



High Pressure Equipment

Pumping Systems, Intensifiers, Gas Boosters and High Pressure Generators

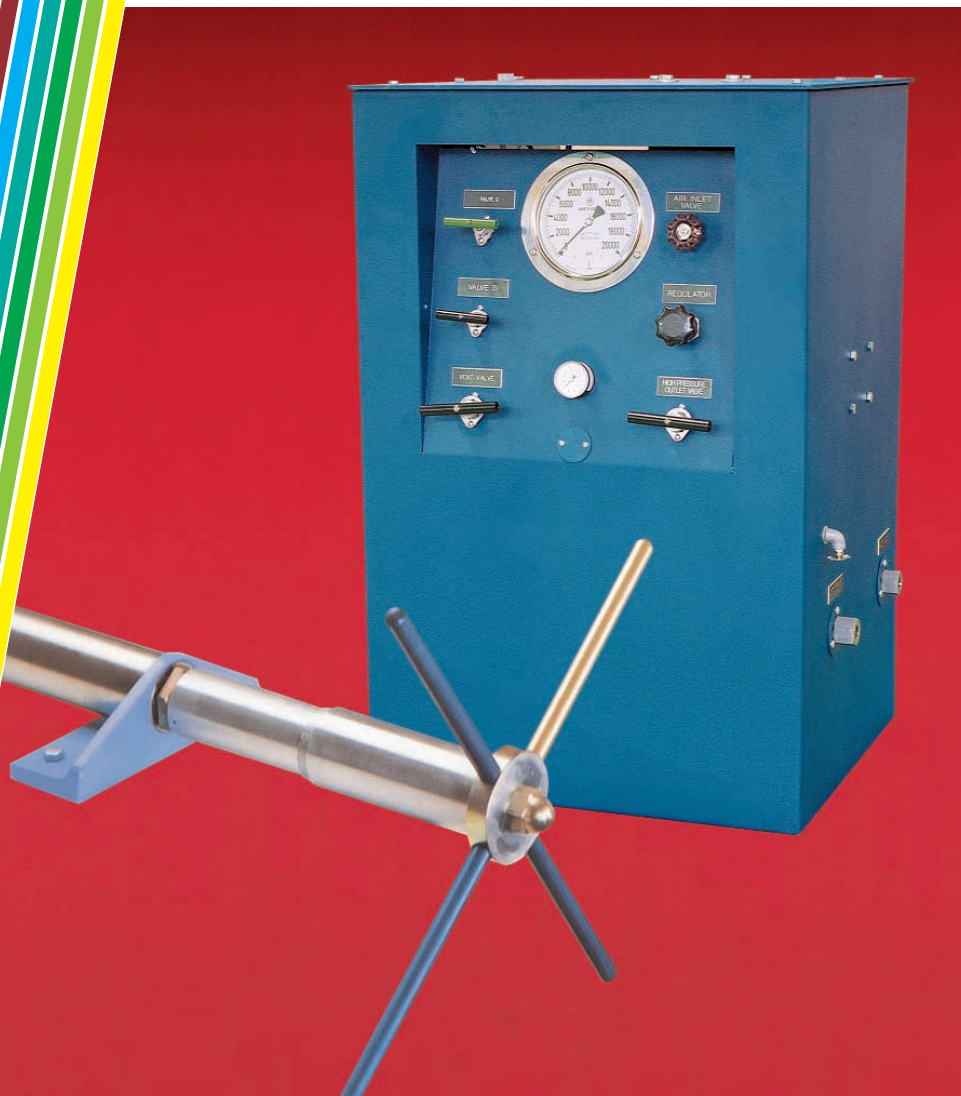
High Pressure Equipment Company produces a number of components and systems for general industrial, elevated pressure applications.

Pumping Systems are air operated, hydraulic systems capable of producing output pressures up to 50,000 psi. These pumping systems are complete, self-contained and ready to operate; just connect to shop air supply.

Hydraulic Intensifiers feature a compression ratio of 10 to 1, which allows for output pressures as high as 150,000 psi when used in conjunction with a commercially available lower pressure pump (15,000 psi).

Gas Boosters and gas booster systems are an excellent method for increasing the pressures or flow rates for a variety of gases. These units offer compression ratios as high as 30 to 1 and output pressures up to 60,000 psi.

