CHAPTER 2

PRINCIPLES OF POWER HYDRAULICS

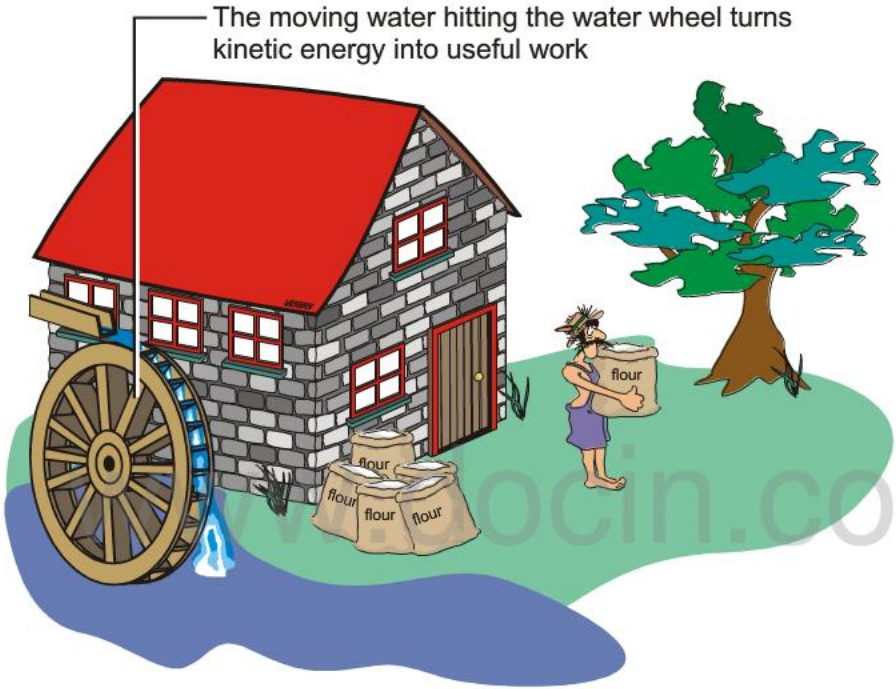
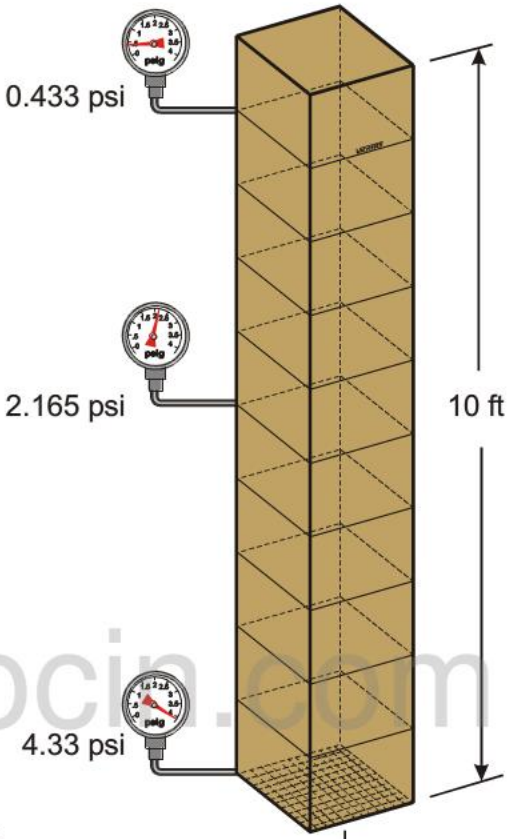


Figure 2-1 Hydrodynamic device uses kinetic energy rather than pressure

1. A foot-square section of water 10 ft high contains 10 cu ft of water. If each cu ft weighs 62.4 lbs



2. then the total weight is 624 lbs. This weight is divided over 144 sq in. This gives us a pressure of 4.33 psi at the bottom of the 10 ft column of water

