

Maintaining exact forces for best results with a pneumatic press

FABCO-AIR – www.fabco-air.com – phone 1-352-373-3578

The Multi-Power® Air Press

Fabco-Air applies its unique force multiplying principle to a precision framework and base, providing the ultimate in a powerful, compact, air-powered bench press for production or laboratory use.

The power cylinder has all the Multi-Power® features plus beefed up construction to meet the rigors of press type applications. Plated steel keys mate the cylinder head and a base plate to high-strength aluminum frame plates. The keyed and bolted construction provides you with the precision and long press life unobtainable from any other “C” frame or post type construction. The model shown above has the Dial-A-Stroke® option for precise control of the ram’s extend stroke.



Determining force requirements –

How much force does it take to crimp a piece of tubing or press a bearing into its housing?

Here’s a simple, economical circuit to use for the job:

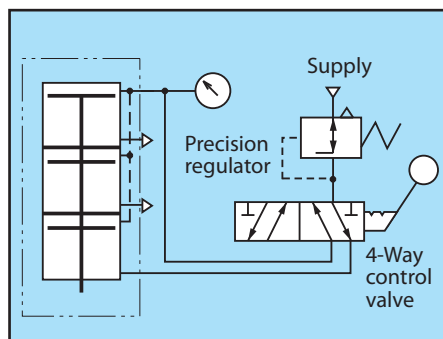
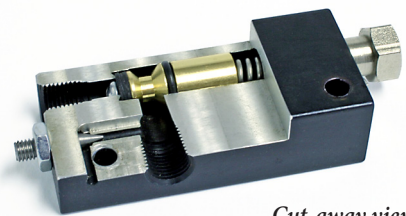


Figure 1. Determining force requirements

1. Adjust regulator to zero pressure.
2. Situate work under the work stroke.
3. Shift valve to extend position.
4. Slowly adjust regulator to raise pressure.
5. Rod will move to the application.
6. Continue increasing pressure while watching the application.
7. At the moment application is completed, read pressure gauge.
8. Multiply gauge pressure by effective piston area of your cylinder.
9. Result is the force (lb.) required by your application.

Producing exact, repeatable forces with a Pressure Sensing Control

Fabco’s “RV” Valve, with its unique poppet type seal, senses the pressure being applied and opens at a pre-adjusted set point to provide a pilot signal for circuit control. Because cylinder force is a direct function of pressure multiplied by area, the “RV” provides direct and precision adjustable force sensing.



Cut-away view of an RV Sequence Valve

If the application requires that a predetermined force be applied to a workpiece at a point that may vary in physical dimensions (such as crimping, riveting, etc.) the “RV” is the control device to use. It assures that the desired force (due to its sensing the pressure) is applied regardless of variations in part thickness.

If system pressure should drop below the “RV’s” set point, it cannot open. The cycle will hold and wait for the required pressure rather than produce an unacceptable rivet or crimp. See the circuit diagram, Figure 2.

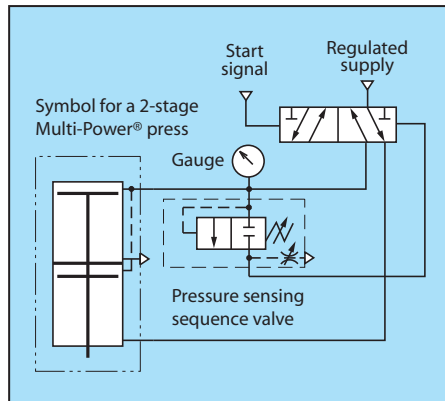
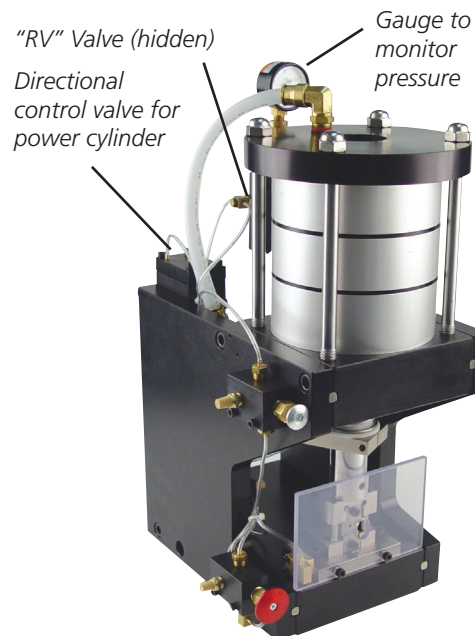


Figure 2. Producing exact forces

Once pressure is restored, the cycle will continue. The part that had been under the work stroke will be finished as a “good part”. The pressure gauge confirms the sensed pressure.