High Pressure Generators are manually operated piston screw pumps for compressing liquids and some gases in small volumes to develop pressure.



Index

Page

Pumping Systems	11.2-11.4
Intensifiers	11.5
Gas Boosters	11.6-11.7
High Pressure Generators	11.8-11.9



High Pressure Equipment

Air Operated Hydraulic Pumping Systems to 50,000 psi



- Model PS-10: 10,000 psi
- Model PS-20: 20,000 psi
- Model PS-30: 30,000 psi
- Model PS-40: 40,000 psi
- Model PS-50: 50,000 psi
- Model PS-90: 90,000 psi

High Pressure air operated hydraulic pumping systems are complete, self-contained units and ready to operate. Just hook up standard shop air supply (maximum 100 psi) to connection supplied on the side of the console. Discharge capacities range to 64 in³/min.

Standard Features

System includes hydraulic oil reservoir, oil filter, air operated hydraulic pump, pressure gauge, panel mounted high pressure valves, safety head assembly, panel mounted air regulator and gauge and air line filter and lubricator.

All components are enclosed in a steel console with only the back exposed.

Dimensions of standard systems are 26" wide, 24" deep and 40" high.

System Capabilities

The output pressure is predetermined by adjustment to the air regulator setting.

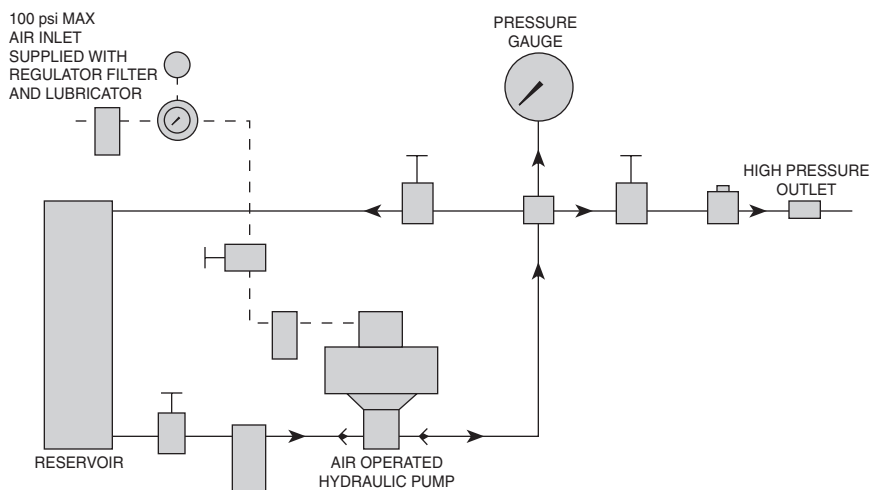
Output pressure is maintained constantly and pump compensates for pressure drops or losses.

Hydraulic input is gravity fed, however, if pump is used alone, the feed can be pressurized to the limit of the pump.

Within the pump the large diameter air piston drives a smaller piston to provide fluid flow at high pressure.

Air consumption will be approximately 56 CFM of free air at 100 psi input.

Reservoir = 4 gallon capacity, do not pressurize.



Standard Pumping System Specifications

Approximate Air to Hydraulic Pressure Ratio — Static Conditions

	Model No.	Air psi										
		10	20	30	40	50	60	70	80	90	100	110
Hydraulic Pressure psi	PS-10	1,500	3,200	5,200	7,100	9,000	10,800	12,500	14,500	16,300	18,000	19,800
	PS-20	3,000	6,000	9,500	12,600	16,000	19,100	22,300	25,600	29,000	32,300	35,600
	PS-30	4,000	8,800	13,700	18,000	22,500	27,000	31,500	36,500	41,400	45,800	50,300
	PS-40	6,000	13,000	21,000	27,000	34,000	40,500	46,000	52,000	59,000	65,000	70,000
	PS-50	6,000	13,000	21,000	27,000	34,000	40,500	46,000	52,000	59,000	65,000	70,000
	PS-90	Uses Dual Pump			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Approximate Rate of Discharge — CIPM

