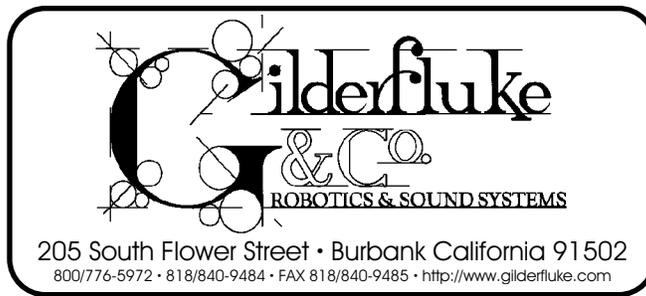


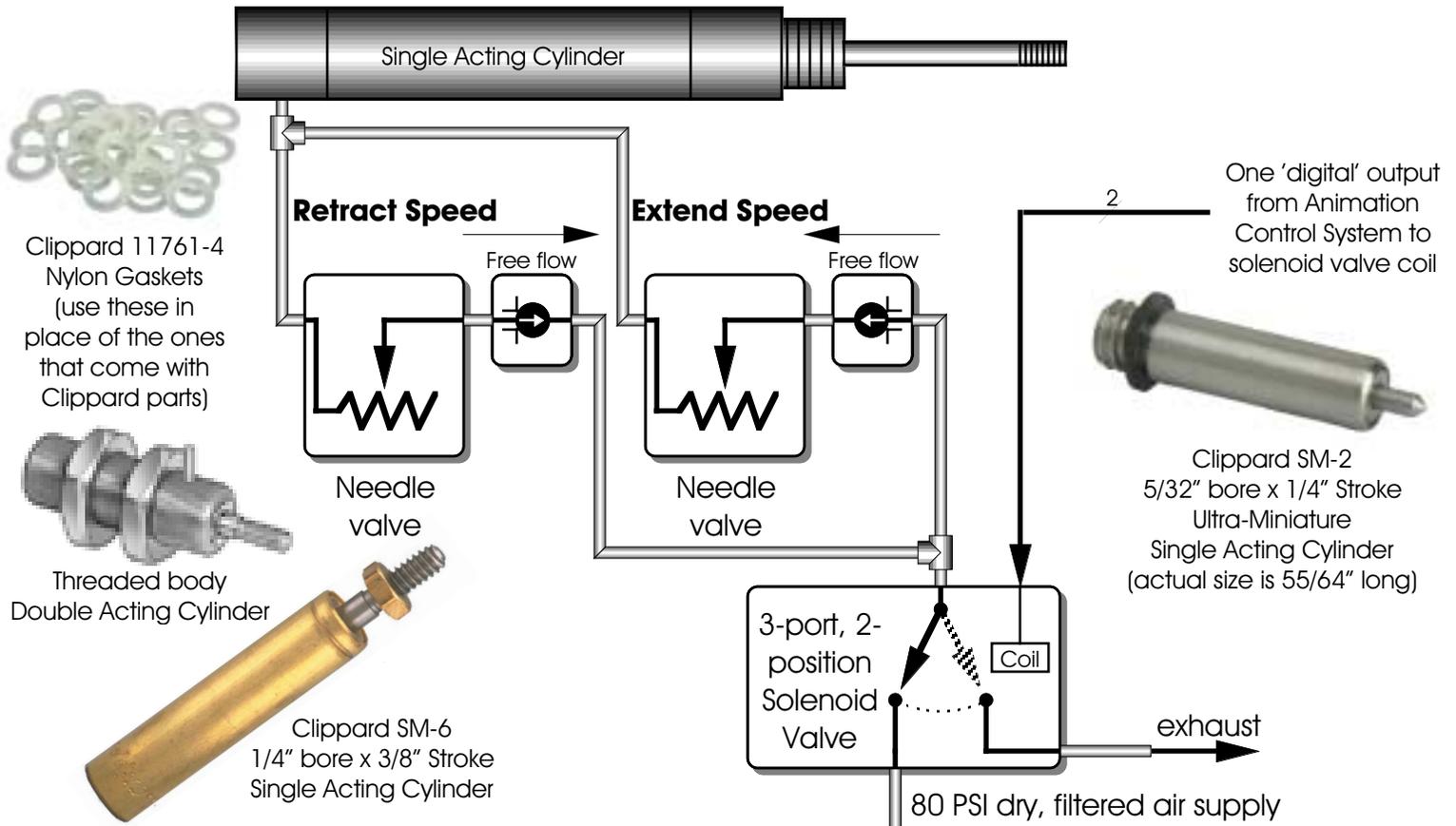


Clippard 3814-7  
1/16" i.d. urethane hose  
or  
Clippard 3814-6  
1/8" i.d. urethane hose



Toll-O-Matic Double  
Acting Cable Cylinder

### Single Acting Cylinder Plumbing (using one 3-port, 2-position valve):



Single acting cylinders use air pressure to power the piston in one direction. A spring (or gravity) returns the piston to the home position. You should try to avoid using single acting cylinders. The springs wear, which affects the cylinders' speeds. If you are using miniature cylinders, you have little choice but single acting cylinders. This plumbing will allow the piston to be moved between the two extremes, and reversed mid-stroke. The two flow controls, which each regulate flow in one direction, don't interact when adjusted. If this is not important to you, you can use a single needle valve. Small cylinders may not displace enough air to open the check valves, so they will need to use a single needle valve for adjustment.

A 3-port, 2-position solenoid valve has three ports and one solenoid coil. One port is the air input, one port is exhaust, and one port goes to the cylinder. When the coil isn't energized, the cylinder port is attached to the exhaust. When the coil is energized, the cylinder port is attached to the air supply and the piston moves. A low cost three port valve like the Clippard EVO-3 can be used. Half of a 5-port, 2-position solenoid valve can also be used. A 5-port, 3-position solenoid valve can be used if you want to try to stop the piston mid-stroke.

The Clippard valves are available from McMaster-Carr (562/695-0677 [www.mcmaster.com](http://www.mcmaster.com)) as their part numbers 4916K22 (12 VDC screw mount), **4916K23** (24 VDC screw mount), 4916K25 (12 VDC manifold mount), **4916K26** (24 VDC manifold mount). Manifolds for mounting 4, 6, 8, or 12 positions are available from Clippard (877/245-6247 [www.clippard.com](http://www.clippard.com)). SMC 5-port, 2-position solenoid valves can be bought from McMaster-Carr as their part numbers **62165K11**. SMC 5-port, 3-position solenoid valves are part number **62165K13**. These can mount on single valve subbase plates (**62165K71**). Manifolds with four (**62165K43**) and eight positions (**62165K47**) are more often used. If you are moving something VERY large, you can use the larger SMC valves. If bought directly through a SMC distributor, you will have additional choices for valves and plumbing connections. Miniature air fittings are available from SMC, Clippard (877/245-6247 [www.clippard.com](http://www.clippard.com)), McMaster-Carr, and others.

If the solenoid valve you are using will let you do so, you can put simple needle valves on the solenoid valve exhaust ports in place of the flow/check valves shown. With the SMC valves, you can only do this only on the single valve mounts.