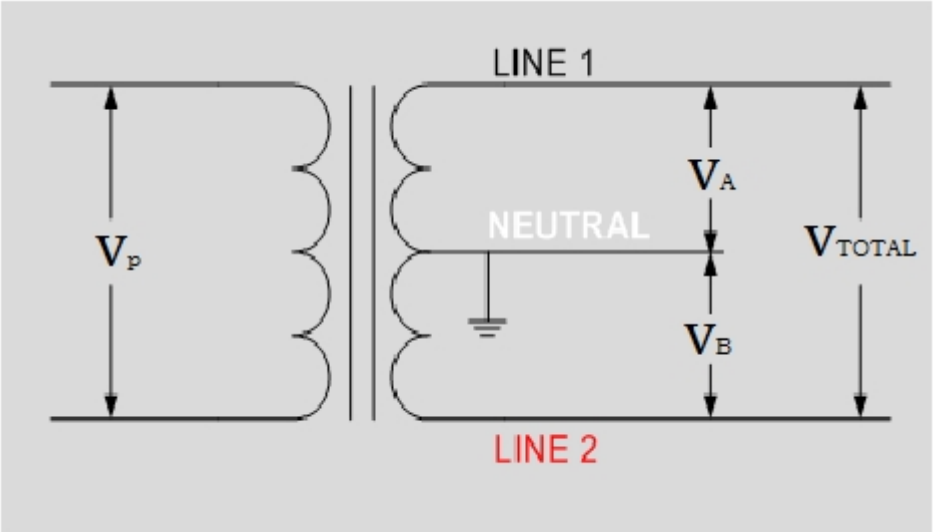
CENTRE TAPPED TRANSFORMER

Working Principle of a Centre Tapped Transformer

A Centre Tapped transformer works in more or less the same way as a usual transformer. The difference lies in just the fact that its secondary winding is divided into two parts, so two individual voltages can be acquired across the two line ends.
The internal process is the same, which is when an **alternating current** is supplied to the primary winding of the transformer it creates a magnetic flux in the core, and when the secondary winding is brought near, an alternating magnetic flux is also induced in the secondary winding as the flux flows through the ferromagnetic iron core and changes its direction with each and every cycle of the **alternating current**. In this way an **alternating current**also flows through the two halves of the secondary winding of the transformer and flows to the external circuit.

Construction

When an additional wire is connected across the exact middle point of the secondary winding of a transformer, it is called a **center tapped transformer**. The wire is adjusted such that it falls in the exact middle point of the secondary winding and is thus at zero volts, forming the neutral point for the winding. This is called the “center tap” and this thing allows the transformer to provide two separate output voltages which are equal in magnitude, but opposite in polarity to each other. In this way, we can also use a number of turn ratios from such a transformer.



As it can be seen from the figure that this type of configurations gives us two phases through the two parts of the secondary coil, and a total of three wires, in which the middle one, the center tapped wire is the neutral one. So this center tapped configuration is also known as a two phase- three wire transformer system.

In this way, half the voltage appears across one half of the phase, that is from line 1 to neutral, and the other half of the voltage appears across the next phase, that is from neutral to Line 2. If the load is connected directly between line 1 and line 2, then we get the total voltage, that is, the sum of the two voltages. This way, we can get more amperes of current at the same voltage.

Working of this transformer

The two voltages, between line 1 and neutral and between neutral and line 2 can be named as VA and VB respectively. Then the mathematical relation of these two voltages shows that they are dependent upon the primary voltage as well as the turn ration of the transformer.

$$V_A = (N_A / N_P) * V_P$$

$$V_B = (N_B / N_P) * V_P$$

One thing that should be noted here is that both the outputs VA and VB respectively are equal in magnitude but opposite in direction, which means that they are 180 degrees out of phase with each other. For this purpose, we also use a full wave rectifier with a center tapped transformer, to make both the voltages in phase with each other.

Difference between a Normal and a Center Tapped Transformer

The primary difference that is evident here is that a normal transformer provides you with only one voltage, for example, say 240 V. But a center tapped transformer will provide you with two voltages each of 240/ 2 i.e. 120 V, so that we can drive two independent circuits.

Source : http://engineering.electrical-equipment.org/electrical-distribution/centre-tapped-transformer.html