Parker Hydraulics

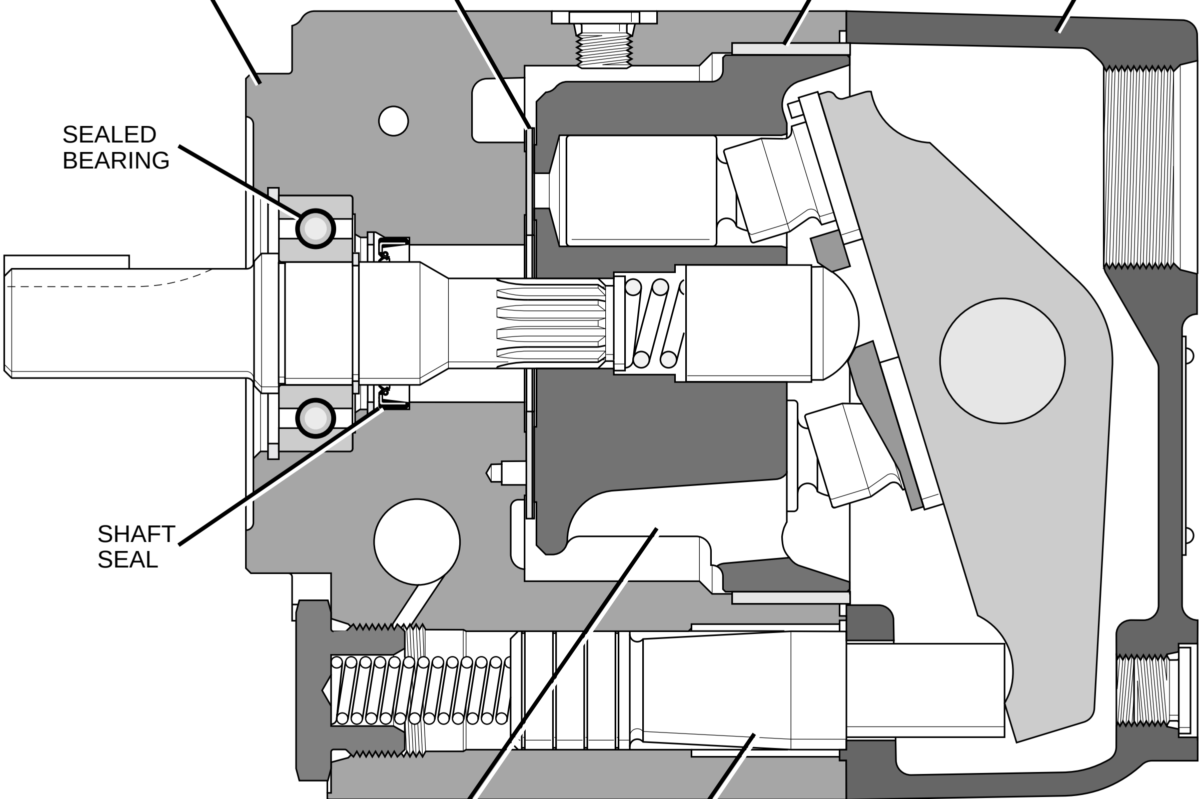
Series PAVC Variable Volume, Piston Pumps

Catalog 2600-101/USA

Quick Reference Data Chart

Pump Model	Displacement CM³/REV (IN³/REV)	Pump Delivery @ 300 PSI (21 bar) in GPM (LPM)		*Approx. Noise Levels dB(A) @ Full Flow 1800 RPM (1200 RPM)				Horsepower At 1800 RPM, and At Maximum Pressure & Displacement	Operating Speed RPM (Maximum)	Pressure PSI (bar) Continuous (Maximum)
		1200 RPM	1800 RPM	500 PSI (34 bar)	1000 PSI (69 bar)	2000 PSI (138 bar)	3000 PSI (207 bar)			
PAVC33	33 (2.0)	10.4 (39.4)	15.6 (59.0)	75 (69)	76 (72)	78 (75)	79 (77)	28.5	3000	3000 (207)
PAVC38	38 (2.3)	11.9 (45.0)	17.9 (67.8)	75 (69)	76 (72)	78 (75)	79 (77)	33.0	3000	3000 (207)
PAVC65	65 (4.0)	20.8 (78.7)	31.2 (118.1)	77 (75)	78 (76)	80 (78)	81 (79)	56.5	3000	3000 (207)
PAVC100	100 (6.1)	31.6 (119.6)	47.5 (179.8)	83 (77)	82 (78)	82 (79)	85 (80)	95.5	2600	3000 (207)

