

Three Phase Connections

There are different methods available for transforming three-phase voltage to higher or lower three-phase voltages.

The most common connections are

- Y (Wye) - Y (Wye)
- Δ (Delta) - Δ (Delta)
- Y (Wye) - Δ (Delta)
- Δ (Delta) - Y (Wye)

Relationship between star and delta connections

Star Connection

The wave winding you learnt in previous chapter is made of star connection. One end of all three coils are joined together, forming a central point called a neutral point.

Line voltage is measured between two conductors and phase voltage is measured between line and neutral.

Delta Connection

End of each coil is connected to the start of the next coil to form a delta connection. Delta connection forms a triangle with three coils as its sides and three joining points.

Voltage is measured from the joining points.

In Star connection,

$$\mathbf{V_{phase} = V_{line}/\sqrt{3} \text{ and } I_{phase} = I_{line}.}$$

In Delta connection,

$$\mathbf{V_{phase} = V_{line} \text{ and } I_{phase} = I_{line}/\sqrt{3}.}$$

Hence,

three-phase star connected system with voltage V_{line} and current I_{line} may be replaced by a delta connected system.

The phase voltage will be V_{line} and phase current will be $I_{line}/\sqrt{3}$.

Also, a balanced three-phase load having equal branch impedance of Z may be replaced by an equivalent delta connection with branch impedance of $3Z$.