# The Valves of a Centrifugal Pump

The suction and discharge piping of a centrifugal pump, will generally have the following valve arrangements :

1. Suction Valve: Allows liquid to enter the pump.
2. Discharge Valve: Allows liquid to flow from the pump to other parts of the system.
3. Check or Non-Return Valve: In the discharge line -Prevents back-flow from discharge to suction through the pump.
4. Vent (priming) Valve: This is used to vent off air/gases from the pump before start-up.
5. Gauge Isolation Valves: Allows the replacement of pressure gauges on suction and discharge lines, the most important being the discharge pressure.
6. Gland Seal Valve: (where fitted). Controls the flow of cooling media to the pump gland cooling fluid.
7. Recycle Valve: This is a flowline valve which is used to recycle pumped liquid back to the suction side or to the suction vessel, in order to maintain a flow through the pump when the discharge valve, (and/or FCV), is closed. (Prevents heat build-up).
8. Drain Valve: Fitted on the bottom of the pump casing and used to drain the pump prior to maintenance work being done.
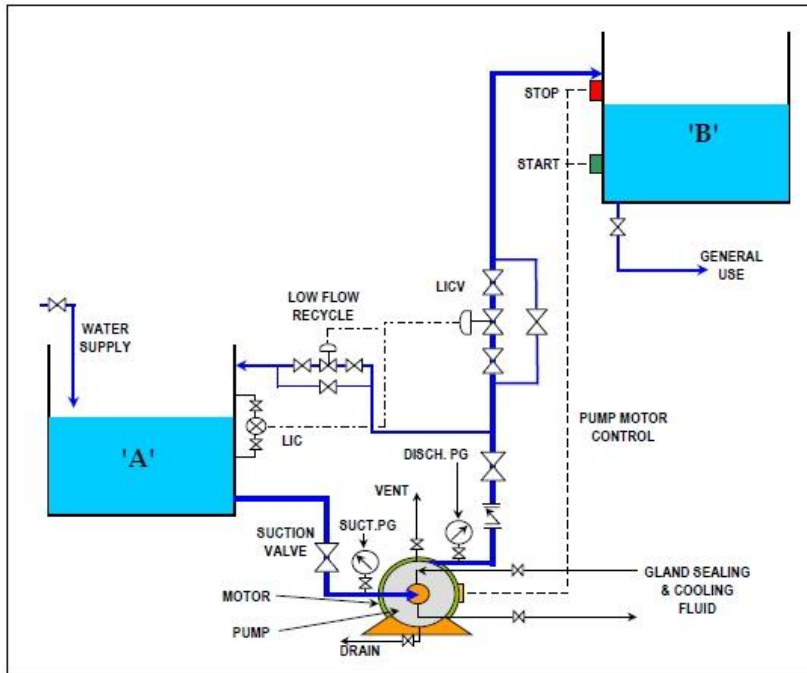
Working principle

A centrifugal pump works by converting kinetic energy into potential energy measurable as static fluid pressure at the outlet of the pump. This action is described by Bernoulli's principle.

With the mechanical action of an electric motor or similar, the rotation of the pump impeller imparts kinetic energy to the fluid through centrifugal force. The fluid is drawn from the inlet piping into the impeller intake eye and is accelerated outwards through the impeller vanes to the volute and outlet piping. As the fluid exits the impeller, if the outlet piping is too high to allow flow, the fluid kinetic energy is converted into static pressure. If the outlet piping is open at a lower level, the fluid will be released at greater speed.
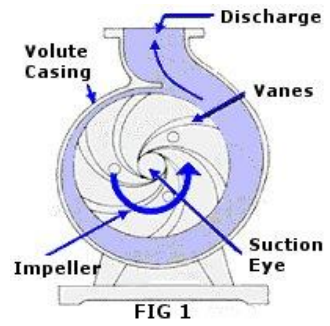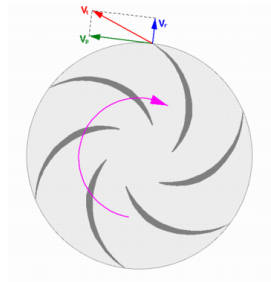
A centrifugal pump uses a spinning "impeller" which normally has backward-swept blade