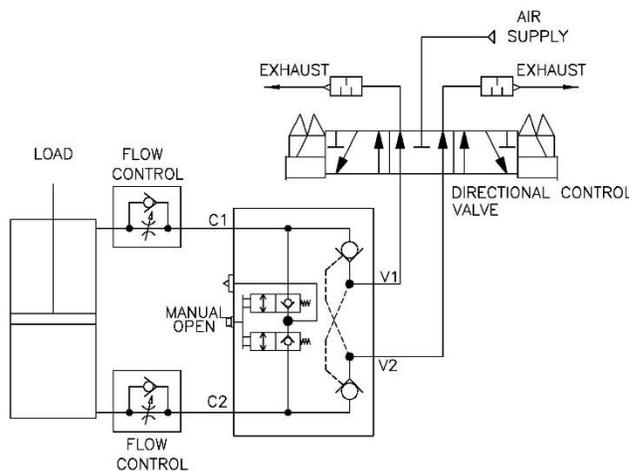


DOUBLE ACTING CYLINDER CONTROL with a DUAL-CHECK®

A typical use of a Dual-Check® valve involves combining it with a direction control valve to control air flow from both ports of a double acting cylinder. With an appropriate combination of direction control valves and other pneumatic components, a cylinder position control system using a Dual-Check® can handle both normal position control and standby or safety stop conditions. A combined valve system can have excellent failsafe and assured control properties. The circuit illustrated below is a basic example of a Dual-Check® used in a vertical cylinder control system.



In the example, the Dual-Check® and direction control valve combination assures load control when the cylinder is under normal control, as well as when there is an interruption of air supply or power. When the direction control valve is de-energized (or in case equipment control, air supply, or electric power is lost, shutoff or isolated/lockout), the Dual-Check® valve holds air in the cylinder and the load is held in position. The Dual-Check® will hold the cylinder piston and load in position (not allowing an energy release) until it is manually overridden or until both equipment control and air supply are reestablished.

The example system has the following characteristics:

- The load can be positioned and stopped anywhere along the cylinder stroke.
- From a stop, standby or shutdown, the velocity control is preserved for both ends of the cylinder.
- When air and electric power supplies have been removed, the piston and load are held in position unless the Dual-Check® is manually overridden or until **both** air pressure and control power are restored. During LOTO, a Dual-Check® will not allow any energy release from the cylinder unless manually overridden. After establishing LOTO, maintenance procedures (for either the cylinder or the load) need to include a step for manual override of the Dual-Check® to vent the cylinder and control lowering of the load.
- A rapidly stopped cylinder behaves like an air shock to cushion the stop of the load. The stopped load is firmly but not rigidly held in a stable position.
- If there is a break in the load lift pressure line between the direction control valve and Dual-Check®, the Dual-Check® will not allow the load to move down when the directional control valve is in the load lift or standby position. .
- The same control system components can be used on a wide variety of pneumatic cylinders, as well as on many rod-less cylinders and rotary actuators. Retrofitting equipment with the control system can be relatively simple. Connections between the cylinder and the direction control valve are simple to plumb.

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- A Dual-Check® typically engages in under 10 msec. so control response time is rapid.
- Load holding capacity is only limited by the cylinder bore and maximum air working pressure.

Additional Control System Design Considerations

When selecting and placing components in the control system, the internal air piloting function of the Dual-Check® valve needs to be considered. Both the V1 and V2 inlet ports must be vented for both check valves to be engaged, since the pilot air for overriding each check valve is supplied through the opposite inlet port. The pilot air venting requirements can restrict some options for direction control valve and flow control valves.

- To provide proper pilot air venting for both normal operation and safety conditions, a three position, open center direction control valve is suitable for most applications. A three position, **closed center** valve should not be used.
- Flow control valves (if used) should be placed between the cylinder and the Dual-Check® valve, where they would not restrict the release of the piloting pressure.

Combining the Dual-Check® valve with a glandless spool and sleeve type of direction control valve can result in a long lasting, low maintenance control system. Glandless spool and sleeve direction control valves are long lasting, but do not seal tightly. The long lasting Dual-Check® valve provides tight sealing when needed by the control system.

The best control sensitivity is obtained by minimizing the internal volume of lines and components between the Dual-Check® valve and the cylinder.

Applications

A Dual-Check® valve can be used in the control systems for a wide variety of double acting cylinder applications. Applications can involve work holding, clamping and positioning, and moving parts or equipment components in a wide variety of manually operated and automated machinery.

Specific circuit design and switching valve selection is application-dependant. Your Aladco® distributor or Aladco® can be contacted to provide assistance with answering application questions.