Calculate the kVA Secondary Winding Capacity of an Isolation Transformer

Program: Electrical Technician

Course: EL150 – Commercial Application

Objectives: At the completion of this experiment, you will be able to:

- Size and select buck-and-boost transformers
- Connect a buck-and-boost transformer to a single-phase circuit so that it will first be in the boost mode and then in the buck mode. Record the voltage increase and decrease for each configuration

Lab Equipment: N/A

Required Tools:

- Pencil and paper
- Calculator

Materials: N/A

Safety (PPE): N/A

Resources: N/A

Shop Maintenance:

- All work will cease 20 minutes prior to the end of class.
- All work areas must be cleaned.
- Tools and equipment must be cleaned and returned to the designated areas (cage, tool room, cabinets etc.)
- Any broken or missing tools must be reported immediately.
- Tools and equipment are students' responsibility

Required Time: 1 Hour

Instructor Notes:

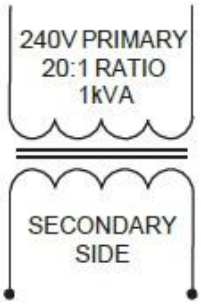
- Round current values to two decimal places and voltage values to whole numbers.
- When calculating secondary voltage based on transformer winding ratio, assume no loss across the windings. For example, a transformer having a primary winding voltage of 120 volts and a winding ratio of 10:1 will have a secondary voltage of 12 volts.

This performance project requires the trainee to calculate the following values:

- The secondary voltage values of two transformers connected as isolation transformers, using the primary voltage values and winding ratios given.
- The primary and secondary current values of two transformers connected as isolation transformers, using kVA ratings and voltage values given.
- The boosted voltage value of an isolation transformer connected as a boost transformer.
- The line current capacity of an isolation transformer connected as a boost transformer.
- The increased kVA secondary winding capacity of an isolation transformer connected as a boost transformer.

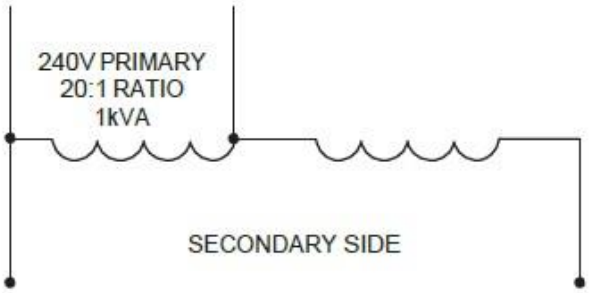
Procedures:

1. Carefully review Figures 1 and 2. Perform the following for Transformers 1 and 2.
2. Calculate and record the secondary voltage of the isolation transformer, based on the primary voltage and the ratio of windings given.
3. Calculate and record the primary and secondary current of the isolation transformer, based on the kVA rating and voltages given.
4. Calculate and record the boosted voltage value of the isolation transformer connected as a boost transformer.
5. Calculate and record the line current capacity of the isolation transformer connected as a boost transformer.
6. Calculate and record the increased or boosted kVA secondary winding capacity of the isolation transformer connected as a boost transformer.



CONNECTED AS AN
ISOLATION TRANSFORMER

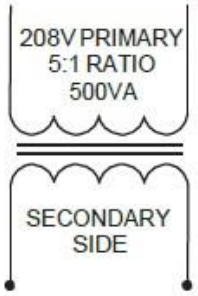
SECONDARY VOLTAGE: ____V
PRIMARY CURRENT: ____A
SECONDARY CURRENT ____A



CONNECTED AS AN
AUTOTRANSFORMER

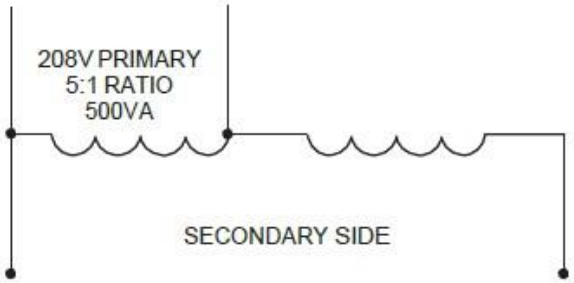
BOOST VOLTAGE: ____
LINE CURRENT: ____
BOOSTED kVA: ____

Figure 1 ■ Transformer 1



CONNECTED AS AN
ISOLATION TRANSFORMER

SECONDARY VOLTAGE: ____V
PRIMARY CURRENT: ____A
SECONDARY CURRENT ____A



CONNECTED AS AN
AUTOTRANSFORMER

BOOST VOLTAGE: ____
LINE CURRENT: ____
BOOSTED kVA: ____

Figure 2 ■ Transformer 2