* Since many variables such as mounting, tank style, plant layout, etc., effect noise levels, it cannot be assumed that the above readings will be equal to those in the field. The above values are for guidance in selecting the proper pump. Noise levels are A-weighted, mean sound pressure levels at 1 meter from the pump, measured and recorded in accordance with applicable ISO and NFPA standards.



Features

- High Strength Cast-Iron Housing
- Built-In Supercharger
- High Speed Capability - 3000 RPM (2600 RPM PAVC100)
- Sealed Shaft Bearing
- Two Piece Design For Ease of Service
- Cartridge Type Controls - Field Changeable
- Replaceable Bronze Clad Port Plate
- Airbleed Standard for Quick Priming
- Hydrodynamic Cylinder Barrel Bearing
- Thru-Shaft (PAVC100 Only)
- Full Pressure Rating On Water Glycol Fluids
- Pump Case and Shaft Seal - See Inlet Pressure Only
- Filter And/Or Cool Drain Line (100 PSI Max.)

Controls

- Pressure Compensation
- Load Sensing
- Horsepower (Torque) Limiting
- Horsepower and Load Sensing
- Remote Pressure Compensation
- Adjustable Maximum Volume Stop
- Electrohydraulic Pressure
- Electrohydraulic Flow & Pressure (Servo Control)
- Low Pressure Standby

General Description

All control is achieved by the proper positioning of the swash plate. This is achieved by a servo piston acting on one end of the swash plate working against the combined effect of the off-setting forces of the pistons and centering spring on the other end. The control spool acts as a metering valve which varies the pressure behind the servo piston.

As shown in Figure 1, the amount of flow produced by the Parker Piston Pump is dependent upon the length of stroke of the pumping pistons. This length of stroke, in turn, is determined by the position of the swash plate. Maximum flow is achieved at an angle of 17°.

The rotating piston barrel, driven by the prime mover, moves the pistons in a circular path and the piston slippers are supported hydrostatically against the face of the swash plate. When the swash plate is in a vertical position, perpendicular to the centerline of the piston barrel, there is no piston stroke and consequently no fluid displacement. When the swash plate is positioned at an angle, the pistons are forced in and out of the barrel and fluid displacement takes place. The greater the angle of the swash plate, the greater the piston stroke.

The centerline of the pumping piston assembly is offset from the centerline of the swash plate. Therefore, as shown on the accompanying Figure 1A, the pistons' effective summation force tends to destroke the swash plate to a vertical (neutral) position. This destroking force is balanced as the swash plate is angled by the force of the servo piston.

