be removed and replaced should it become clogged with an excess of dirt. The valve between the reservoir and filter should be closed before removing the filter.

Trouble Shooting:

The pump is running but will not develop pressure:

1. If the system has just been shipped, moved to a new location, or repairs have been made within the hydraulic lines, an "air lock" may have developed. A connection on the inlet side of the pump should be broken enough to determine whether or not the pump is receiving oil from the reservoir. If so, a connection on the outlet side of the pump should be broken slightly. With the pump operating (set the regulator so that the pump is operating slowly) determine as to whether there is a flow through the lines. This will usually clear the "air lock" and the connection can be retightened.
2. If the pump will not develop pressure and there does not appear to be an "air lock." The check valves on the inlet and outlet side of the pump should be cleaned or replaced.

Spare parts or further information about your pumping system may be obtained direct from the HiP factory. Parts are generally stocked for immediate delivery.