Model		PS-10			PS-20			PS-30			PS-40			PS-50		
Air psi		60	80	100	60	80	100	60	80	100	60	80	100	60	80	100
Pressure	10,000 psi	27	52	64	31	40	44	28	33	35	19	23	24	19	23	24
	30,000 psi	0	0	0	0	0	14	0	16	21	12	15	17	12	15	17
	40,000 psi	0	0	0	0	0	0	0	0	14	2	12	15	2	12	15
	50,000 psi	0	0	0	0	0	0	0	0	0	0	6	11	0	6	11



High Pressure Equipment

150,000 psi Pumping System

Model PS-150

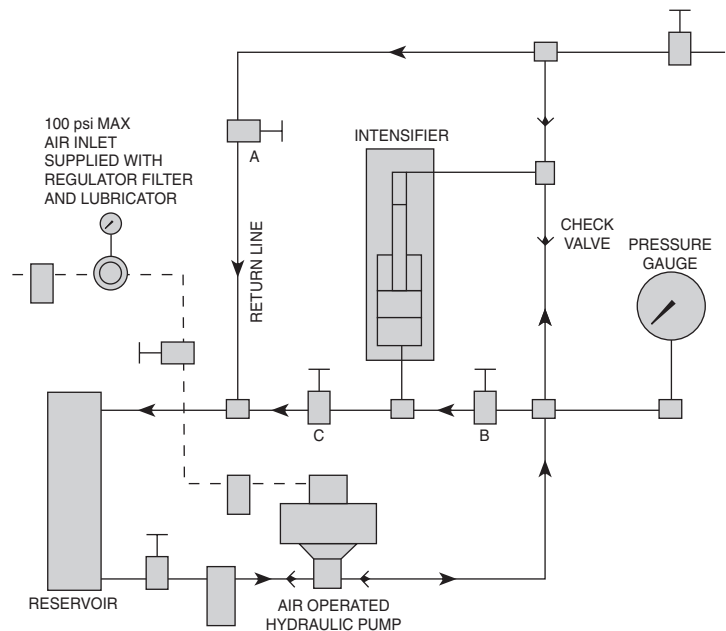


The Model PS-150 Pumping System is designed for generating hydraulic pressure up to 150,000 psi by means of an air operated hydraulic pump and an intensifier. The 10 to 1 ratio intensifier is fully illustrated on facing page 11.5. This system is complete and ready to operate requiring only the connection of an air supply of approximately 80 psi.

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 to 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 to 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.



150,000 psi Hydraulic Intensifiers

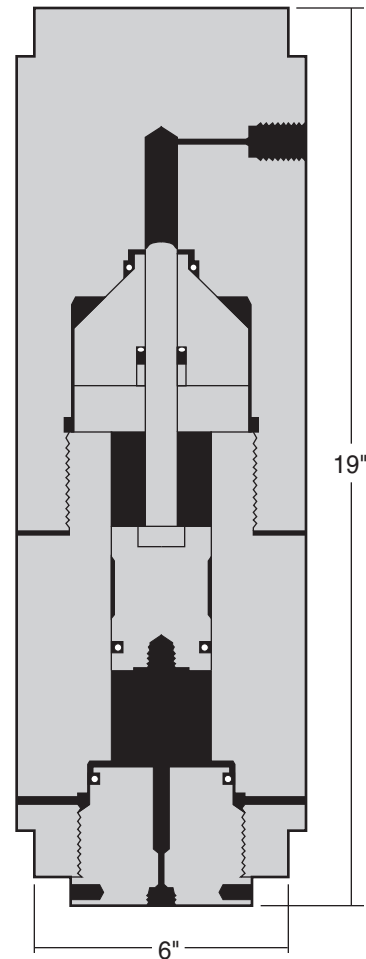
The 150,000 psi Hydraulic Intensifier is designed with a ratio of areas on the two pistons of 10 to 1. Consequently, pressures up to 150,000 psi can be achieved by using a commercially available lower pressure (15,000 psi) pump.

Operation of this intensifier is illustrated in the typical installation shown in the schematic on facing page 11.4.

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 $\frac{1}{4}$ " O.D. tubing (HF4) on the low pressure end and $\frac{3}{8}$ " O.D. x $\frac{1}{16}$ " I.D. tubing (XF6) on the high pressure end.