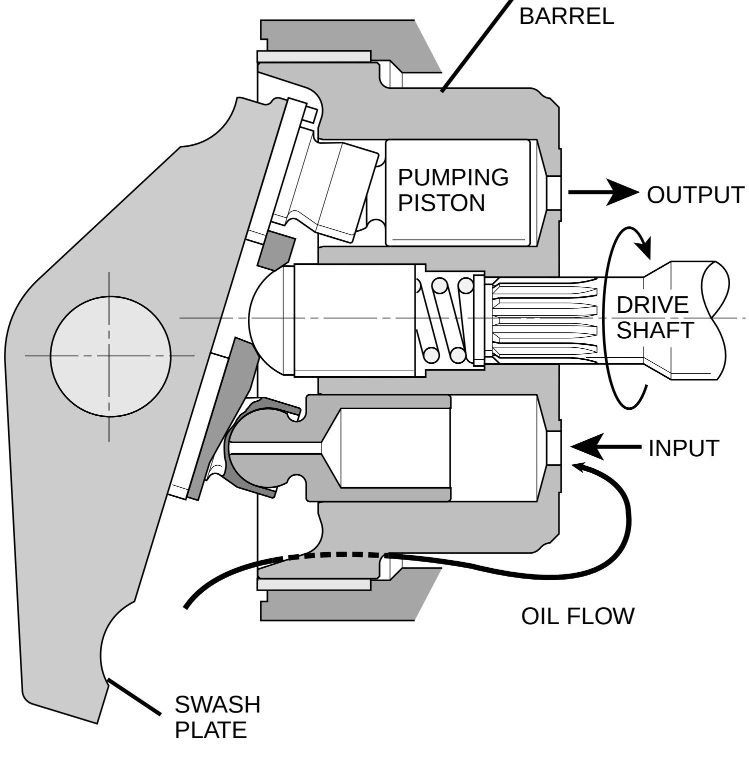


FIGURE 1. Pumping Action

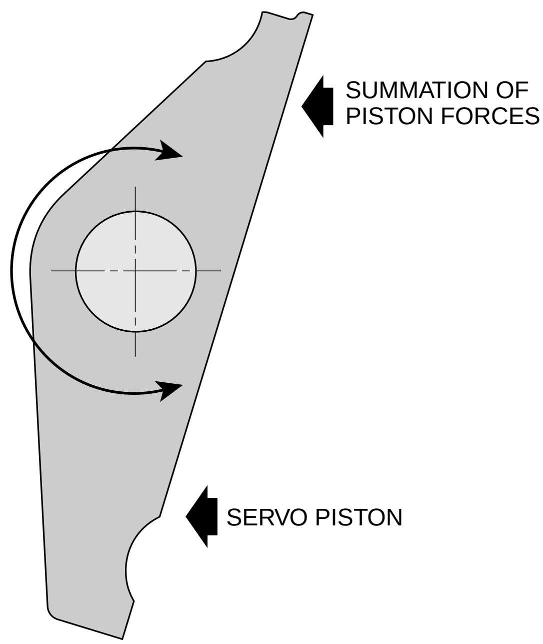


FIGURE 1A.

Pressure Compensated Control

Swash plate angle controls the output flow of the pump. Swash plate angle is controlled by the force generated against the swash plate by the pumping pistons and by the force of the servo piston. The force of the servo piston is greater than the force of the pumping pistons when both are at the same pressure.

By means of internal porting, pressure is connected from the output port to the servo piston via orifice (E), and to the control spool via passage (D). Also pressure is applied to the control spool chamber thru orifice (F). As long as the pressures at both ends of the control spool remain equal, the spool will remain offset upward, due to the added force of the spring.

When pressure reaches the setting of the compensator control, the dart leaves its seat causing the pressure in the spool chamber to be reduced. The spool now moves downward causing pressure in the servo piston cavity to vent via port “A”. The reduced pressure at the servo piston allows the servo piston to move to the right. This movement reduces the angle of the swash plate and thereby reduces the pumps output flow.

As pump pressure on the control spool drops below pressure and spring force in the spool chamber, the control spool moves upward to maintain an equilibrium on both sides of the spool. If pump pressure falls below compensator control setting, the control spool moves up, bringing the pump to maximum displacement.