F55 Series Press shown with customer tooling

Controlling speed and shock when punching holes

Now assume we want to punch holes in a stack of laminations with our Multi-Power® press. If needed, we can get as much as 39,843 lbs force at 90 psi supply pressure from a 12 in. bore, 4-stage cylinder. But it is important that we make accommodations for the inertial and impact forces that will be released when our tooling breaks through the work piece. To capture these potentially destructive forces, and prevent damage to the cylinder and tooling, an air-over-oil tank is incorporated in the circuit between the directional control valve and the cylinder return port. (Figure 3)

How it works–

Fluid in the tank is used for the cylinder’s return media only. Fluid flow and cylinder speed are controlled by a needle or flow control valve. In our example we have chosen a flow control valve because we want to control the speed of the “work” stroke while allowing a full speed retract stroke. When the material shears and the cylinder tries to complete the stroke, the non-compressible fluid resists rapid movement. It “catches” the built up forces, dissipating them before the cylinder can bottom out. Thus the piston won’t “pound” on the piston stop.

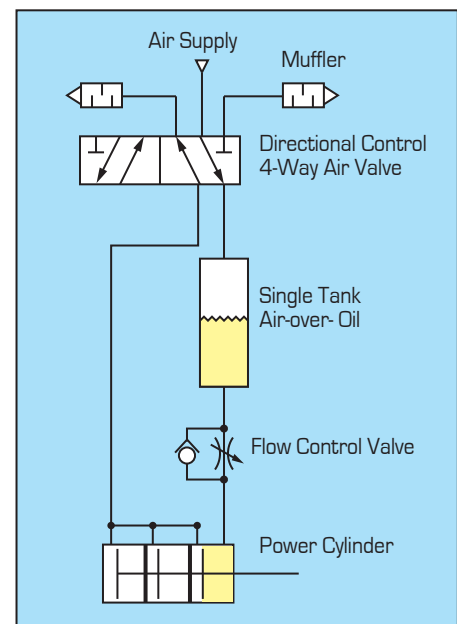


Figure 3. Air-over-oil shock control circuit

Hydraulic Shock option

Seals on the piston, piston rod, and cylinder tube are increased in the single-stage retract section (Shown yellow in Figure 4). Dynamic Poly-Pak® seals combine an automatic lip type seal with an O-spring energizer for excellent sealing from zero to 500 psi. Piston thickness is increased.

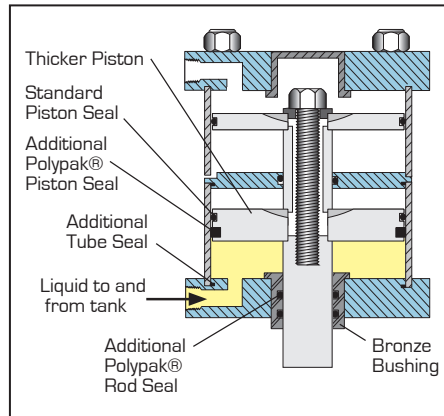


Figure 4. Beefed up construction

2 speed work stroke with shock control

A single air/oil tank with a sequence, needle and shut-off valves, as shown in Figure 5, provides us with 2-speed work stroke operation.

The sequence is as follows:

1. Rapid “extend” stroke to approach the work.

2. Automatic switch to controlled rate when resistance is met and pressure builds up to the point where a Fabco-Air RV “Sequence Valve” actuates the 2-way shut-off valve forcing fluid flow through the speed controlling needle valve.
3. Fluid catches the cylinder motion, thus controlling the shock that could otherwise occur.
4. Automatic return to rapid rate on “Cylinder Retract” stroke.

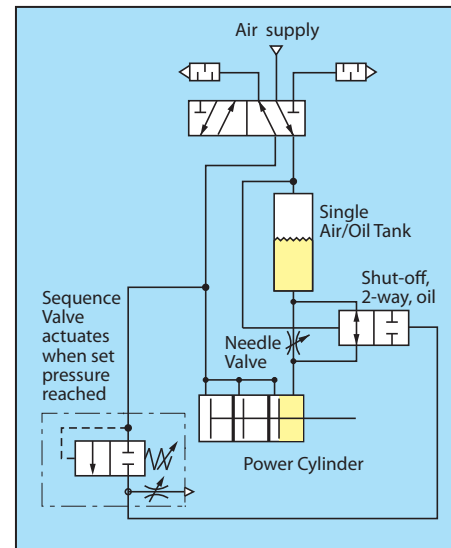


Figure 5. 2-Speed work stroke circuit

about FABCO-AIR



One of Fabco-Air's 24/7 lights-out machining centers

Fabco has all the popular off-the-shelf pneumatic components you want, ready for immediate shipment. Yet almost half of our business comes from helping customers solve design problems with special pneumatic solutions. We can design, prototype and deliver custom samples within 72 hours! **Fabco-Air solves problems. Let us help!**

FABCO-AIR since 1958

With operations housed in 61,000 sq. ft. in Gainesville, Florida, Fabco is dedicated to developing and providing advanced fluid power technology to give our customers the competitive edge they need in their field.

24/7 lights-out precision machining centers drive production, assure product quality and enable reliable delivery.