Figure 2-2 Pressure 揾ead?comes from weight of the fluid

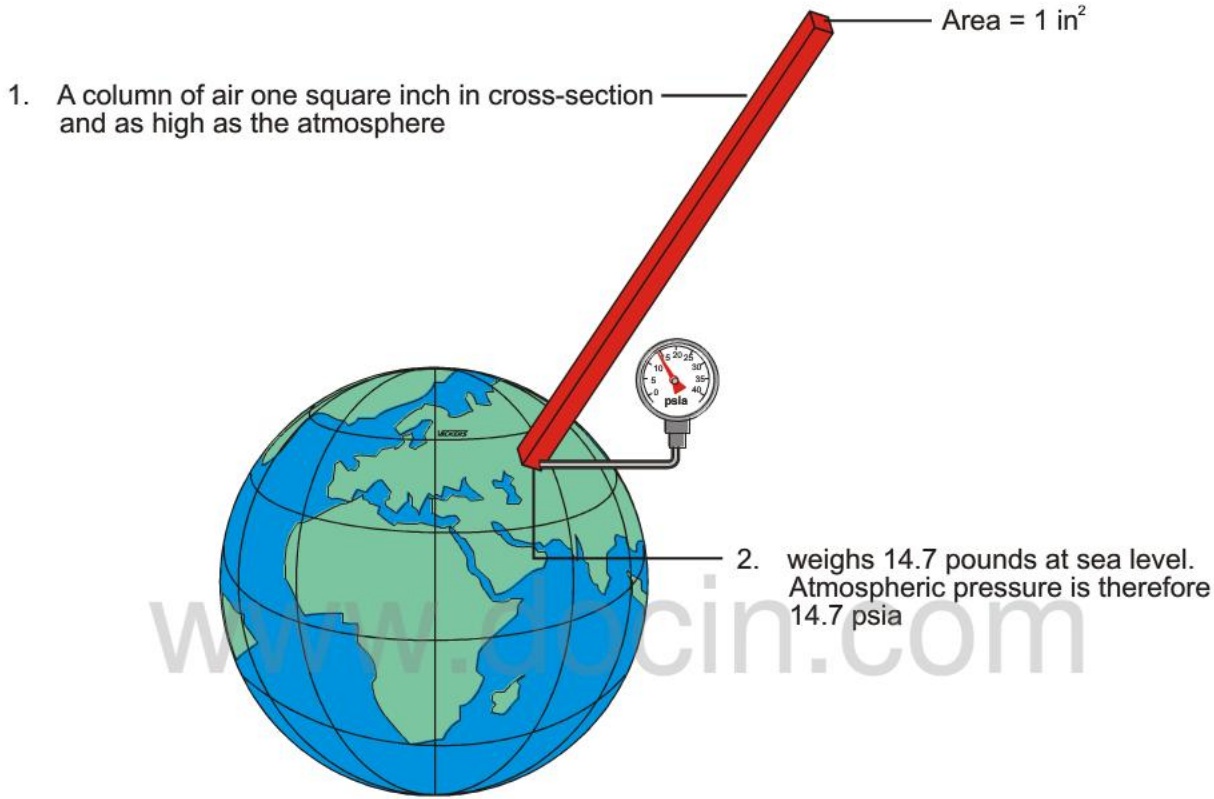


Figure 2-3 Atmospheric pressure is a 揾ead?of air

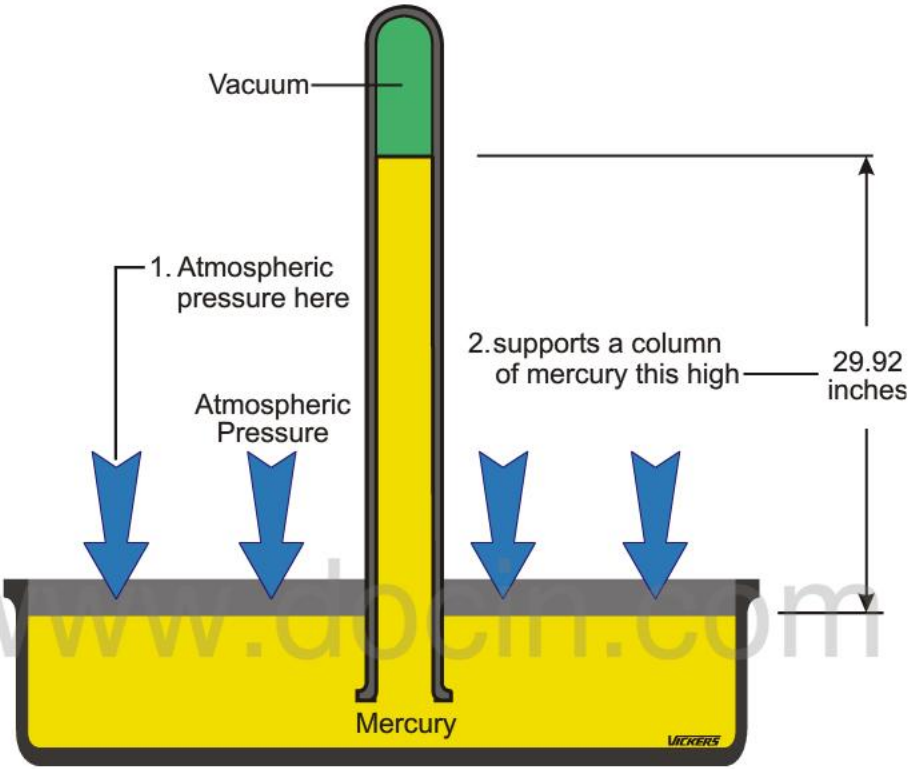


Figure 2-4 The mercury barometer measures atmospheric pressure

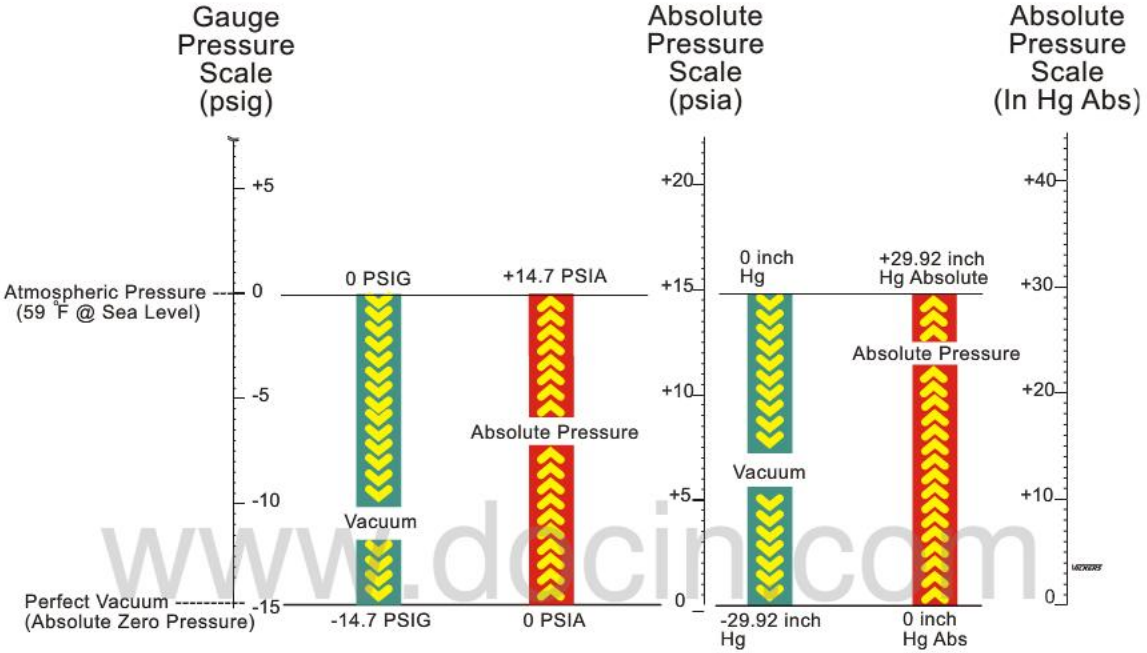