High Pressure Equipment

Gas Boosters

MODEL GBS - 30

30,000 psi Gas Booster System
(One-to-one ratio — 112 cubic inch
per stroke displacement)
(17-4PH stainless steel construction)

MODEL GBS - 60

60,000 psi Gas Booster System
(Thirty-to-one ratio — 4.7 cubic inch
per stroke displacement)
(4340 alloy steel construction)



The Model GBS-30 and GBS-60 Gas Booster Systems are complete and ready to operate. All that is required is an air supply for the pump (approximately 70 psi) and a commercially available container of compressed gas.

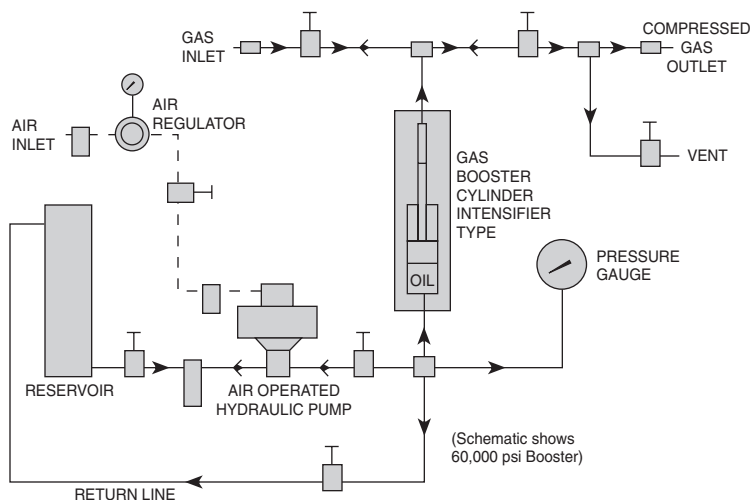
The steel console is 26" wide, 24" deep, 40" high and includes manual valves, air regulator, filter and lubricator, air gauge, high pressure gauge, reservoir, oil filter, pump, gas booster and related high pressure tubing and fittings.

Operation is by means of an air operated hydraulic pump which pressurizes one end of the gas booster which then compresses the gas in the opposite end of the booster. To accomplish this, the gas inlet valve is opened to permit gas to fill the gas end of the booster. Check valves are provided to permit gas flow in one direction only. With the gas outlet valve open, the hydraulic pump is operated in order to pressurize the hydraulic end of the booster. Thus, the gas is compressed in the booster. If required pressure is not reached by the end of the stroke, the gas booster can easily be recycled for additional strokes.

Note the gauge on these systems is connected to the hydraulic side of the booster. On the Model GBS-30 which has a 1 to 1 ratio, there is a direct reading of the pressure in the gas end of the booster. The Model GBS-60 has a 30 to 1 ratio and the gauge will accordingly indicate a reading of one-thirtieth (1/30) of the actual pressure in the gas end of the booster. An additional gauge can be furnished for connection to the gas end of the booster to provide direct pressure readings of the gas pressure.

Details of the gas boosters are shown on facing page 117.

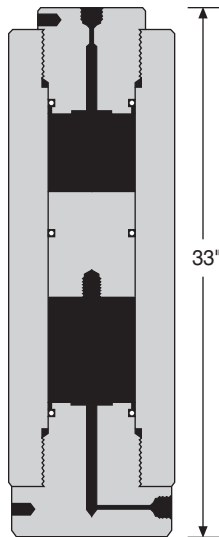
These systems should not be used with hydrogen or oxygen.



Gas Boosters

Model GB-30

30,000 psi



The Model GB-30 Gas Booster is rated for use up to 30,000 psi and has a one-to-one ratio. Displacement per stroke is 112 cubic inches (1835 ml).

Material of construction is 17-4PH stainless steel for the body and covers. The piston is supplied in brass with other materials available as an option. Standard O-ring material for the covers and piston is BUNA-N (nitrile).

