When operating and controlling a pneumatic clutch or brake device on a mechanical power press, it is common and most often required to use a control reliable double valve (a.k.a. double valve, dual valve, press safety valve, etc…). Double valves are designed to provide SAFETY for the operators and maintenance personnel working on presses. Understanding their basic design, features and functions requires a brief review of applicable safety standards:

**OSHA 1910.217**

1910.217(b) (7) (xi)

The control of air-clutch machines shall be designed to prevent a significant increase in the normal stopping time due to a failure within the operating valve mechanism, and to inhibit further operation if such failure does occur.

**ANSI B11.1**

6.4.4.1 Clutch/brake valve

The clutch/brake operating valve(s) for part revolution clutch presses and the brake valve for direct drive presses shall be designed and constructed to prevent a significant increase in the normal stopping time due to any single failure within the operating valve mechanism and to inhibit further operation if such failure does occur.

Per these US standards, control reliable double valves are designed to accomplish two major objectives:

1) In the event of a failure within the double valve, the braking process of the press is secured. This means when the valve is in a faulted mode, the braking process is immediately initiated (air is exhausted from the brake assembly, allowing the brake to engage) and this must happen without a significant increase in time (or brake angle) compared to the normal stopping time of the press.

2) In the event that the double valve faults, it will fail to a safe condition (stopping the press) and inhibit further operation of the machine by the normal actuating means until the fault is recognized, corrected and the valve is properly reset.

To meet the first objective, modern press double valves include redundant elements with a “crossflow” design. Prior to current safety standards, single (3/2) directional control valves were utilized for these applications. These valves use moving parts which are subject to eventual failure. With only one internal control element, one failure inside the valve could maintain air pressure within the clutch and brake systems, allowing for an unintended repeat press stroke—a very hazardous condition.

The earliest “double valves” were either two (3/2) valves in series or two (3/2) valves in parallel. These early control circuits added redundant flow paths, which did add some safety. If one valve failed, the other valve’s exhaust path would allow the clutch/brake to safely depressurize. However, in a series circuit it was often difficult to recognize if one valve was faulted in an open condition, which resulted in the machine once again operating properly on one single valve element.
Parallel circuits added increased exhaust flow capacity, but if one valve faulted, often the residual pressure remaining in the clutch/brake lines was enough to engage the clutch or release the brake. Crossflow designs initially developed in the 1980’s brought together the advantages of redundant series safety and parallel exhaust capacity circuits without their inherent disadvantages. Crossflow principles have been modified and improved over the years, but remain a well-proven and reliable design for pneumatic safety products to this day.

To meet the second major objective, modern press double valves must be used with a pneumatic or electronic monitoring system to prevent the press controls from providing a “go” signal to the double valve in a faulted condition. Monitors, like double valve designs, have evolved and developed over time. They began as complicated electronic devices, relying on switches and sophisticated logic modules, but developed into much simpler devices with few or no moving parts. The most advanced, state-of-the-art monitor designs today are dynamic and self-monitoring. This means the monitor changes state and checks for proper valve operation on every cycle. In the event of a failure within the valve, the valve elements exhaust all downstream air and the monitor moves into a “lockout” position to inhibit further operation.

Using press double valves with built-in dynamic, self-monitoring systems such as the DM2® Series D double valves guarantees maximum safety and provides the highest degree of reliability. DM2® Series D double valves are base-mounted, dual-ported safety devices with an integral monitoring system. Monitoring is designed to detect abnormal operation within the double valve elements to within 100-125ms. This allows for diminished performance monitoring and alerts operators to potential problems well before catastrophic failure. It is virtually impossible to override, or tamper with, the fault detection system. These valves have memory so that a ready-to-run or faulted valve remains in that condition even if all power sources are removed and then reapplied. Built in anti-tie-down features reduce the chance for controls or operator errors inadvertently, or intentionally, by-passing the safety of the clutch/brake control valve. Optional features include fault signal indication to the press controls, air, solenoid or manual reset options and a variety of body sizes and port threads.

Control reliability for press clutch/brake systems is built upon the foundation of:
1. Redundancy,
2. fail-to-safe operation,
3. monitoring capability
4. and inhibiting further operation when a fault occurs.

ROSS Controls has been the global leader in double valve and safety valve development for over 50 years. Our philosophy has been to provide self-monitoring, stand-alone Category 4 PL e safety devices for press clutch and brake systems and we remain committed to providing the most advanced and long-lasting products available in the industry.

For more information, please feel free to contact us at 1-800-GET-ROSS (1-800-438-7677).

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Additional resources
For extended information related to press metalforming, press safety products, please contact your local ROSS distributor. Also, please visit the press metalforming page at [www.rosscontrols.com](http://www.rosscontrols.com).