Figure 2-5 Gauge and absolute pressure comparison

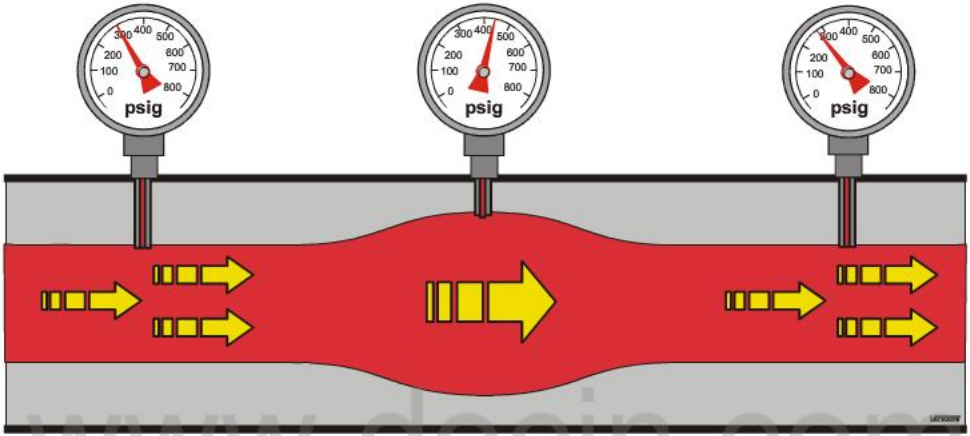


Figure 2-6 Flow is volume per Unit of time; velocity is distance per unit of time

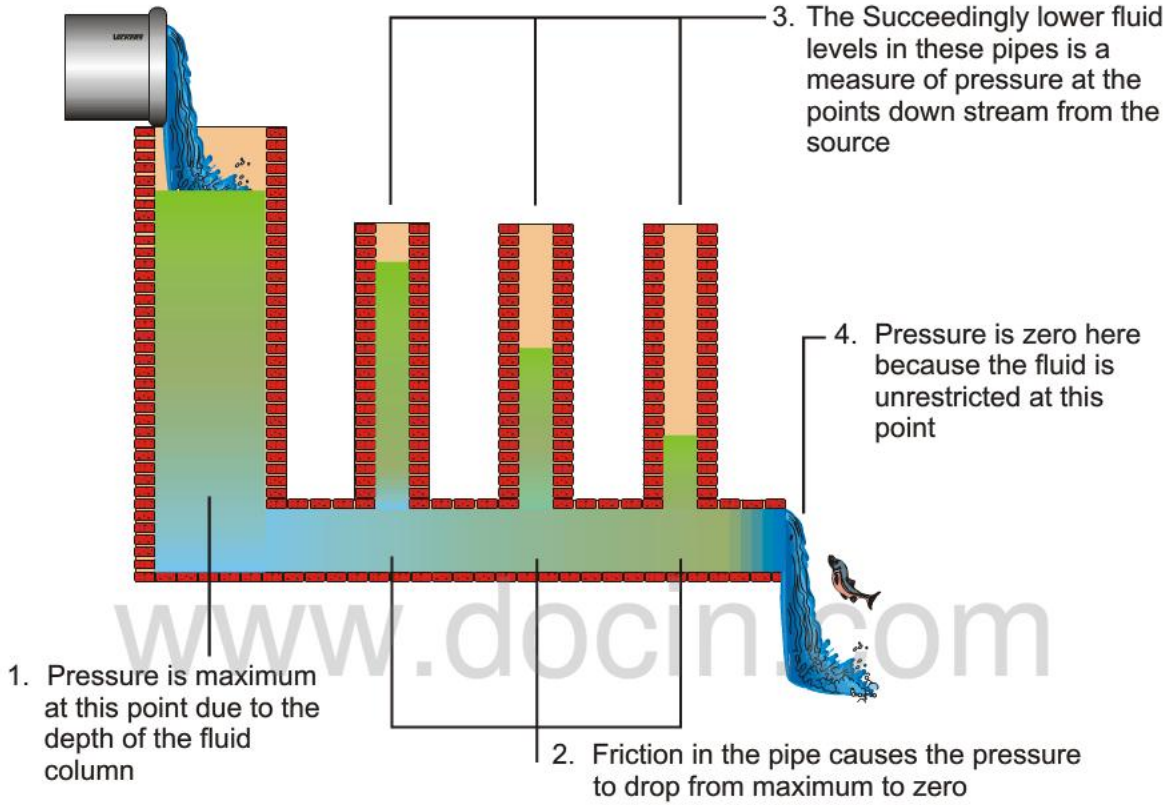


Figure 2-7 Friction in pipes results in a pressure drop

A.