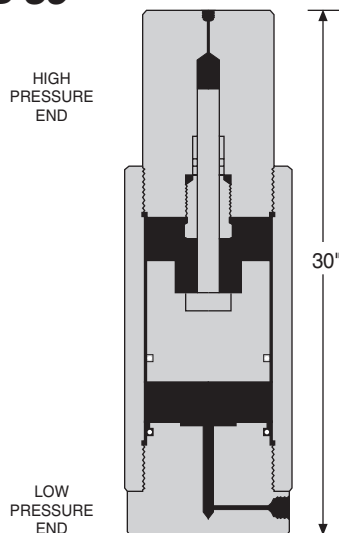
Standard connections supplied are for $\frac{1}{4}$ " O.D. High Pressure tubing (HF4 connection) at each end.

The Model GB-30 can be supplied as a separate unit or with the complete system (Model GBS-30) shown on page 11.6.

The Model GB-30 should not be used with hydrogen or oxygen.

Model GB-60

60,000 psi



The Model GB-60 Gas Booster is rated for use up to 60,000 psi and has a thirty-to-one (30-1) ratio. Thus, 60,000 psi can be obtained at the high pressure end using only 2,000 psi inlet pressure. Displacement per stroke is 4.7 cubic inches (77 ml).

Material of construction is Type 4340 alloy steel (or equivalent) properly heat treated for use at high pressure. Other internal materials include 17-4PH stainless steel and aluminum bronze. Seals include BUNA-N (nitrile) O-rings and a Parker Poly Pak®.

Standard connections supplied are for $\frac{1}{4}$ " O.D. High Pressure tubing (HF4 on the high pressure end and AF4 on the low pressure end).

The Model GB-60 can be supplied as a separate unit or with the complete system (Model GBS-60) shown on page 11.6.

The Model GB-60 should not be used with hydrogen or oxygen.

Piston travel - 6"

Special Gas Boosters and Intensifiers

High Pressure Equipment Company has designed and supplied numerous gas boosters and intensifiers to meet the customer's special requirements. A price quotation can be made by advising us of the requirements including: media (gas or liquid) to be pressurized, maximum outlet pressure required, available inlet pressure and required displacement per stroke.



High Pressure Equipment

High Pressure Generators

The HiP High Pressure Generator is a manually operated piston screw pump. It is designed for any application where a liquid* is to be compressed within a small volume to develop pressure.

Pressure Ranges:

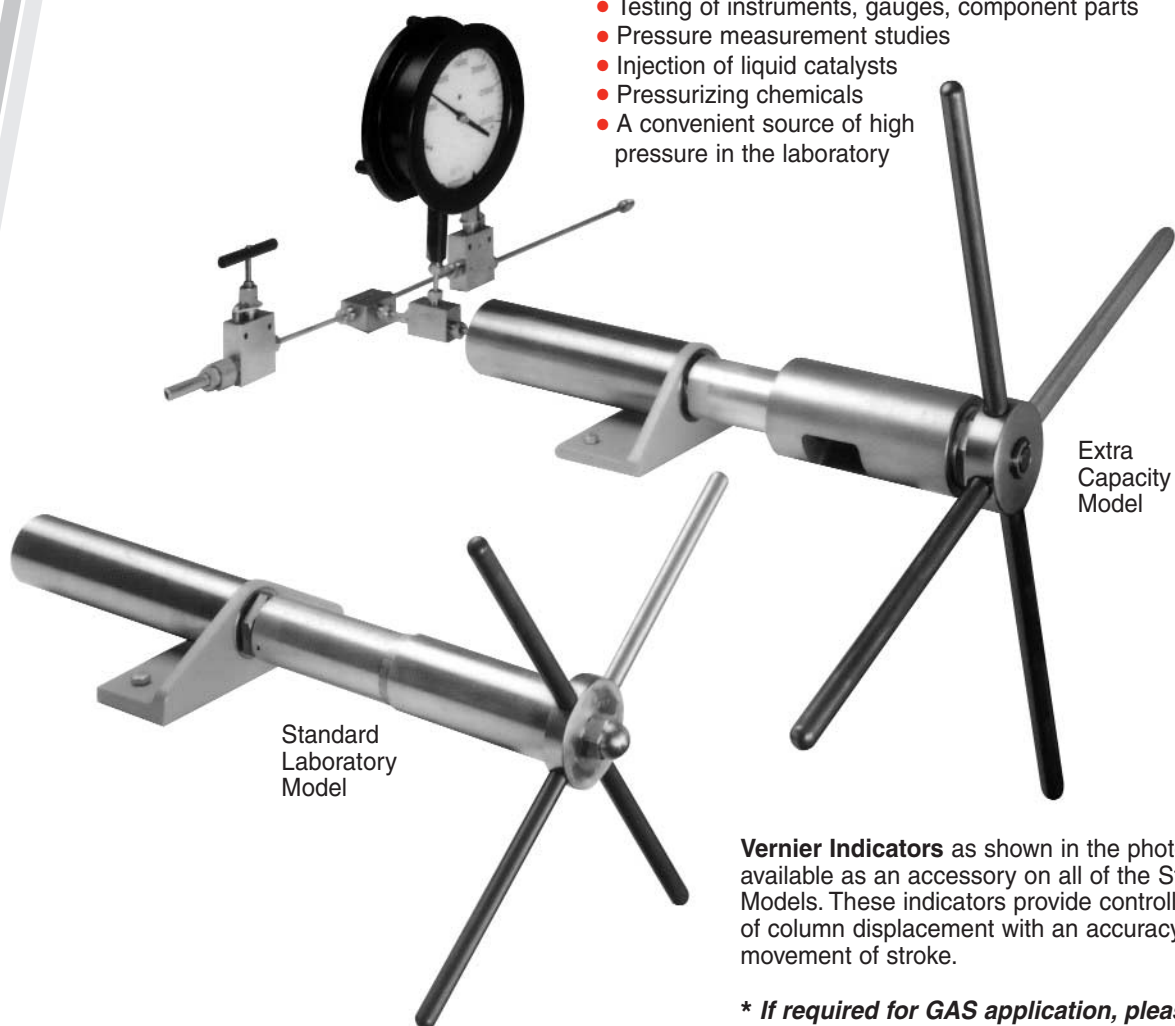
- 0-5,000 psi
- 0-10,000 psi
- 0-15,000 psi
- 0-30,000 psi
- 0-60,000 psi
- 0-75,000 psi
- 0-100,000 psi