∆P Adjustment of PAVC Pumps

PROCEDURE:

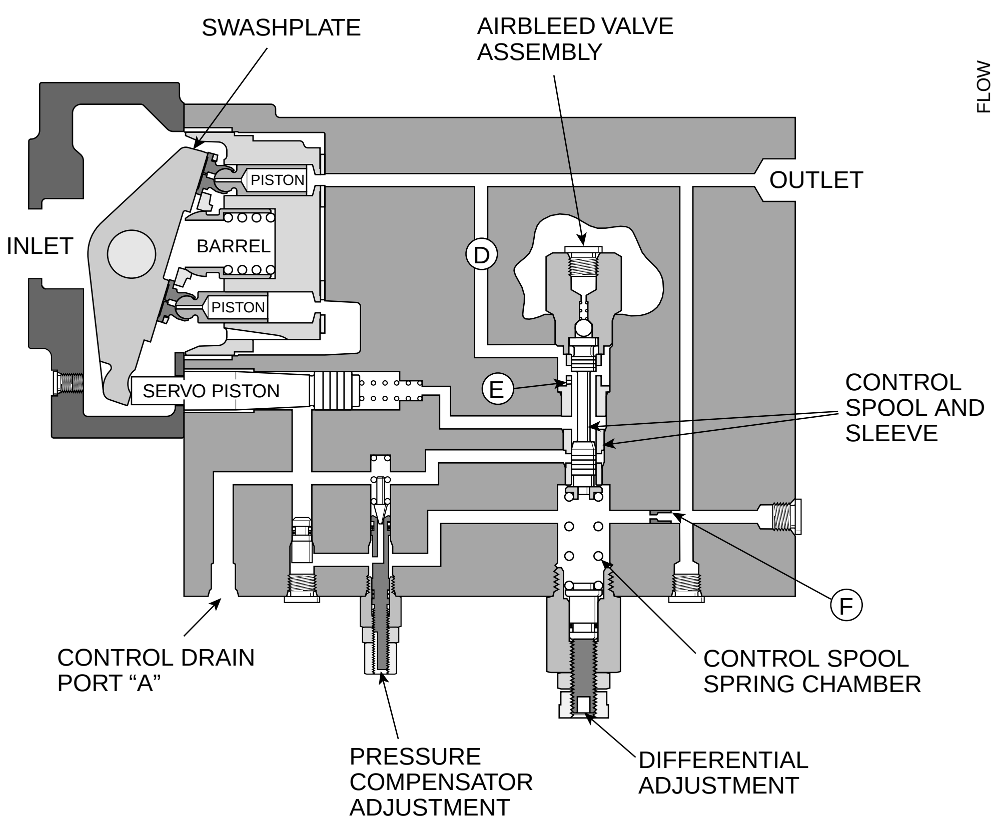
a. Standard Pressure Compensated Pump

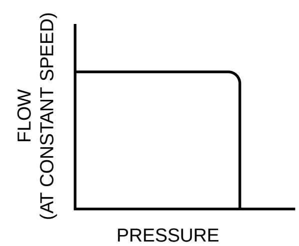
Pumps are shipped from factory with a differential pressure of approximately 150 PSI (10 bar) on PAVC 33/38/65, PAVC 100 is 300 PSI (21 bar) at 50% of maximum swash angle. Differential pressure will not normally change through the life of the pump. If this control has been tampered with, a close **approximation** of the correct setting can be made as follows:

Dead head the pump (no flow) with a 0-3000 PSI (0-207 bar) gauge in the **OUTLET** (not the low signal “B” port), back the pressure compensator adjustment out (full counterclockwise).

The gauge should read between 325-375 PSI (22-26 bar) PAVC 33, 38 & 65, 500-575 PSI (34-40 bar) PAVC 100. If the gauge reads different than this, turn the differential adjustment knob (Differential Option 4) or add/remove shims (Omit Option) until correct PSI figure is reached.

CONTROL OPTION - ‘OMIT’





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Remote Pressure Control

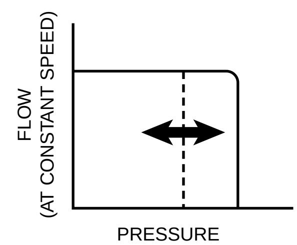
Control Type (M)

Remote control of the PAVC output pressure can be achieved by controlling the pressure in the low signal "B" port when the pump is set up for Control Type (M). A manual, hydraulically piloted, electrical or electro-proportionally controlled pressure control device is installed in the line from the low signal "B" port to tank. The pump will then maintain pressure approximately equal to the pressure in the "B" port plus the pump differential setting.

