

Zig – Zag Transformers

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For customers considering updating their 480 volt ungrounded systems. A wye grounded system would be very advantageous with regard to providing ground fault protection.

A cost effective way to obtain a system neutral is to use a Grounding Transformer. There are three types of grounding transformers that are commonly used. They are the “Zig-Zag” the “Wye –Delta” and the “Scott-T” style transformers.

This article will address the use of the “Zig-Zag transformer”.

The zig-zag transformer is typically the least costly of the above three transformers mentioned. It can be ordered as a custom three phase unit or as (3) individual single phase units.

Each core leg of the zig-zag transformer has two coils wound on it. One coil is the outer coil and the other is the inner coil. Each coil has the same number of windings turns but they are wound in opposite directions. The coils are connected as follows:

The outer coil of phase A is connected to the inner coil of phase B.

The outer coil of phase B is connected to the inner coil of phase C.

The outer coil of phase C is connected to the inner coil of phase A.

The outer coils are connected to phases A,B,C of the existing delta system.

The inner coils are connected together to form the neutral and are tied to ground

Under normal system operation the outer and inner coil winding's magnetic flux will cancel each other and only negligible current will flow in the neutral of the zig –zag transformer.

During a phase to ground fault the zig-zag transformer's coils magnetic flux are no longer equal in the faulted line. This allows zero sequence

current to now flow from the point of the fault to ground and return to the zig-zag transformer's neutral.

To specify a zig-zag transformer the following information should be considered:

Provide the line to line voltage of the system.

Provide the magnitude of the neutral current.

Provide how long the neutral current will flow. Typically ten or sixty seconds is used.

Provide the System impedance per phase.

References

Industrial Power Systems GER-2659 Grounding Transformers by Edward W.Bogins