All wetted parts are of 316 stainless steel and 17-4PH stainless steel. Parker Poly Pak® is standard .

The High Pressure Generator is easily mounted to a work bench and maximum pressures may be obtained with a minimum amount of effort by the operator. The standard connection is a High Pressure coned-and-threaded (HF4) opening for 1/4" O.D. tubing up to 60,000 psi and XF4 connections for pressures above 60,000 psi. Adapters are available with optional Teflon packing at no additional cost for other type connections including pipe.

Typical Applications:

- Testing of instruments, gauges, component parts
- Pressure measurement studies
- Injection of liquid catalysts
- Pressurizing chemicals
- A convenient source of high pressure in the laboratory



Standard
Laboratory
Model

Extra
Capacity
Model

Vernier Indicators as shown in the photo at left are available as an accessory on all of the Standard Laboratory Models. These indicators provide controlled measurement of column displacement with an accuracy of ± 0.003 " movement of stroke.

** If required for GAS application, please consult factory.*

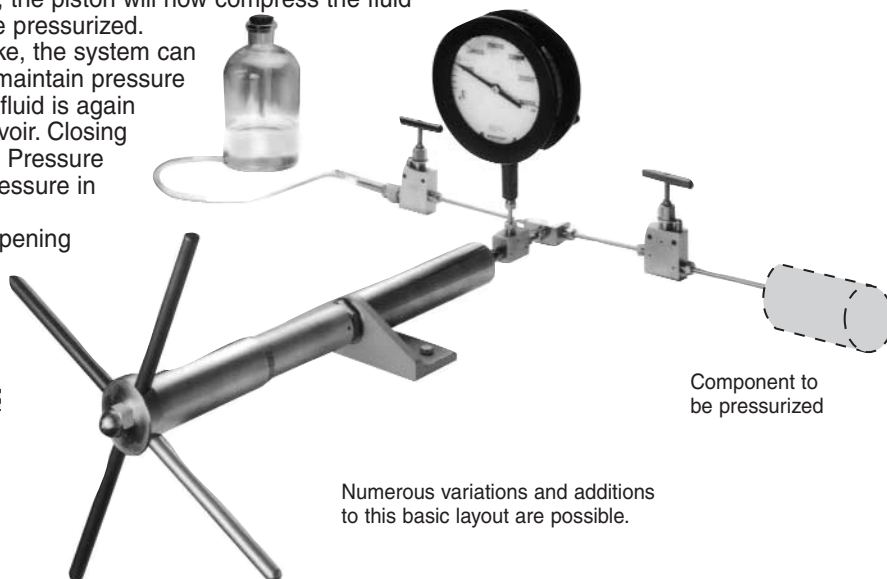
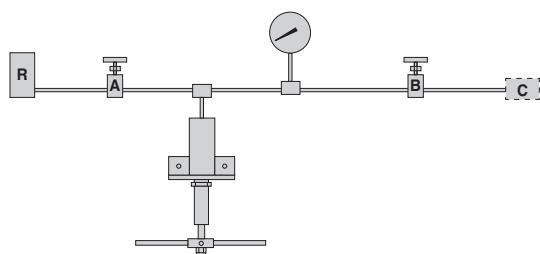
High Pressure Generators