1. The liquid is subject to atmospheric pressure at all points so the fluid is the same level at all points

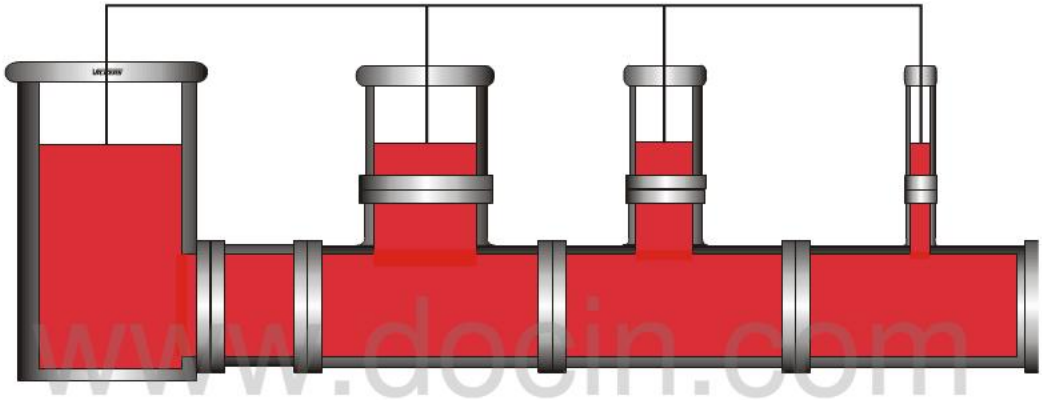


Figure 2-8 Liquid seeks a level or levels depending on the pressure

B.

