Hand Out 04: ISO Fluid Logic Symbology Notes

Flow Paths

Lines indicate flow paths. Intersecting flow paths are indicated by filled dots placed at the junction. Non-intersecting or crossing lines are depicted without the filled dot. A short, perpendicular line at the terminus shows terminated lines. Electrical control lines are shown as a line with a little "lightning bolt" arrow striking it. Exhaust lines are indicated by a triangle at the terminus of the flow line, pointing in the direction of exhaust flow.

Directional Control Valves

Squares indicate valve-switching positions; therefore, the number of adjacent squares is the number of positions in a switch. Vertically oriented lines on the outside of the square indicate the ports on a valve, and paths through the valve are shown as arrows (indicating flow direction) or terminations. Horizontally oriented lines on the outside of the valve indicate the actuation signals. The ports are shown on the square that represents the normal switch position, and alternative flow paths are indicated by mentally shifting the position squares to align with the ports. Nomenclature for directional control valves lists the number of ports, followed by a forward slash, then the number of positions.

Example Symbols

Function	Symbol
3/2 directional control valve, general manual actuation with spring return	
3/2 directional control valve, mechanical actuation with spring return	
3/2 directional control valve, solenoid actuation with spring return	
3/2 directional control valve, single air activated with spring return	

5/2 directional control valve, double air	
activated	
Shuttle valve (OR gate)	
Two-pressure valve (AND gate)	
Single acting cylinder, with spring return	
Double acting cylinder	
Pressure source	•
Flow lines intersecting at a tee junction	
Crossing flow lines	
Electrical control line	

5/2 directional control valve, air activated, spring return	
5/2 directional control valve, double solenoid/manually operated	
4/3 directional control valve, neutral closed (draw your own activation!)	
Check valve, with spring	
Double acting cylinder, double ended	
Fixed displacement compressor	
Control valve	
Needle valve (speed control) ISO Non-ISO	
Pneumatic pilot line	
Exhaust port	\bigvee

Pneumatic Logic Examples

Example 1. Single acting cylinder work piece clamp, actuated by both the presence of the work piece and an operator push button, and retracted when the push button is released. The circuit in Figure 1a utilizes a two-pressure valve for explicit AND logic control. The equivalent circuit in Figure 1b utilizes series flow for an implicit AND function, saving one valve.



Figure 1. Two Examples of AND Logic to Control a Single Acting Cylinder

Example 2. Redesign of Example 1b, with the addition of latching logic for the clamp (to avoid operator fatigue) and a clamp release push button to free the workpiece.



Figure 2. Redesign of Figure 1b for Clamping Latch and Clamp Release Switch