ELECTRONICS FOR BEGINNERS

CHAPTER 2: Pressure, Flow, Resistance, Power

OK, water, not electrons. Look at Figure 2.1. Pressure from a pump makes water flow through a restriction. The restriction adds resistance, limiting the water current's flow rate. The picture shows a smaller pipe but the resistance could just as well come from a valve, nozzle or some other restriction. Changing the restriction varies the flow. More resistance (smaller pipe diameter, less valve opening) decreases the water current; less resistance increases it.

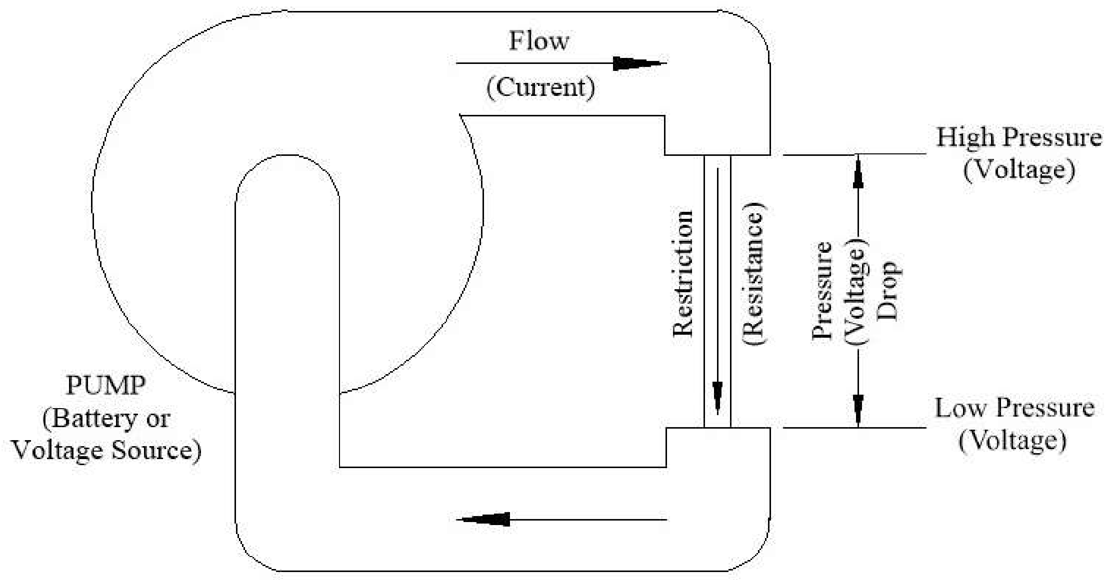

Figure 2.1. Water flow compared to electric current.

If flow gets too low we need more pressure to bring it back up: maybe a bigger pump, or maybe our pump has variable speed. Anyway, more pressure, more flow. As an approximation:

Flow = Pressure / Resistance

It takes power to drive the pump. More flow needs more power. So does more pressure. Another approximation:

Power = Pressure x Flow

Actually, this equation covers only the power used up by the restriction (resistance), not total power. Power losses such as the wide pipe resistance or the inefficiencies of the pump are not included. Suppose the resistance came from driving a water turbine instead of a restriction. In that case, the equation would compute the power delivered to the turbine.

These equations are just examples, not exactly correct because of the properties of fluids. Electrons are different – they have similar equations which are exact.

Flow = Pressure / Resistance becomes:
Current (amperes) = Volts / Resistance (ohms)

Power = Pressure x Flow becomes:
Power (watts) = Volts x Current (amperes)

Let's flush the water. The next chapter moves on to electrons!