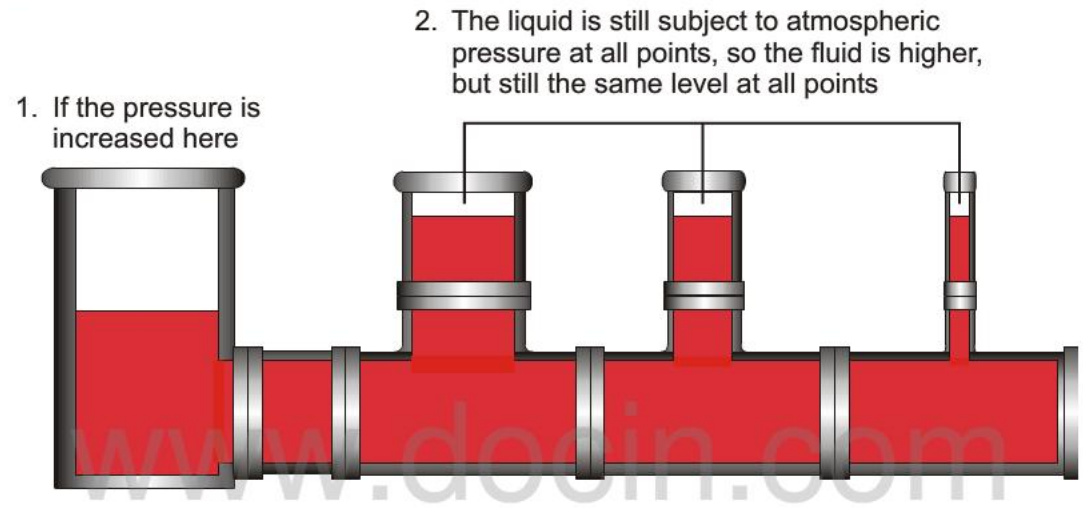


Figure 2-8 Liquid seeks a level or levels depending on the pressure

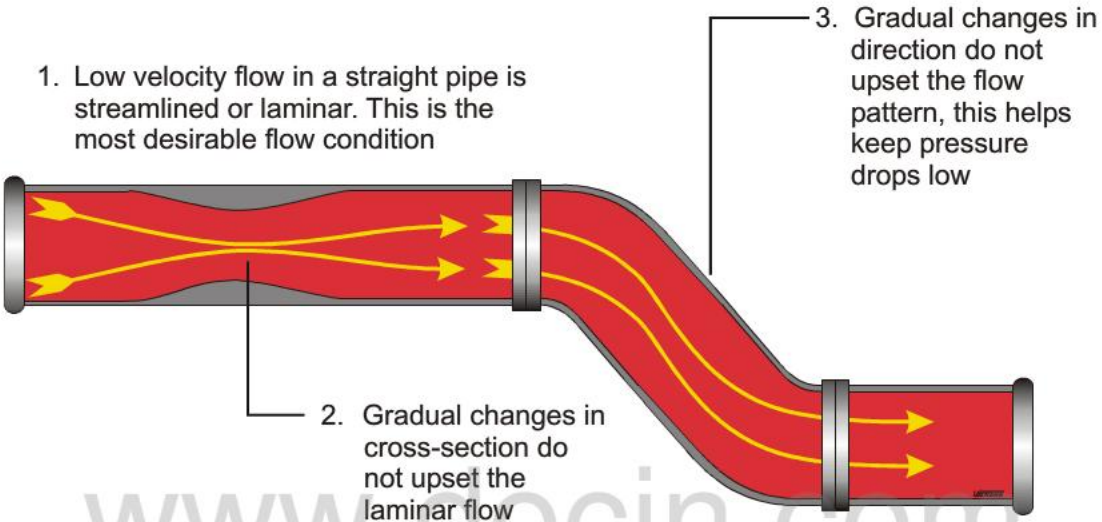


Figure 2-9 Laminar flow is in parallel paths

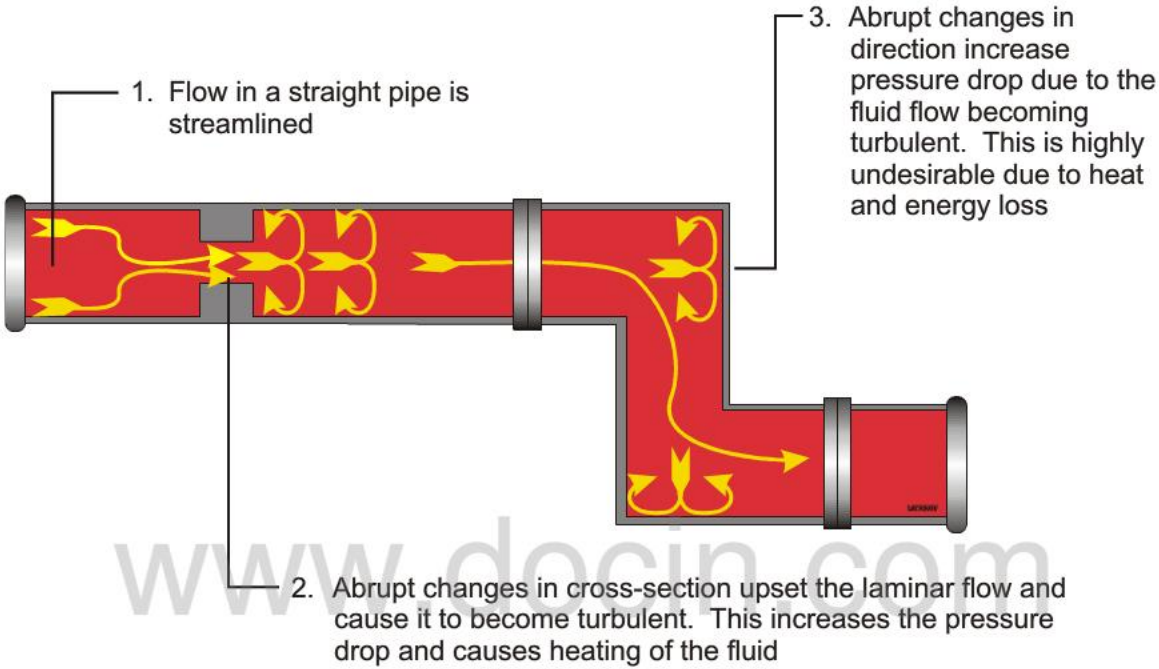


Figure 2-10 Turbulence results in flow resistance

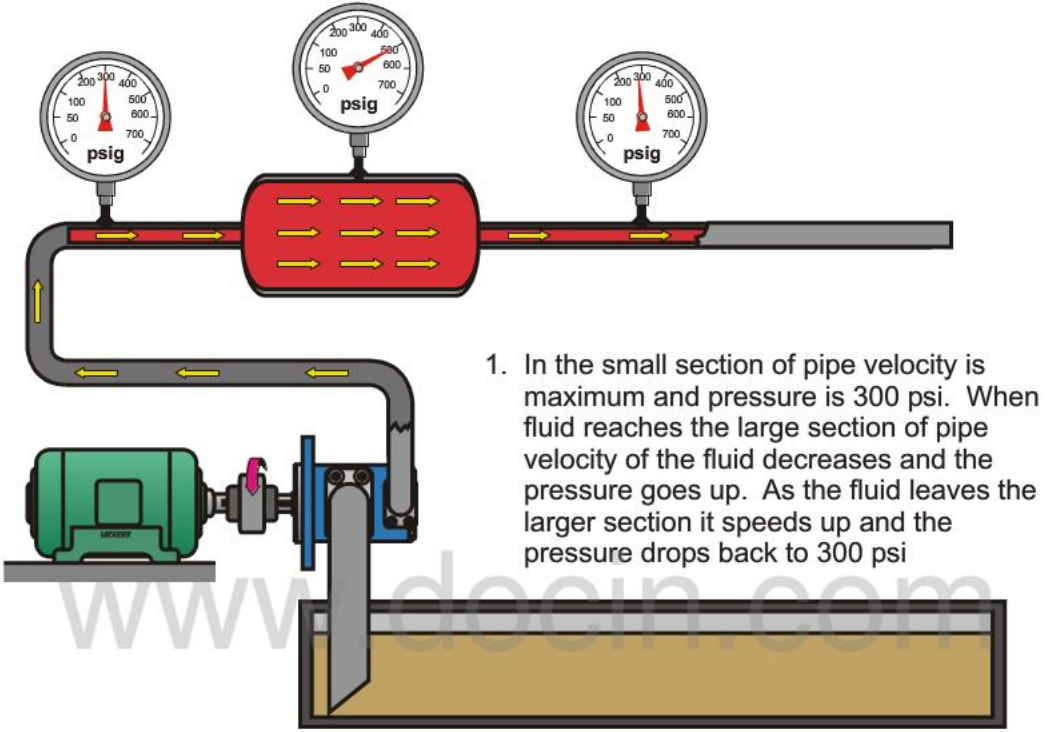


Figure 2-11 The sum of pressure and kinetic energy is constant with a constant flow rate

