

1. General Description

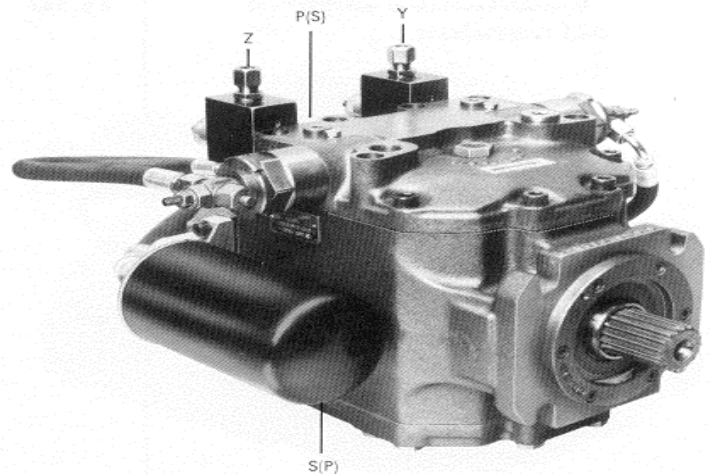
This control is a modification of the standard hydraulic remote control of BPV'S. In the same manner as hydraulic remote control, pilot pressure applied into Y or Z moves the servo piston. The movement of the servo piston manipulates a spool valve which leads the oil flow coming from the boost circuit to the actuation cylinders that control the swash plate in the pump. The stroke of these cylinders determine the amount and direction of oil flow from the main pump. Two features are added to complete the control, pilot pressure limiting valves and system pressure feedback.

2. Flow Direction

The pump is in neutral and will not deliver any oil flow from the main discharge ports when neither control port is pressurized. Pilot control pressure introduced into control ports Y or Z will develop pump flow and the establish direction.

2.1 Control Logic:

	Control Pressure in:	
	Y	Z
CW PUMP in/out	S(P) - P(S)	P(S) - S(P)
CCW PUMP in/out	P(S) - S(P)	S(P) - P(S)



3. Control Pressure Range:

8 - 10.5 Bar

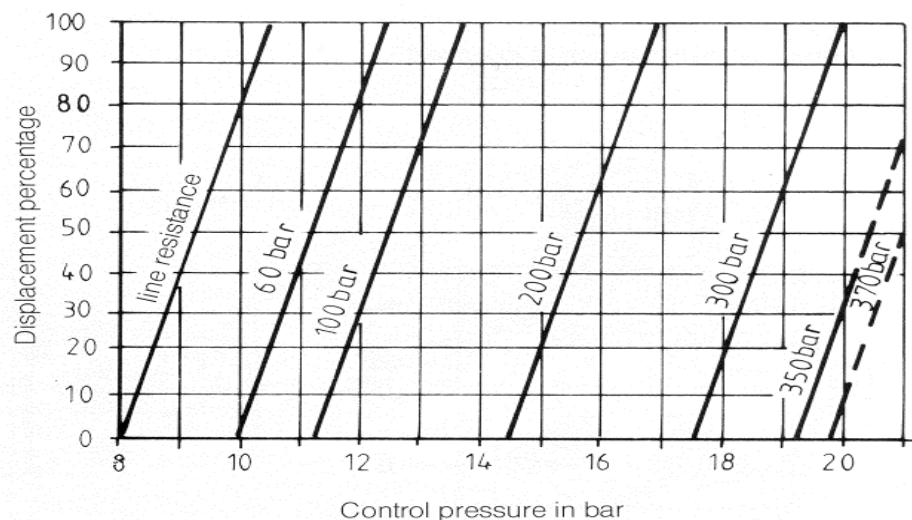
4. Control Volume:

8.6 cc

5. Response Time:

≥ 1 Sec

6. Geometric Displacement vs Control Pressure:





**BPV TORQUE CONTROL - "TC"
CONTROL CHARACTERISTICS
(valid for all BPV except 130 and 200)**

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7. How It Works:

Control pressure is introduced into control port Y or Z and acts on the servo piston which is 28mm in diameter. Though the various internal pump controls, the swash plate in the pump is tilted to produce pump flow which, due to resistance, establishes system pressure. This system pressure is fed back on a 5mm diameter pin on the opposite side of the servo piston countering the initial input control signal. The final position of the servo piston and thence the relative displacement of the pump will be when the various pressures acting on their respective areas balance each other in physical force.

The key to the operation of the torque control is system equilibrium as established by the relationship of the control pressure working on the servo piston diameter of 28mm and system pressure working on a 5mm pin in the opposite direction. Simplifying this relationship further, it is important to realize the following area ratio:

$$\frac{\text{Area of 28 mm Dia.}}{\text{Area of 5 mm Dia.}} = 31.36 : 1$$

Therefore, if 100 psi were introduced into Y or Z then for equilibrium to occur system pressure would have to be 3136 psi.

Consider the following application; a swing drive pump for an excavator. When digging, very often the swing function is used to force the bucket against the sides of the excavated hole to enlarge the excavation. Usually this maneuver is met with heavy resistance due to the resistive forces imposed by the solid earth. System pressure, if left unchecked, builds to release itself over the relief valves in the swing circuit. This produces heat in the hydraulic system!

With torque control in this swing application, system pressure is fed back to the opposite side of the servo piston in the swing pump which counters the control pressure being applied in the control port. In an effort to find system equilibrium, the pump destrokes so as to deliver only the system pressure to balance the imposed control pressure. Flow from the pump is not as important as pressure in this situation. Constant pressure in this application affords constant torque on the swing drive which translates into constant force and thus the name "torque control".