

SNS COLLEGE OF TECHNOLOGY, Coimbatore - 641 035

(An Autonomous Institution)

Department of Mechanical Engineering



UNIT I- FLUID POWER SYSTEM FUNDAMENTALS

Properties of fluids and ISO symbols



Fluid Power Principles

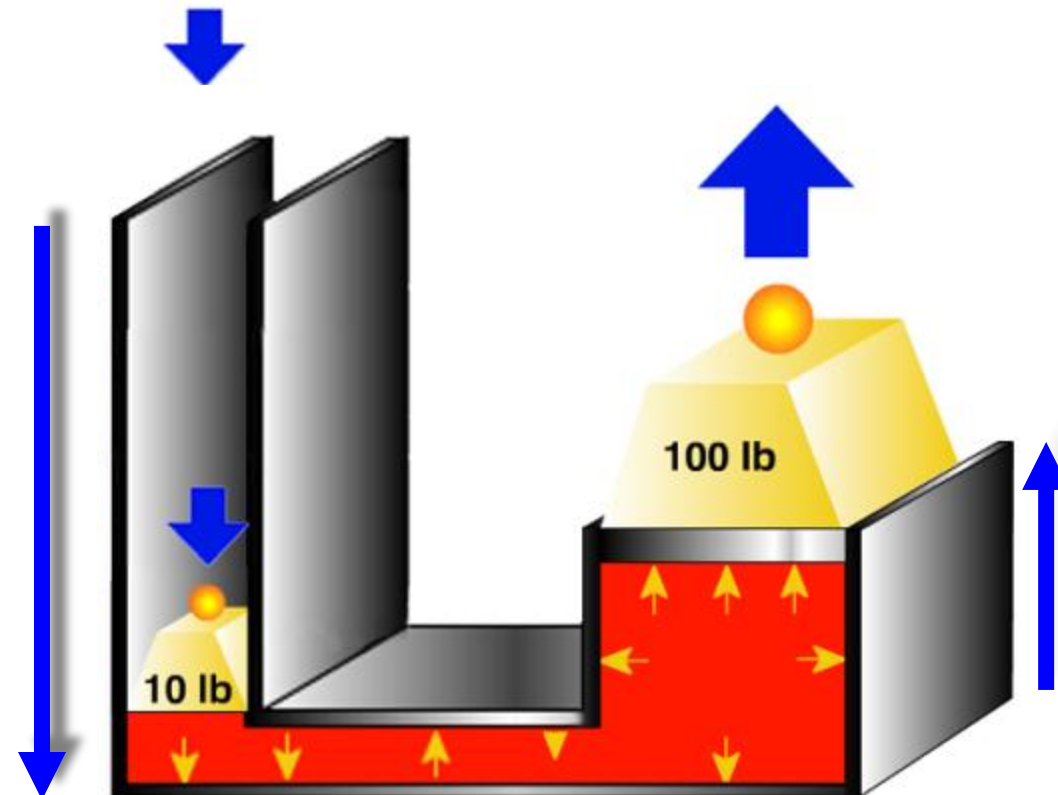
Pascal's Law

Hydraulic Press

10 lb can lift 100 lb

What is the tradeoff?

Distance



National Fluid Power Association



Fluid Power Schematics

Symbols

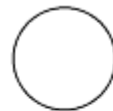
Critical for technical communication

Not language-dependent

Emphasize function and methods of operation

Basic Symbols

Circles



Squares



Triangles



Arcs



Arrows



Dots






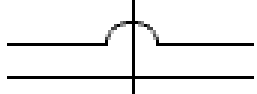
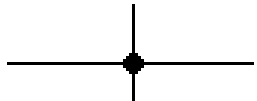

Crosses





Fluid Power Schematics

Lines

-  Continuous lines indicate working, pilot supply, return or electrical lines
-  Dashed lines indicate a pilot, drain, purge, or bleed line
-  Flexible lines indicate a hose which usually connects moving parts
-  Crossing lines use loops at cross over
-  Lines joining may use a dot at the junction
-  Components (like this filter) inserted into lines