The schematic illustrates a very basic layout for using a Pressure Generator. A reservoir (R) is shown connected by means of valves and fittings to a component (C) that is to be pressurized. A gauge has been included for determining pressure.

With valve "B" closed and valve "A" open, the handle of the Pressure Generator is rotated counter-clockwise to draw fluid from the reservoir into the cylinder body of the Pressure Generator. Valve "A" is then closed and valve "B" is opened. By rotating the Pressure Generator handle clockwise, the piston will now compress the fluid to develop pressure in the component that is to be pressurized.

If sufficient pressure is not reached in one stroke, the system can be "recycled." Valve "B" can be closed in order to maintain pressure in the components. Valve "A" is then opened, and fluid is again drawn into the Pressure Generator from the reservoir. Closing Valve "A" and opening Valve "B" will now allow the Pressure Generator to be operated to develop increased pressure in the component.

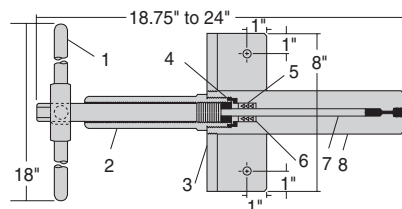
Pressure in the component can be vented by opening both valves.



Component to be pressurized

Numerous variations and additions to this basic layout are possible.

Standard Laboratory Models



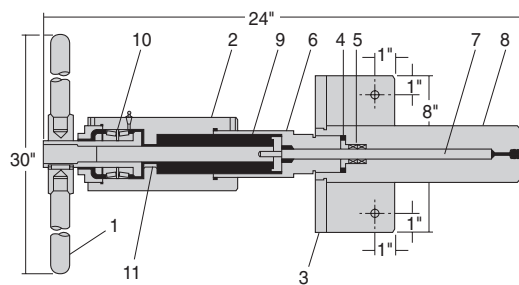
1. Handle
2. Gland Nut
3. Mounting Bracket
4. Top Packing Washer
5. Packing
- * 6. Bottom Packing Washer
7. Shaft
8. Body

Model	Pressure Rating psi	Capacity per Stroke	Shaft Diameter
87-6-5	5,000	60 mL	7/8"
62-6-10	10,000	30 mL	5/8"
50-6-15	15,000	20 mL	1/2"
37-6-30	30,000	11 mL	3/8"

Length of stroke: 6 inches. 14 revolutions of handle produces one inch travel of shaft.

* Use item six only with optional Chevron Teflon packing.

Extra Capacity Models



1. Handle
2. Housing
3. Mounting Bracket
4. Packing Washer
5. Packing
6. Extension Gland
7. Shaft
8. Body
9. Stem Screw with Keyway
10. Bearing Assembly
11. Key

Model	Pressure Rating psi	Capacity per Stroke	Shaft Diameter
112-5.75-5	5,000	93 mL	1 1/8"
81-5.75-10	10,000	48 mL	13/16"
68-5.75-15	15,000	35 mL	11/16"
50-5.75-30	30,000	18 mL	1/2"
37-5.75-60	60,000	10 mL	3/8"
31-5.75-75	75,000	7 mL	5/16"
25-5.75-100	100,000	4.5 mL	1/4"

Length of stroke: 5 3/4 inches. 14 revolutions of handle produces one inch travel of shaft.