

Hydraulic Control Valves for Forklift

Forklift Hydraulic Control Valves - The function of directional control valves is to route the fluid to the desired actuator. Normally, these control valves include a spool positioned inside of a housing made either of steel or cast iron. The spool slides to different places in the housing. Intersecting grooves and channels route the fluid based on the spool's position.

The spool has a central or neutral location that is maintained by springs. In this position, the supply fluid is returned to the tank or blocked. When the spool is slid to a direction, the hydraulic fluid is directed to an actuator and provides a return path from the actuator to tank. When the spool is moved to the other direction, the return and supply paths are switched. When the spool is allowed to return to the neutral or center position, the actuator fluid paths become blocked, locking it into position.

Typically, directional control valves are designed to be able to be stackable. They normally have a valve per hydraulic cylinder and one fluid input which supplies all the valves within the stack.

In order to avoid leaking and tackle the high pressure, tolerances are maintained extremely tight. Typically, the spools have a clearance with the housing of less than a thousandth of an inch or $25\text{ }\mu\text{m}$. To be able to avoid jamming the valve's extremely sensitive components and distorting the valve, the valve block will be mounted to the machine's frame by a 3-point pattern.

The position of the spool could be actuated by mechanical levers, hydraulic pilot pressure, or solenoids which push the spool left or right. A seal allows a part of the spool to stick out the housing where it is accessible to the actuator.

The main valve block is usually a stack of off the shelf directional control valves chosen by capacity and flow performance. Some valves are designed to be on-off, while others are designed to be proportional, like in valve position to flow rate proportional. The control valve is among the most sensitive and pricey components of a hydraulic circuit.