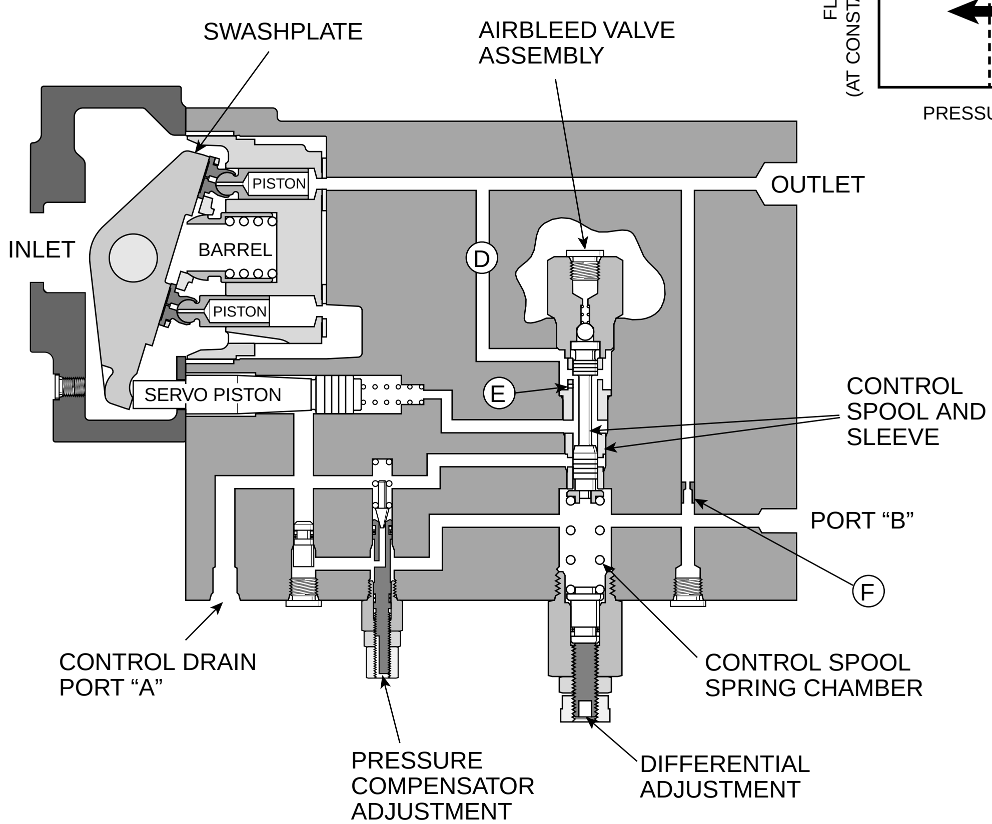
Low Pressure Standby
This option can be used as an alternative to the load sensing option (A) to achieve low pressure standby. Minimum standby pressure is somewhat higher than that achieved using option (A). In the compensating mode there is approximately .3 GPM (1.14 LPM) flow from the low signal "B" port in addition to .9 GPM (3.4 LPM) flow from the control drain port "A".

Multiple Pressure Standby
If the pressure level in the low signal "B" port is limited by a relief valve, as the desired pump outlet pressure is reached, the relief valve in the "B" port will allow the pump to standby at a preset pressure. Adding to this concept, multiple, remotely piloted relief valves plumbed in parallel in the "B" port line can yield multiple, sequential pressure settings.

Electrohydraulic Pressure & Flow Control
A proportional pressure control valve can be used in place of relief valves to give variable pressure control proportional to an electrical input signal to the valve. By combining this arrangement with a swash plate position sensing device, amplifier, and logic circuit, servo control of pressure and/or flow is achieved. **NOTE:** In most systems, a load equivalent to the minimum operating pressure of the pump cannot be guaranteed. Because of this, a sequence valve is required in the discharge line to maintain servo flow control. Please refer to ordering information section for servo components.