Fluid Power Schematics

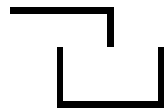
Reservoirs



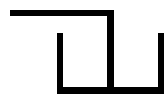
Vented reservoirs are shown as rectangles without top lines



Pressurized reservoirs are shown as capsules



Above oil level return-line reservoir



Below oil level return-line reservoir

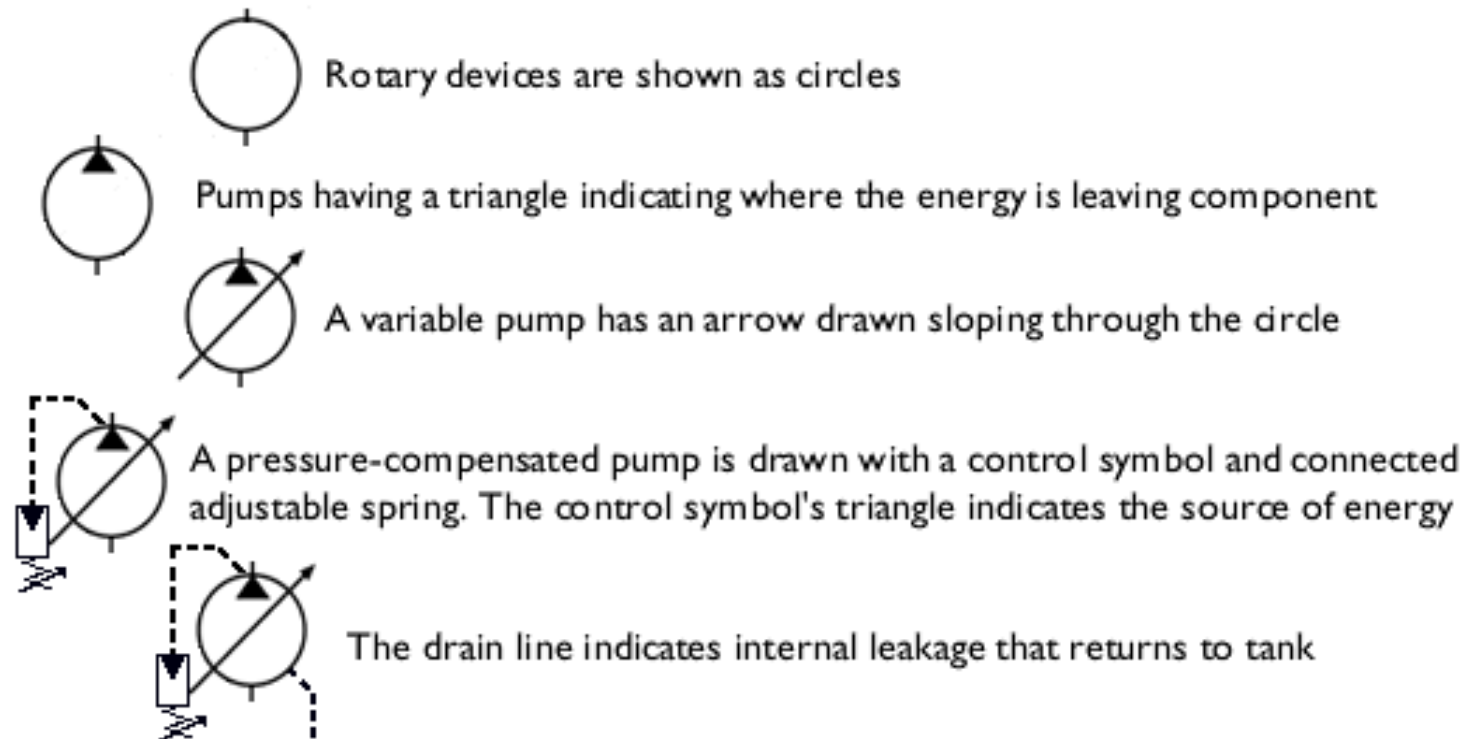


Common reservoir symbol minimizes the need to draw a number of lines into one reservoir