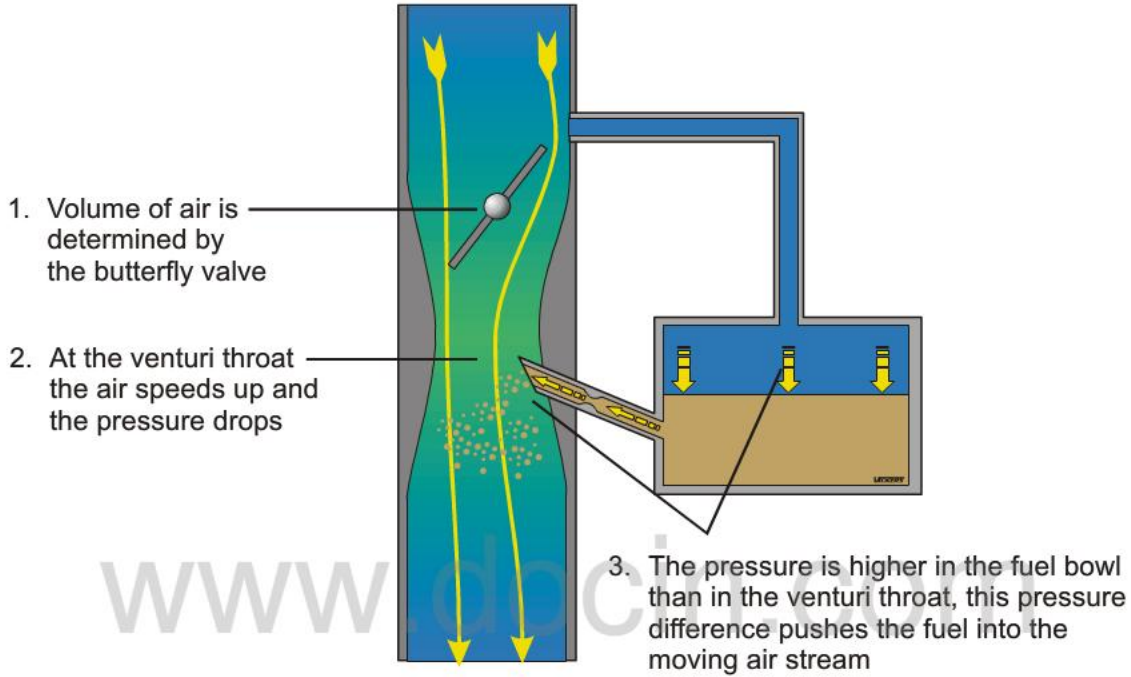


Figure 2-12 Venturi effect in a gasoline engine carburetor is an application of Bernoulli担principle

