

General Design of the HPR Series Control

The standard regulator or control for the HPR Series pumps is load sensing with pressure compensation. Load sense control adjusts the amount of flow from the pump to maintain a given pressure differential through a throttling device independent of changes in pump drive speed and/or working pressure. This control changes the pump's displacement to match system flow and pressure which saves fuel and reduces heat generation. When system pressure reaches the set limit, the pressure compensator automatically destroys the pump in order to avoid overpressurizing the line between the pump and throttle or opening pressure relief valves with consequently high losses.

Load Sense and Pressure Compensator Control Function

Figure 1 illustrates a typical HPR Series pump schematic with a load sense/pressure compensator control.

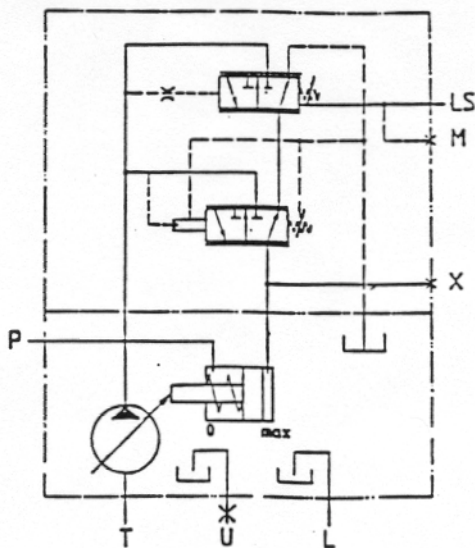


Figure 1

Refer to Figure 2 at the end of this Bulletin for the following explanation. In HPR pumps, pump discharge pressure is always directed to the smaller, pump upstroke actuator. The load sense spring (item 1) attempts to keep the load sense control spool (item 2) in a position that vents the larger, pump destroke actuator (item 5) via a similarly biased pressure compensator spool (item 8), thus keeping the pump at maximum displacement. The load pressure signal, downstream of the throttling device is supplied to the spring end of the load sense control spool at port "LS".



The pump will stay at maximum displacement until the pump's discharge pressure, acting on the opposite end of the load sense control spool, is high enough to move the spool to the right causing the pump's discharge pressure to pass into the intermediate pressure passage 1, through the pressure compensator control (item 4) and through passage 2 to the large, pump destroke actuator causing the pump to destroke until the set pressure differential is attained through the throttling device.

The load sense regulator (item 6) attempts to maintain a constant pressure difference between pump discharge and the load pressure across the throttling device; any increase in flow due to decreasing load or increase in pump shaft speed will cause an increase in the differential pressure. This action immediately results in movement of the load sense control spool to allow pump pressure to act on the large, pump destroke actuator destroking the pump to reduce output flow until the set pressure differential is across the throttling device is re-established. If the pressure difference across the throttle device falls below the set point, the load sense control spool moves to allow the large, pump destroke actuator to vent to tank, causing the pump to upstroke, thus increasing output flow until the set pressure differential is again re-established. If there is no load pressure signal, the pump will destroke when pump discharge pressure reaches a level corresponding to the set point of the load sense spring.

If the force caused by pump discharge pressure acting on the small compensator piston (item 3) exceeds the force of the pressure compensator spring (item 7) on the pressure compensator spool (item 8), then the pressure compensator spool moves to the right directing pump discharge pressure to act on the large, pump destroke actuator causing the pump to destroke to a point where maximum standby pressure at the compensator setting is maintained.



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