Fluid Power Schematics

Pumps





Fluid Power Schematics

Flow Control Valves



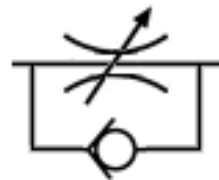
An upper and lower arc symbolize a fixed orifice flow control valve



An arrow through the arcs indicate an adjustable orifice



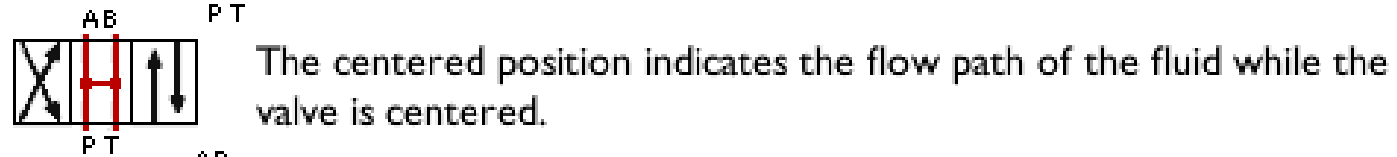
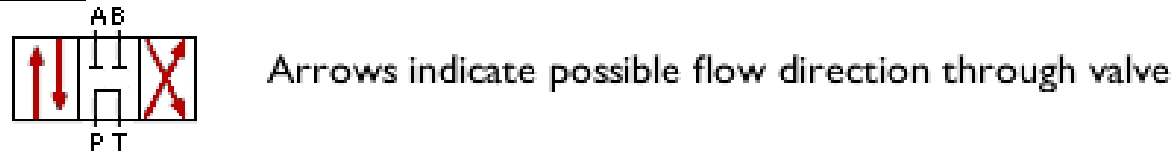
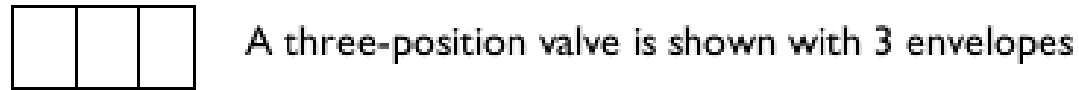
An arrow inside a control box indicates pressure compensated flow control



A check valves indicates reverse flow around the valve

Fluid Power Schematics

Directional Control Valves

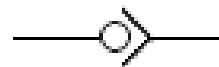




Fluid Power Schematics

Check Valves

 Check valves are drawn with small circles inside an open triangle

 Free flow is opposite the direction the triangle is pointed

 As the circle moves into the triangle, the flow is blocked

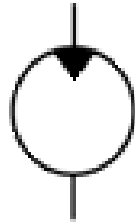
 Pilot to open is indicated with a pilot line directed to the triangle

 Pilot to close is indicated by directing pilot line to back of the circle

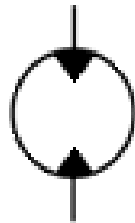


Fluid Power Schematics

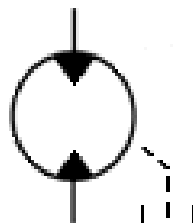
Motors



Energy triangle points into the circle indicating fluid energy entering



Two energy triangles indicate a bi-directional or reversible motor



A dashed line leaving the circle indicates a drain line to tank

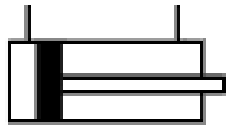


Fluid Power Schematics

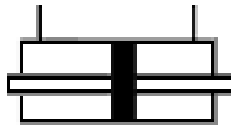
Cylinders



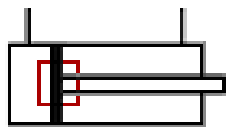
Single Acting (one line)



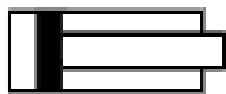
Double acting (two lines)



Double rod (two lines and two rods)



The internal rectangle indicates a cushion device at end of the stroke



If diameter of rod is larger than usual, the symbol must reflect it