CONTROL OPTION - 'M'



Pressure & Flow Control (Load Sensing)

Control Type (A)

Flow control is achieved by placing an orifice (fixed or adjustable) in the pump outlet port. The pressure drop (ΔP) across this flow control is the governing signal that controls the pump's output, as explained below.

Whenever the pressure drop at the flow control increases (indicating an increase in output flow), the pump attempts to compensate by decreasing the output flow. It does this by sensing the lower pressure on the downstream side of the flow control via line (C), which is balanced against the pump pressure via passage (D), on the control spool. The control spool is forced down against the control spool spring by differential pressure. This vents the servo piston cavity, destroking the pump to a point where the set pressure drop across the orifice is maintained and the flow is obtained.

The converse of this is also true whenever the pressure drop decreases (indicating a decrease in output flow). In this case, the control spool is forced up. This increases pump displacement in an attempt to maintain the predetermined pressure drop or constant flow.

It should be noted that the pump is still pressure compensated and destrokes at the selected pressure setting. The pressure compensator control will override the flow control whenever the pressure compensator control setting is reached.

Low Pressure Standby

This arrangement can also be used to provide low pressure standby by venting the "B" port through a simple on/off valve suitable for flows of 1-2 GPM (3.8-7.6 LPM). When flow or pressure is required, this valve is closed allowing system pressure to build behind the control spool and bringing the pump on-stroke.