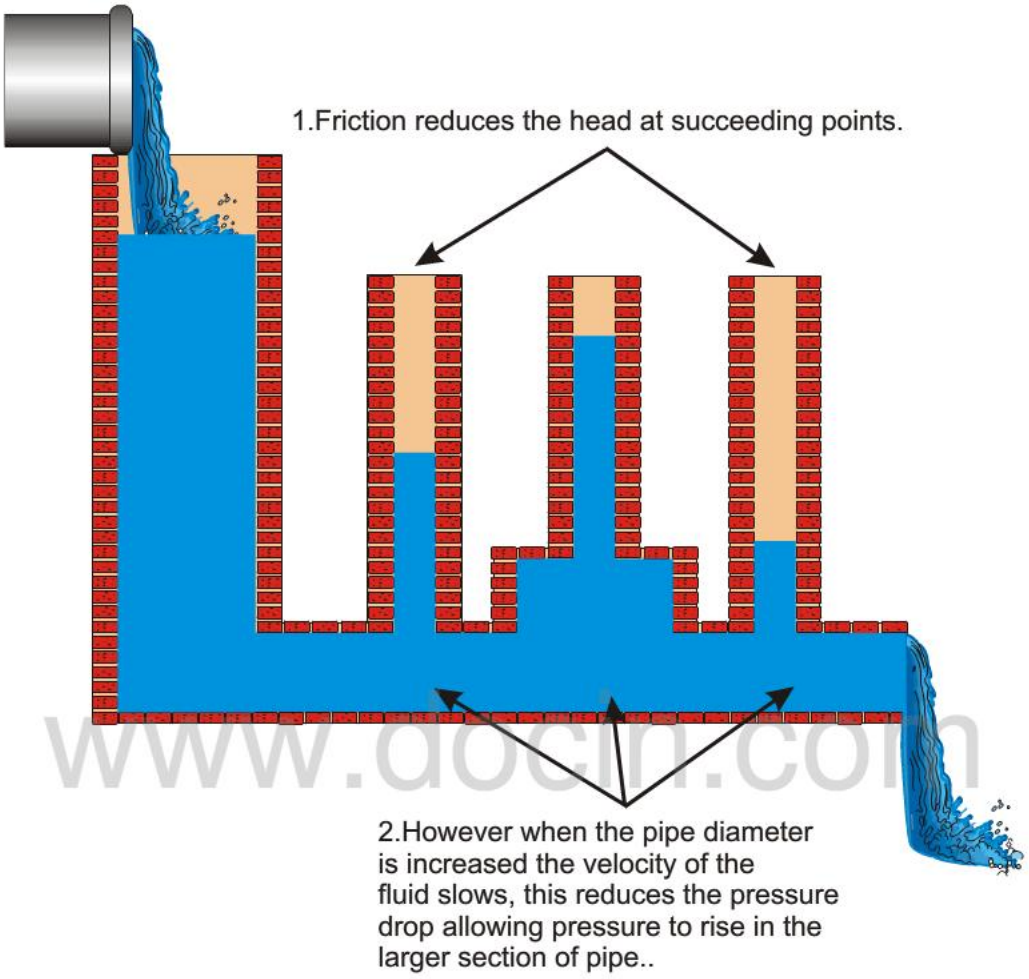


Figure 2.13 Friction and Velocity Affect Pressure

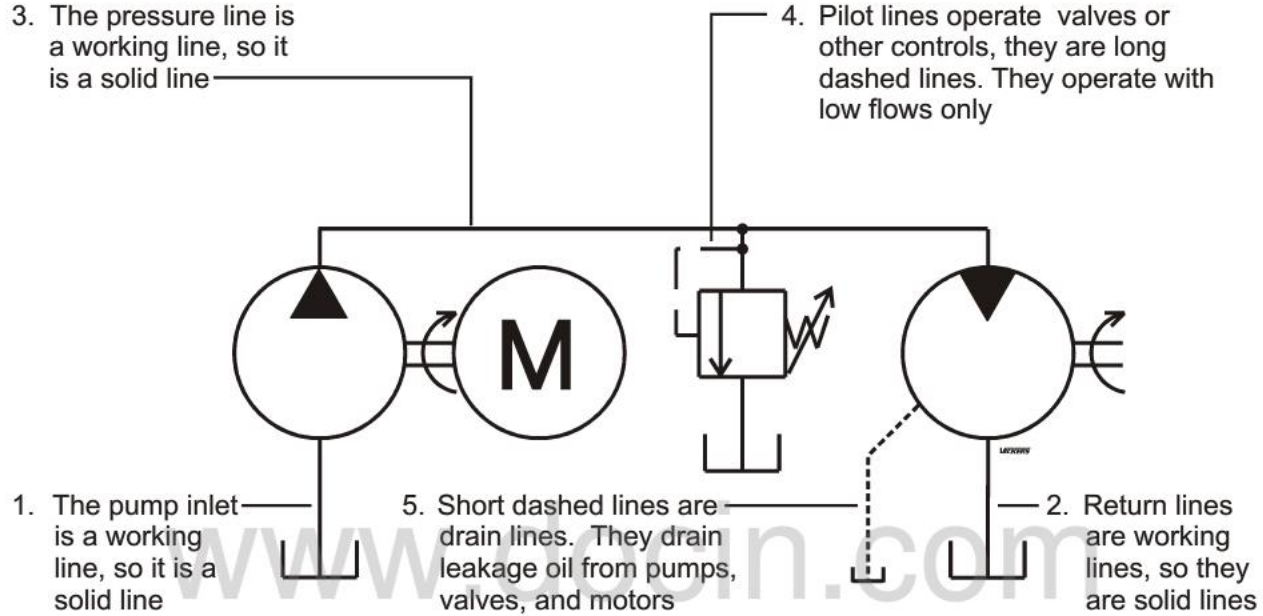


Figure 2-14 Three classifications of lines

1. The fluid energy triangle points out showing the pump as a source of flow

Pump

3. The triangle pointing in shows the motor receiving energy

Motor

2. Two fluid energy triangles show the pump to be bi-directional, meaning flow may switch between ports

Bi-directional Pump

4. Two triangles show the motor to be bi-directional, the motor is reversible

Bi-directional Motor

Figure 2-15 A circle with energy triangles symbolize a pump or motor

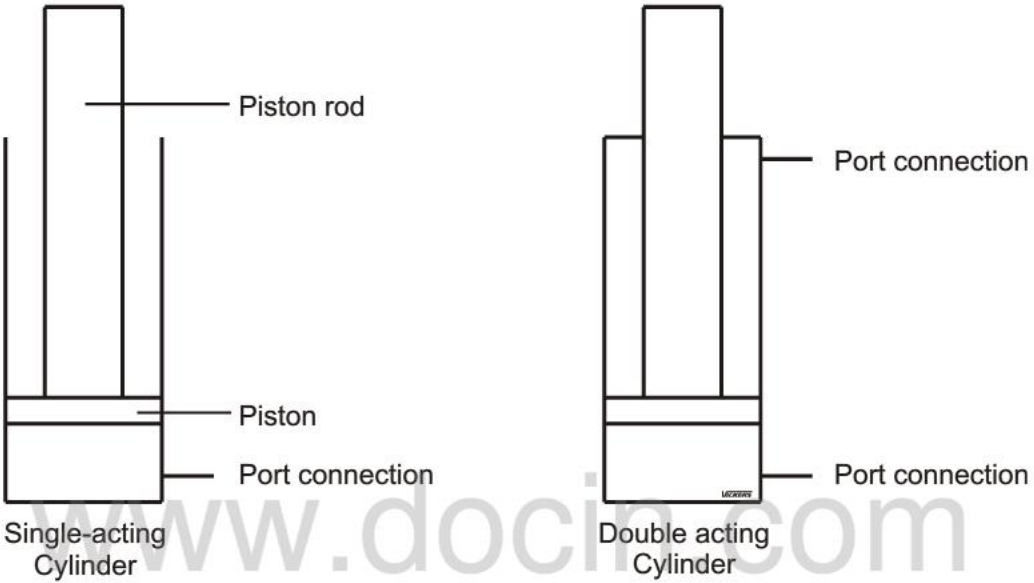


Figure 2-16 Cylinder symbols are single acting or double acting

A.

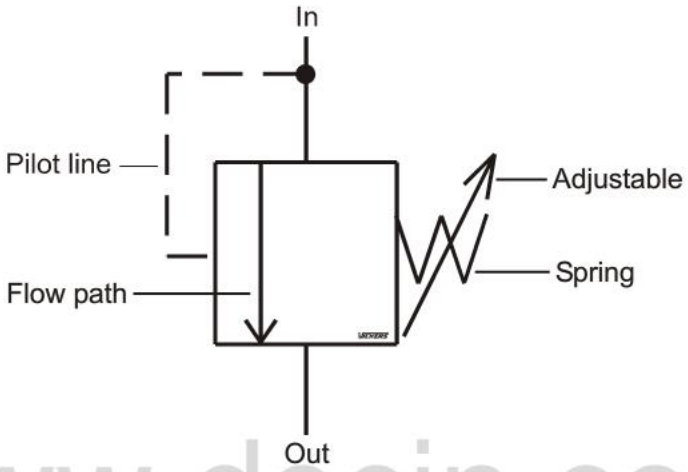


Figure 2-17 An envelope is the basic valve symbol

B.

