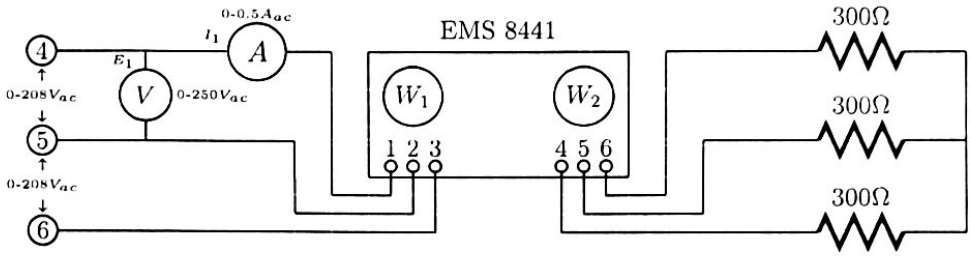
EEET 242 Lab 2: Three-Phase Power Measurements & Phase Sequence

Objective

To measure power in a 3-phase circuit using 2 wattmeters and to determine the phase sequence of a 3-phase line.

Part 1

1. Connect the following circuit using the 3-phase wattmeter.



2. Turn on the power supply and adjust the line voltage to 208 VAC as indicated by E_1

3. Record the line current I_1 and the power indicated by W_1 and W_2.

Current (A)	Power (W)	Power(W)
$I_1 = 0.46$	$W_1 = 68$	$W_2 = 70$

4. From the results of #3 calculate the 3-phase apparent power, real power, reactive power and power factor:

$S_{3\phi}$ (VA)	$P_{3\phi}$ (W)	$Q_{3\phi}$ (var)	$pf_{3\phi}$
$S_{3\phi} =$	$P_{3\phi} =$	$Q_{3\phi} =$	$pf_{3\phi} =$

5. Replace the resistance with the capacitance module. Set each capacitance to 8.8 micro Farad.

6. Repeat #2, #3 and #4.

Current (A)	Power (W)	Power(W)
$I_1 = 0.42$	$W_1 = 40$	$W_2 = 38$

$S_{3\phi}$ (VA)	$P_{3\phi}$ (W)	$Q_{3\phi}$ (var)	$pf_{3\phi}$
$S_{3\phi} =$	$P_{3\phi} =$	$Q_{3\phi} =$	$pf_{3\phi} =$

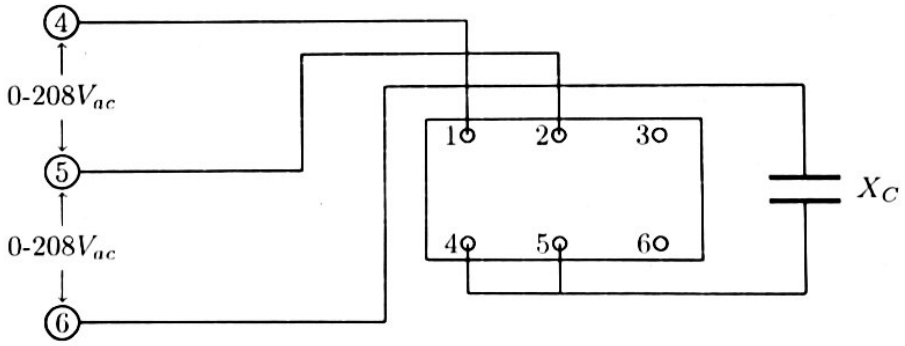
7. Replace the capacitance with the inductance module. Set each inductance to 0.8 H.
8. Repeat #2, #3 and #4.

Current (A)	Power (W)	Power(W)
$I_1 =$ 0,46	$W_1 =$ 47	$W_2 =$ 26

$S_{3\phi}$ (VA)	$P_{3\phi}$ (W)	$Q_{3\phi}$ (var)	$pf_{3\phi}$
$S_{3\phi} =$	$P_{3\phi} =$	$Q_{3\phi} =$	$pf_{3\phi} =$

Part 2

1. Connect the circuit shown below using the synchronizing switch and capacitance modules.



2. Set the capacitance to 2.2 uF.
3. Place the synchronizing switch in its open position (to the right).
4. **Before turning on the power supply make sure the synchronizing switch is open!**
5. Determine the phase sequence fr.om the relative lamp brightness. 5, 4, 6
6. Shut off the power supply and interchange any 2 lines. Swap 4 and 5
7. Turn on the power supply and adjust to 50 VAC. 456

8. Determine the phase sequence.
9. Replace the capacitance with the inductance module set for 3.2 H. leaving setup
10. Repeat #5 and #6. 546 ; swap 4 +5;456
11. Write a 1 page discussion of results.

Questions

1. Could 1 wattmeter be used to measure total 3-phase power on a balanced 3-phase, 4-wire system?
2. Can a wattmeter that has I through and V across it, indicate 0 watts? Explain.
3. Could a 3-phase induction motor be used to establish the phase sequence of a 3 phase line?
4. Line voltages are 120 degrees out of phase with each other. Are the phase voltages also 120 degrees out of phase with each other? Explain.