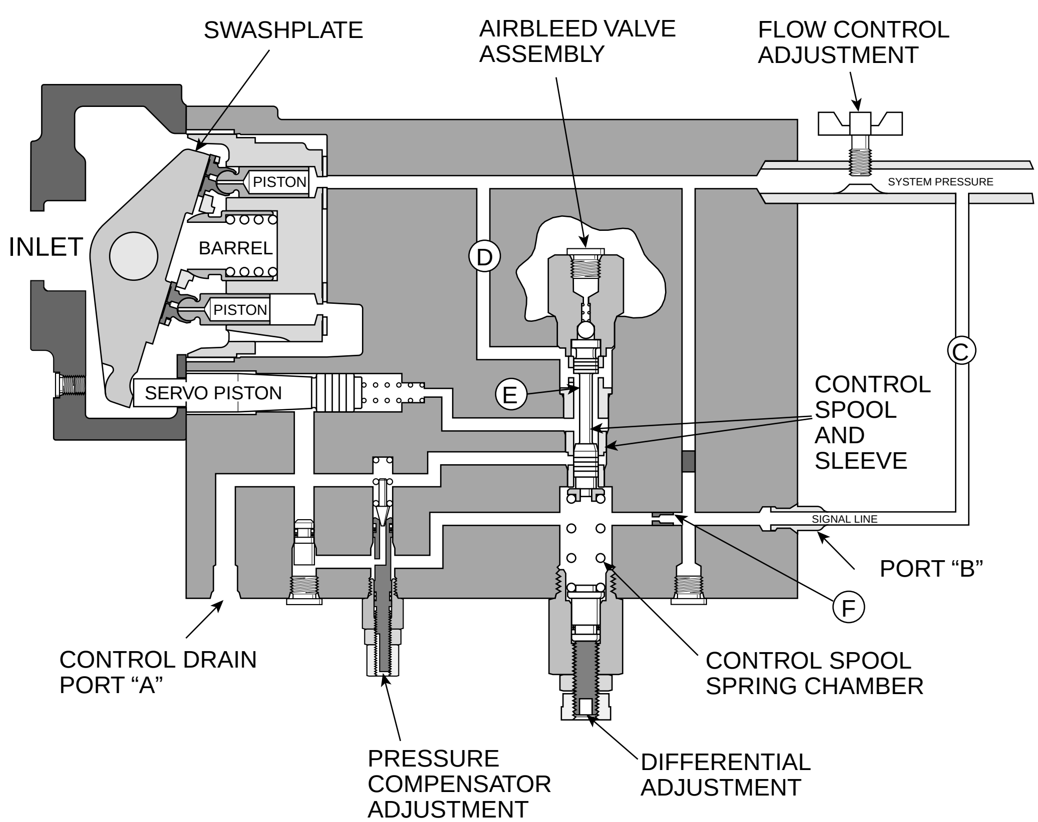
Load Sensing

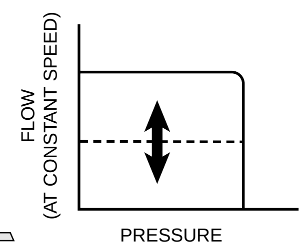
If, instead of measuring the pressure drop across the orifice in the pump outlet port, it is measured downstream of a directional control valve, a constant pressure drop will be maintained across the valve spool. This results in a constant flow for any given opening of the directional control valve regardless of the work load downstream or the operating speed of the pump.

The pump "senses" the amount of pressure necessary to move the load and adjusts output flow to match the valve opening selected and pressure to overcome the load plus the preset ΔP across the valve spool.

The benefits of this arrangement are that excellent, repeatable flow characteristics are achieved, and considerable energy savings are realized while metering, compared to using a straight pressure compensated system.

CONTROL OPTION - 'A'





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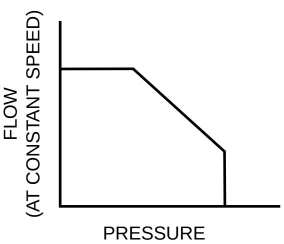
Pressure & Horsepower Control

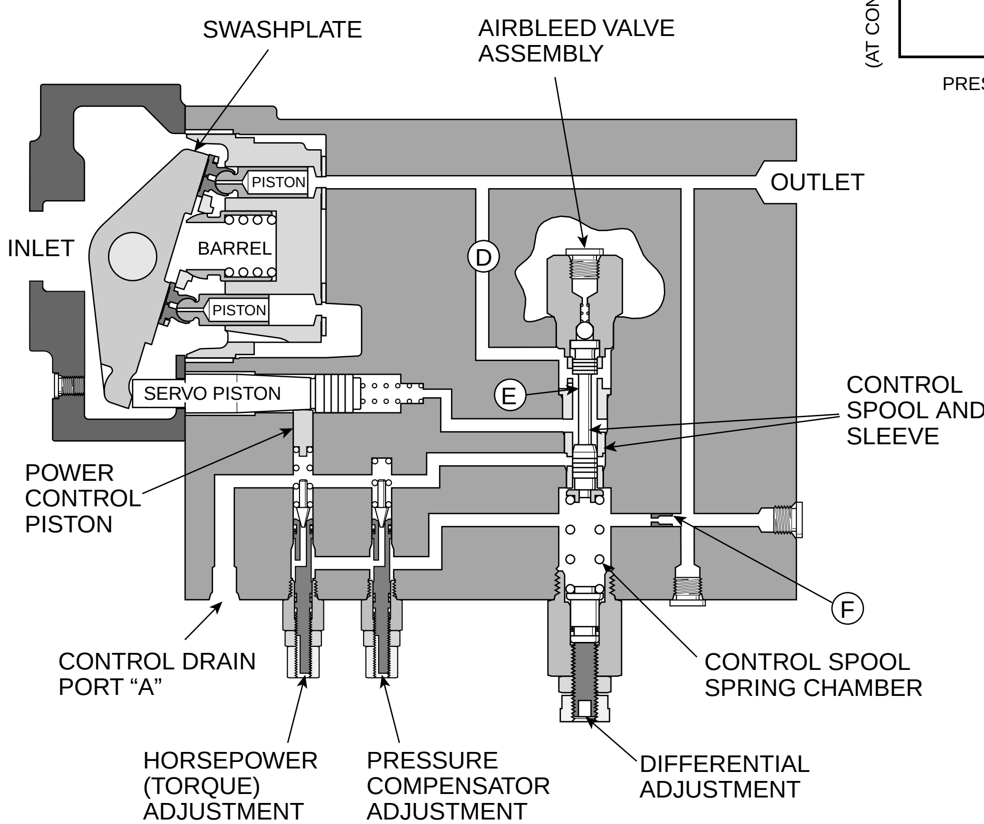
Control Type (H)

