ETME 4130

Lab 4: Three-Phase Power

Pre-Lab Analysis:

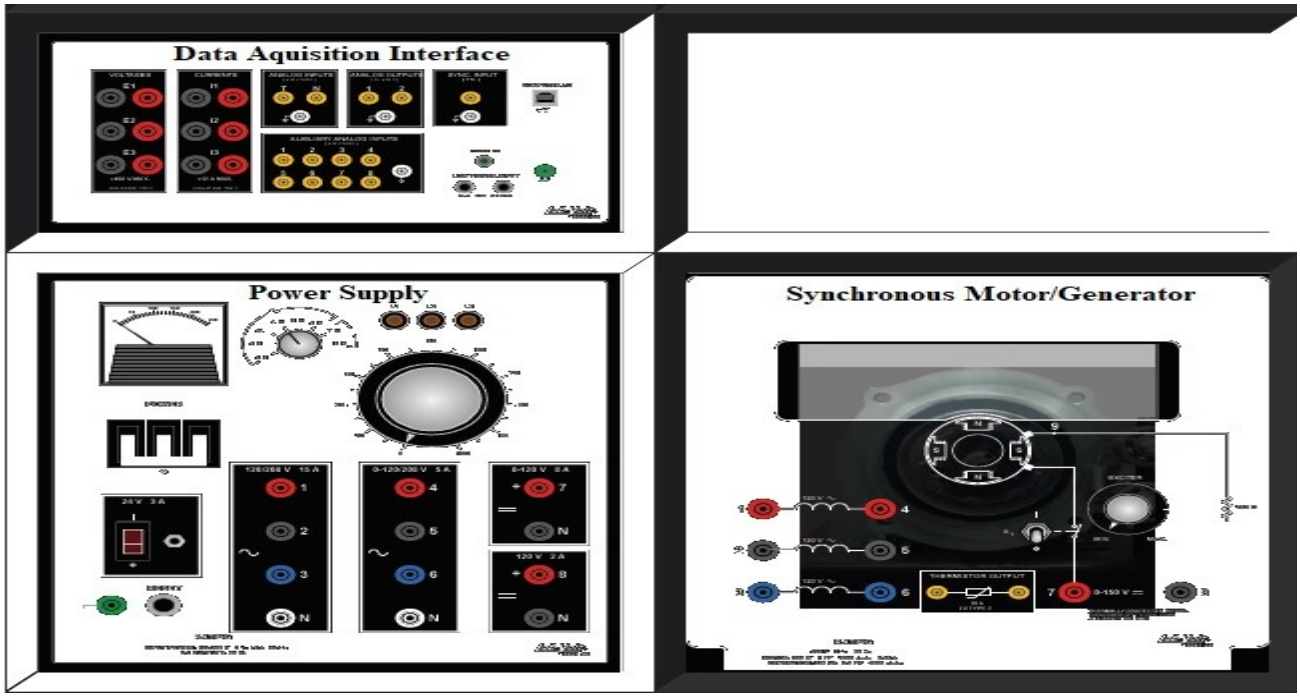
1. If the line-to-line voltage of a Y-Connected power source is 208 volts, what is its phase voltage?

2. A Y-connected power source has four terminals (X, Y, Z, N), If the voltage measured between the X-terminal and the N-terminal was 120 V, what is the voltage between the two terminals Y and Z?

Lab Work:

Wear your safety glasses continuously while in the lab. In this lab we will connect the synchronous motor as an induction motor, and power it from the variable three-phase power supply. First, do the proper connections on the picture below to setup the circuit, then do the actual connections. A video of the experimental setup can be found here: https://www.youtube.com/watch?v=AhRdXPtccOg

1. Connect terminals 4, 5, and 6 of the motor together.
2. Connect terminal 2 of the motor directly to terminal 5 of the power supply
3. Connect terminal 3 of the motor directly to terminal 6 of the power supply.
4. Connect terminal 1 of the motor to one of the two terminals of the ammeter A1 on the data acquisition module.
5. Connect the second terminal of ammeter A1 to terminal 4 of the power supply.
6. Connect terminal 5 of the power supply to one of the terminals of voltmeter E1 on the data acquisition module, and connect the second terminal of E1 to terminal 6
7. Connect the N-terminal of the power supply to one terminal of voltmeter E3 and connect the second terminal of the voltmeter E3 to terminal 5 of the power supply.



8. Draw the electrical schematic of the circuit that you built in the lab.

9. Open the Labvolt Data Acquisition software, and monitor the voltages E1,E3, and ammeter A1. Slowly increase the voltage between terminals 4 and 5 on the variable AC voltage power supply to 90 volts, the motor should start running at about 30 volts while you increase the voltage. **If the motor does not start running while you increase the voltage, stop and turn off the power, and notify the professor.** what is the voltage between terminals 4 and N?

10. Increase the voltage slowly until the voltage reading between terminals 5 and N is 120 volts, what is the voltage between terminals 5 and 6?

11. Reduce the voltage to zero, and turn off the power supply and disconnect the circuit.

Post-Lab Analysis:

1. Considering that the maximum voltage across each winding on the motor cannot exceed 120 volts, Why the motor stator windings must be connected in Y-configuration, and cannot be connected in Delta?

2. In which configuration are the windings of the power source in the experiment connected, in the Y-configuration or the Delta configuration? Why did you conclude that?