Scott Connection

The Scott connection, also known as the Scott-T transformer connection, is a circuit that enables the conversion of:

- Three-phase (3φ) electric power to two-phase (2φ) electric power
- Two-phase electric power to three-phase electric power

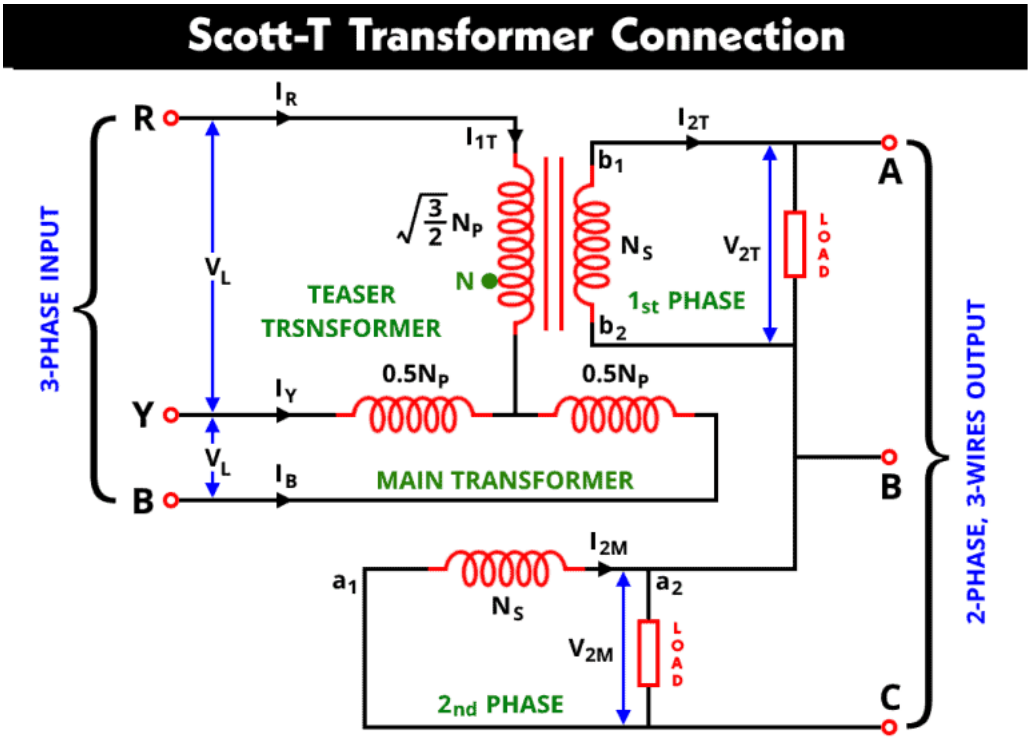
This conversion is achieved by connecting two single-phase transformers in a specific configuration. The Scott connection offers a balanced load distribution across the phases of the source.

Components

The Scott connection utilizes two transformers:

1. **Main Transformer (T1):** This is a center-tapped transformer with a 1:1 ratio. The center-tapped side signifies that the transformer has a winding with a mid-point connection.
2. **Teaser Transformer (T2):** This transformer has a ratio of $\sqrt{3}/2$ (approximately 86.6%).

Diagram



The Scott connection can be visualized through the following diagram:

In the diagram:

- The center-tapped side of T1 connects between phases B and C of the three-phase system.
- The center tap of T1 connects to one end of the lower turn count side of T2.
- The other end of T2's lower turn count side connects to the remaining phase (phase A).
- The other sides of both transformers (T1 and T2) connect directly to the two output phases of the two-phase system.

Working Principle

The Scott connection functions by leveraging the voltage and phase shift properties of the transformers. The center-tapped transformer (T1) splits the three-phase voltage into two components with a 120-degree phase shift. The teaser transformer (T2) introduces a √3 voltage ratio and a 30-degree phase shift, resulting in the creation of a two-phase system with a 90-degree phase difference between the phases.

This configuration allows for the conversion between three-phase and two-phase power while maintaining a balanced load on the source.

Applications

The Scott connection finds applications in various scenarios, including:

- Connecting a three-phase system with a two-phase system for power exchange.
- Operating single-phase loads, such as electric trains, from a balanced three-phase supply.
- Supplying power to two single-phase electric furnaces simultaneously from a three-phase supply.