The horsepower control is sensitive to the position of the servo piston. When the servo piston is to the right, the swash plate causes low flow and the power control piston develops maximum spring pressure on its companion poppet (mechanical feedback). When the servo piston is left and the flow is high, the power control piston reduces spring pressure on the poppet. This allows it to open under less pressure in the control spool chamber, thereby venting some of the pressure in the control spool chamber. As with the operation of the pressure compensator control, this allows the control spool to move downward, venting the servo piston cavity and causing the servo piston to move to the right. This reduces output flow and thereby power.

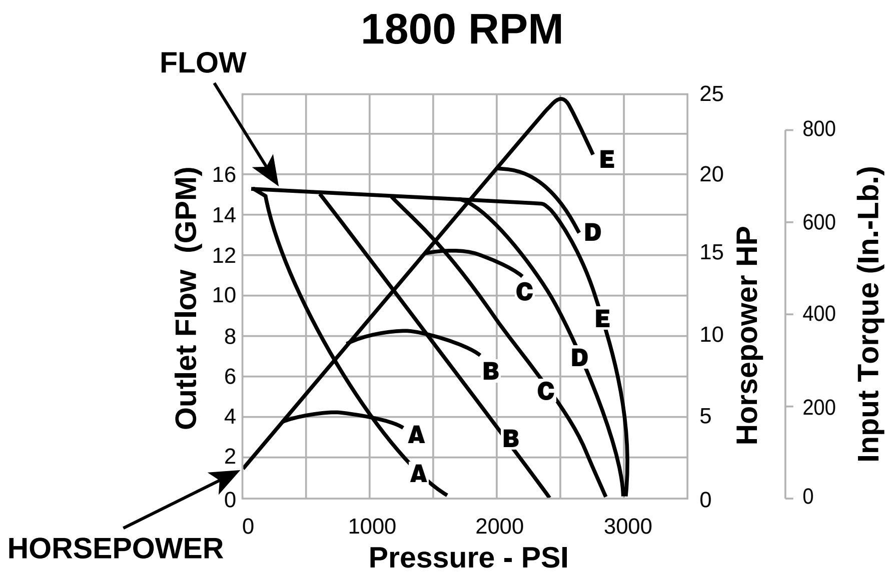
As indicated in the pictorial drawing, pressure in the control spool chamber is affected by both the pressure compensator control and the power control. The resultant pressure in this chamber is a function of the set points of these two controls. Both set points are adjustable.



CONTROL OPTION - 'H'



How to read horsepower control curve data

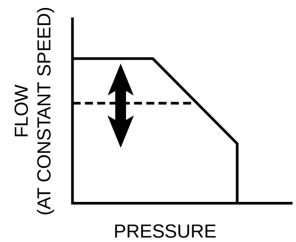


1. Horsepower "**A**" curve corresponds to flow "**A**" curve. This represents a particular setting of the torque control.
2. With this setting the maximum horsepower required will be as shown at the apex (maximum point) of the horsepower curve.
3. The flow at this setting will follow the flow vs. pressure curve shown.
4. Example – 1800 RPM, curve labeled "**C**":
   A. Flow will follow curve "**C**" and pump will deadhead at 2750 PSI.
   B. Full flow will not be realized above 1200 PSI.
   C. Flow at 1500 PSI will be approximately 12.7 GPM.
   D. Maximum horsepower (15 HP) occurs at approximately 1700 PSI.
5. Torque values are shown to correspond to horsepowers at speed shown.

Pressure, Horsepower & Flow Control

Control Type (C)

In addition to the three control configurations just discussed, it is possible to combine all three control devices in one pump. In this mode, the position of the control spool is a function of the actions of the pressure compensator adjustment, horsepower adjustment, and flow control.



CONTROL OPTION - 'C'