

# Design an indoor three-phase transformer

Lu Zhang

Advisor: Luke Dosiek, Ph.D

## Introduction

- A transformer is a device that change voltage level of an AC electric power through magnetic field.
- Three-phase AC power systems have more advantages compared to one-phase systems
- In a three-phase system, all components should consist with three-phase including generators, transformers, and loads. These components are usually in the form of either Wye (Y)-or Delta ( $\Delta$ )-connection.

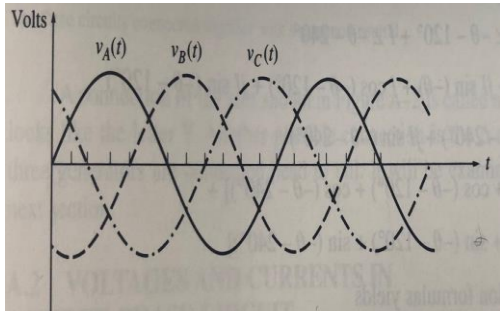


Figure 1. three single-phase sources equal in magnitude and 120 degrees apart in phase

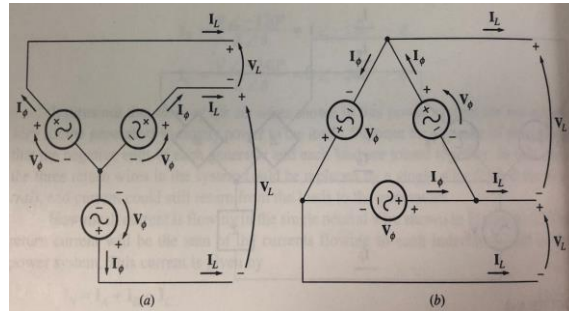


Figure 2. (a): Wye connection, (b): Delta connection

## Procedure

- Choose the proper case with good ground condition.
- The transformers assembled are 9T56V128 transformer from GE. There are two possible outputs depend on the connection way on the secondaries.
- Base on the practical scenarios, Delta( $\Delta$ )-connection is implemented.

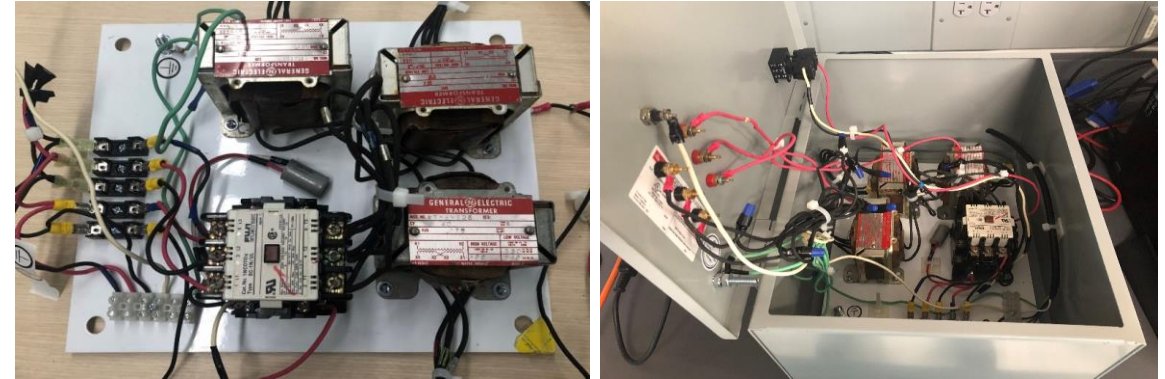


Figure 4, 5. finish look on the connection

## Testing

- Testing the ground status.
- The voltage on the output side when Delta( $\Delta$ )-Delta( $\Delta$ ) connected in both one and three-phase condition.
- Repeat above measurements with Delta( $\Delta$ )-Wye(Y) connection.
- Fit the data into equations:  $\frac{V_{Lprimary}}{V_{Lsecondary}} = \frac{\alpha}{\sqrt{3}}$  (Delta-Wye connection) and  $\frac{V_{Lprimary}}{V_{Lsecondary}} = \alpha$  (Delta-Delta connection).

## Acknowledgement

Thank you to Union College, Prof. Luke Dosiek.