

THE FLOW MATCH VALVE SYSTEM

REXA'S ELECTRAULIC™ TECHNOLOGY for actuators and drives seems simple; however, the engineering of this product required a technological breakthrough. The patented Flow Match Valves (FMVs) enable REXA to precisely and smoothly channel hydraulic fluid between two ports of a double acting cylinder without a reservoir or a constant pressure head.

Technological Breakthrough

The hydraulic flow circuit has two operational criteria:

- (1) Move the piston against an external load, and
- (2) Move the piston in the same direction as the load.

Since the direction and magnitude of the load will continually change, these criteria must be met by both ports. In addition, it must be possible to quickly reverse the fluid flow from one port to the other.

Moving a piston against an external load is straight forward. The pump is run until the piston reaches the desired position. At this point, the pump is stopped and the piston is held in place by a check valve which prevents any back-flow of oil.

The second objective, moving the piston in the same direction as the external load, is actually the harder of the two. An entirely different set of conditions exists when the load drives the piston. The difficulty lies in dissipating the energy accumulated in the high pressure port. The oil must be throttled down from 2000 psi to almost atmospheric in a stable, controlled manner.

To do this, the pump meters the fluid flow from the high pressure side to the low pressure side of the cylinder. The pressure breakdown occurs throughout the hydraulic circuit. The internal porting of these valves can throttle a high pressure drop in a consistent manner. In effect, the Flow Match Valves act as a pump back pressure governor for the system, and the pump controls the rate of flow.

This dual action, acting as a check valve in one direction and a throttle valve in the opposite direction, is the unique feature of the Flow Match Valves.

System Operation

Although the FMVs have evolved considerably from a pilot operated check valve, it is useful to visualize their operation in this manner. In the diagram, the pump is rotated in the direction to cause fluid to flow from the right port to the left. This increase in pressure moves the pilot of FMV2 which opens the ball check for reverse flow and connects the pump drain. The fluid flows through the check valve of FMV1 and then to the upper chamber of the cylinder.

The oil in the lower chamber is returned to pump suction by the pilot-opened check of FMV2.

Reversing the rotation of the pump to cause the flow from left to right will fill the lower section of the cylinder and empty the upper. When the pump is stopped, the check valves of FMV 1 & 2 are closed to securely lock the cylinder in place.

