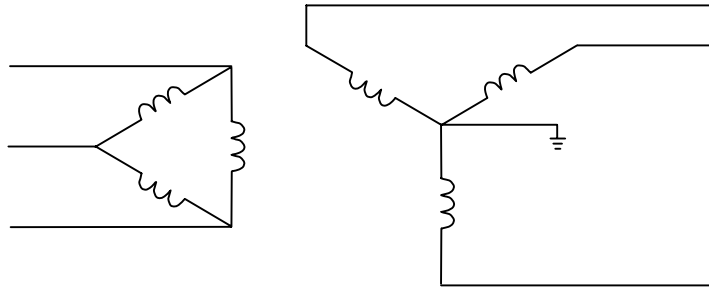


Power Distribution Systems

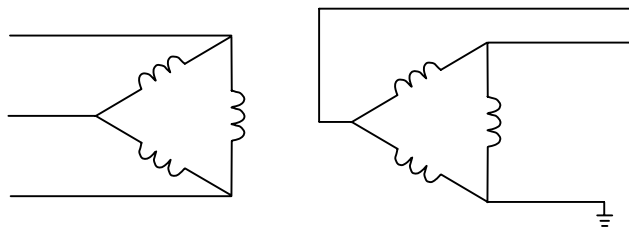
The type of transformer and the connection configuration feeding a drive plays an important role in its performance and safety. The following is a brief description of some of the more common configurations and a discussion of their virtues and shortcomings.

Delta / Wye with grounded Wye neutral:



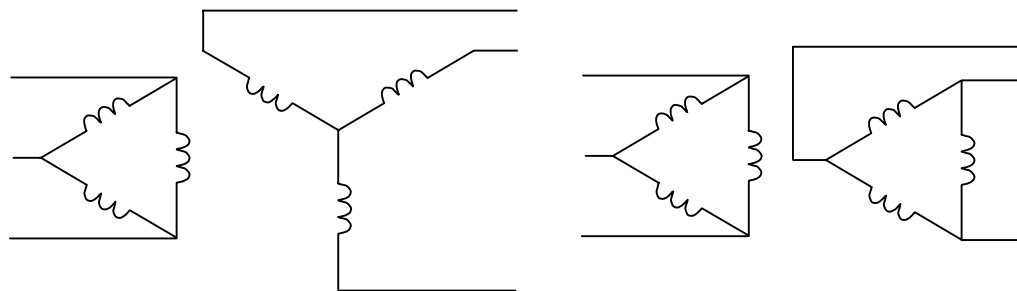
This configuration is one of if not the most common. It provides re-balancing of unbalanced voltage with a 30 degree phase shift. Depending on the output connections from the drive to motor, the grounded neutral may be a path for common mode current caused by the drive output.

Delta / Delta with grounded leg:



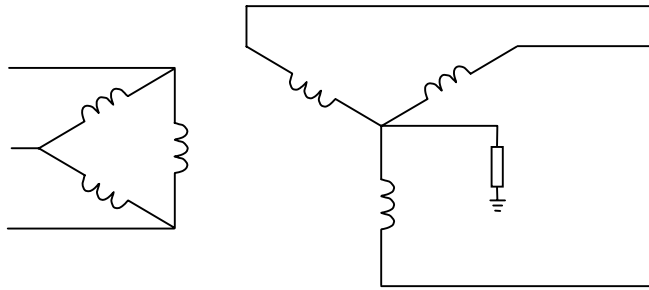
Another common configuration providing voltage re-balancing with no phase shift between input and output. Again, depending on the output connections from the drive to motor, the grounded neutral may be a path for common mode current caused by the drive output.

Ungrounded secondary.



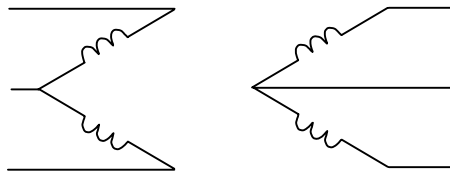
Grounding of the transformer secondary is essential to the safety of personnel as well as the safe operation of the drive. Leaving the secondary floating can permit dangerously high voltages between the chassis of the drive and the internal power structure components. In many cases this voltage could exceed the rating of the input MOV protection devices of the drive causing a catastrophic failure. In all cases, the input power to the drive should be referenced to ground. If the transformer can not be grounded, then an isolation transformer must be installed with the secondary of the transformer grounded.

Resistance grounding and ground fault protection:



Connecting the Wye secondary neutral to ground through a resistor is an acceptable method of grounding. Under a short circuit secondary condition, any of the output phases to ground will not exceed the normal line to line voltage. This is within the rating of the MOV input protection devices on the drive. The resistor is often used to detect ground current by monitoring the associated voltage drop. Since high frequency ground current can flow through this resistor, care should be taken to properly connect the drive motor leads using the recommended cables and methods. In some cases, multiple drives on one transformer can produce a cumulative ground current that can trigger the ground fault interrupt circuit.

Open Delta:



This type of configuration is uncommon. From time to time it may be encountered where only single phase power is available and three-phase power is required. The technique uses two single phase transformers to derive a third phase. When used to power a drive this configuration must be derated to about 70% of the single phase rating of one transformer. This system provides poor regulation and it is possible that only the two line connected phases will provide power. In this case the drive must be derated to 50% of its rating.

Single Phase Connection:

For small drive with a diode rectifier front end it is possible to run a three phase output with a single phase input. Only part of the three phase input bridge is used. Ripple current becomes 120 hertz rather than 360. This places a greater demand on the DC filter components (Capacitor bank and DC choke). The result is that the drive must be derated to 50% current. Single phase will not work with an SCR front end drive.