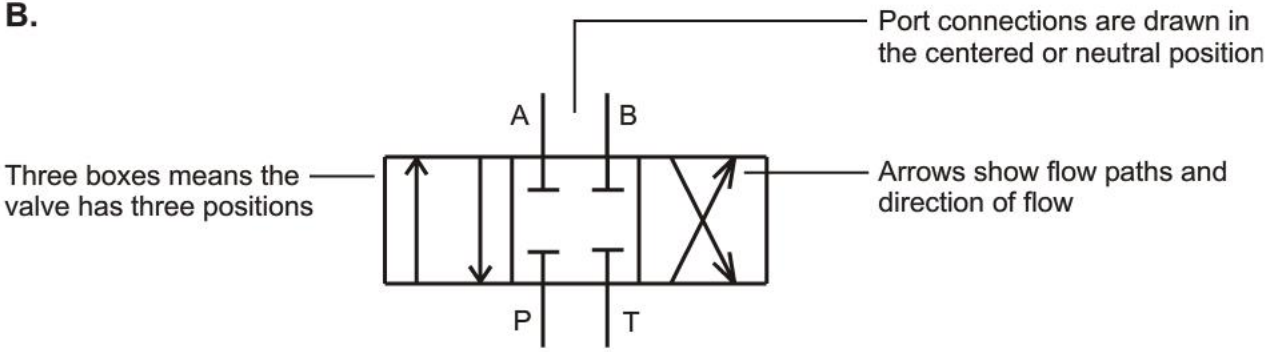


Figure 2-17 An envelope is the basic valve symbol

C.

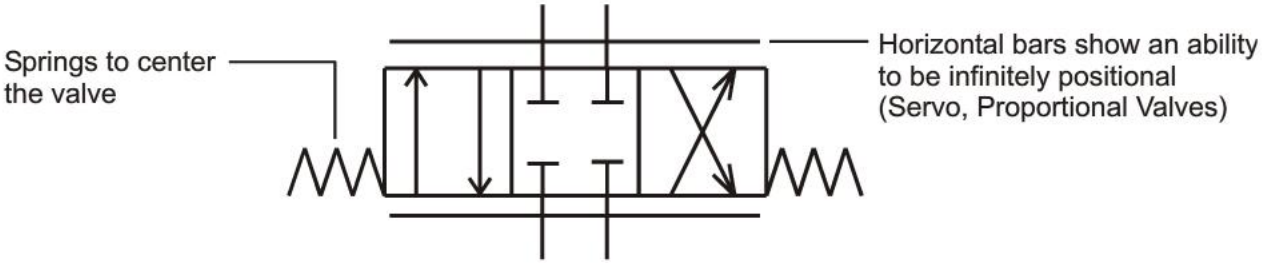
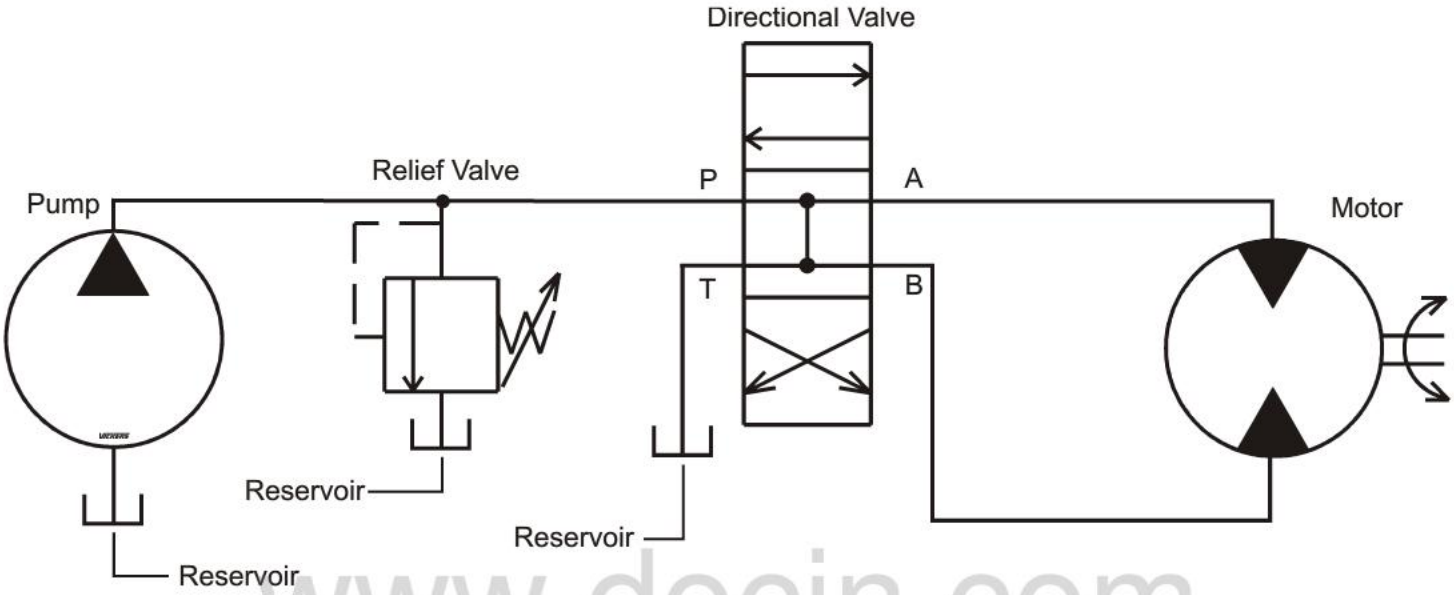


Figure 2-17 . An envelope is the basic valve symbol



There is typically only one reservoir in a system though the symbol is redrawn for simplicity sake.

Figure 2-18 Graphical diagram of motor-reversing circuit