

Dual-Check™ Valve With Manual Override Basics.

A Dual-Check™ valve equipped with manual override contains two main check valves plus two small, manually actuated, check valves. Figure 1 is a functional schematic for a Dual-Check valve equipped with manual override.

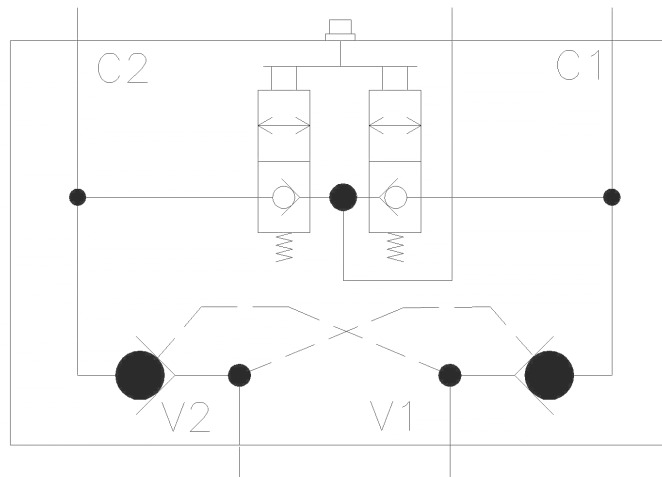


Figure 1. Dual-Check™ with Manual Override Components Schematic.

In a typical application the V1 and V2 ports are connected to the switching or directional control valve and the C1 and C2 ports are connected to the inlet ports of the pneumatic component.

Air is checked on C1 and C2 (component) ports. Both of the main check valves are engaged when there is no pressure on both the V1 and V2 (valve) ports. Either of the main check valves can be overridden when there is enough air pressure on the valve port of the opposite check valve. Therefore, the C2 check valve can be overridden by pressurizing the V1 Port or the C1 check valve can be overridden by pressurizing the V2 Port. In the Dual Check™ valve the air piloting function and connections are all internal to the valve.

The two small, manually actuated override valves are connected to the C1 and C2 ports and are normally closed. Pressing a single button will override both of the valves and vent checked air on both of the main check valves. Releasing the button allows the valves to go back to their normally closed state.

The physical components of a Dual-Check™ valve with manual override are illustrated in a cross section model in Figure 2.

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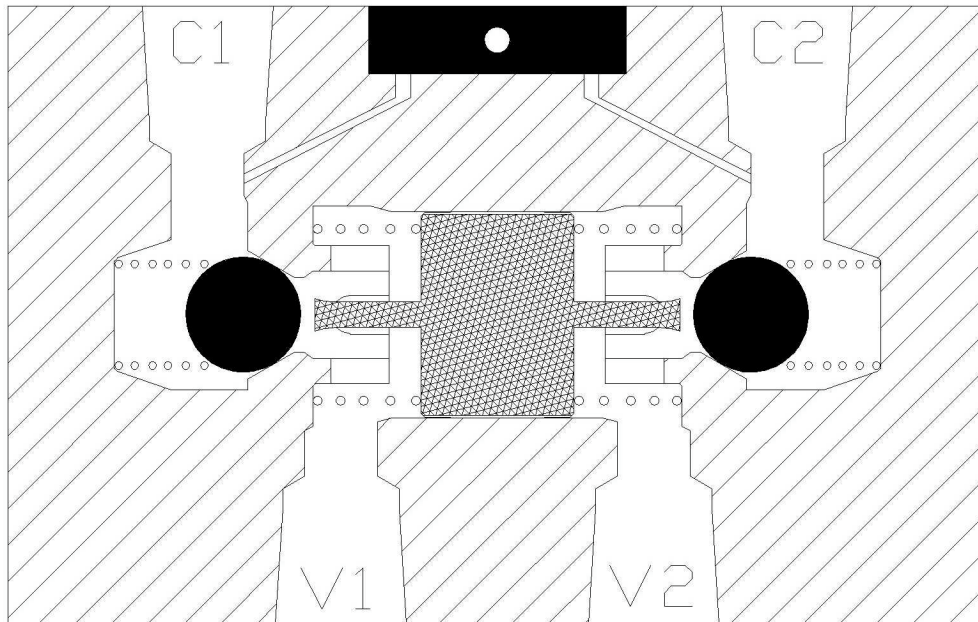


Figure 2. Dual-Check™ with Manual Override Components. (unpressurized state).

The main check valve seals are obtained by spring loaded Buna-N balls. The two main check valves share the same piloting piston, which shuttles between the two check valves. The piston has two arms and is set between two springs that center the piston when the pressure difference between the V1 and V2 ports is low.

It requires approximately a 4 PSI pressure differential between the V1 and V2 ports for the piston to move enough from the centered positioned to where an arm contacts a check ball. When the pilot piston contacts the ball, additional pressure will be needed to move a ball checking pressure. The ratio of the piston area to the ball seating area is approximately 4 to 1. Consequently, the V1-V2 pressure differential needed to uncheck a ball is approximately 25% of the checked pressure plus 4 PSI. The pilot piston will shuttle almost as rapidly as the pressure differential on the valve ports change. Typical piloting and unpiloting response times can be 5 to 10 milliseconds or less.

The manual override module, holds two small, manually actuated override valves. The module is placed into the top of the valve body between the C1 and C2 ports. The base of the module is connected to C1 and C2 ports by two separate channels. The two valves in the module are normally closed. Pressing a single button on the center of the module will override both of the valves. To engage the override for normal operation pressures, the initial load on the button is typically 2 pounds or less. The button is spring loaded, so the button and the module valves rapidly reset when the load on the button is removed.