Topic Skills Practice Cover Sheet

NAT10809003 – Apply Australian standards and requirements to solve LV a.c. circuits/systems problems.
Topic: 2. Power Factor Improvement

Skill Practice Number:	**2.2**
Skill Practice Name:	**Power Factor Improvement Method**

Student Name:	
Student ID:	
College/Campus:	
Group:	

Results	
Planning:	
Carryout:	
Completion:	
Overall Results:	
Comments:	

Topic Skills Practice 2.2

NAT10809003 – Apply Australian standards and requirements to solve LV a.c. circuits/systems problems.

KE-10809003 - LV a.c. circuits/systems problems principles

Topic: 2. Power Factor Improvement

Skills Practice 2.2: Power Factor Improvement Method

Task:
To examine power factor improvement methods using static capacitors on a single phase motor circuit.

Objectives:

At the completion of this skills practice, you should be able to:

- connect up a single phase motor and a capacitor bank used for power factor improvement
- demonstrate that the overall power factor of an inductive circuit can be improved by the addition of capacitors in parallel with the circuit
- determine the capacitance of a capacitor to produce unity power factor by: experiment; and calculation
- construct a power triangle to calculate the required reactive power (VAr) to produce a power factor of 0.8 lagging, 0.9 lagging and 0.95 lagging

1. Planning the Skills Practice

1.1 Equipment:	**1.2 Suggested Materials:**	**1.3 Miscellaneous Items:**
• Extra low voltage a.c. supply • Two multimeters • One wattmeter • One single-phase induction motor	• One capacitor bank • Connecting leads	

1.4 Risk Assessment

Risk assessment procedure:

- ✓ Identify any hazards that may exist with this skills practice below
- ✓ List the supervision level you will be working under - Direct (D), General (G) or Broad (B)
- ✓ List the risk classification – High Risk (H), Medium Risk (M) or Low Risk (L)
- ✓ List the control measures required for each identified hazard that you need to implement.

Hazard/s Identified	Supervision Level (D, G or B)	Risk Classification (H, M or L)	Control Measure/s

Topic Skills Practice 2.2

2. Carrying Out the Skills Practice

Procedures:

Part A

1. Connect up the circuit as shown in Figure 1.

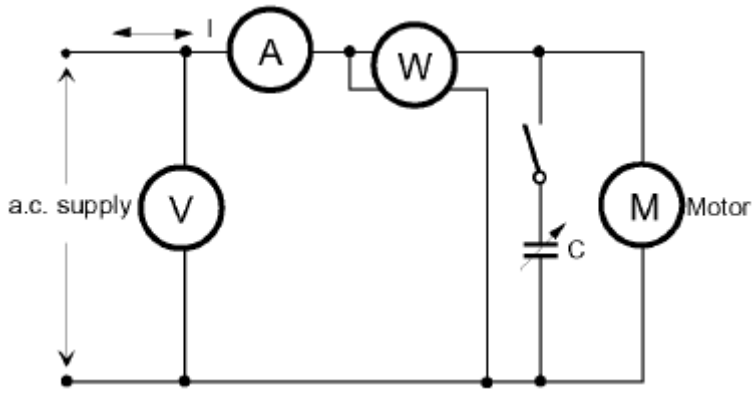


Figure 1

2. Make sure the capacitor switch is open and turn on the supply to the motor. Measure the input power, current and voltage and record these values in Table 1.

Supply voltage , V volts	***Current, I amperes***	***Input power, P Watts***

Table 1

3. Turn off the supply and set the capacitor bank to a value specified by your teacher.

4. Close the switch to connect the capacitor in parallel with the motor and measure the supply voltage, current and input power and record in Table 2.

5. Repeat step 3 and 4 for each of the capacitor values specified by your teacher.

Capacitance C µF	***Supply Voltage Volts***	***Current I Amperes***	***Supply Voltage Volts***	***Power factor p.f.***	***Lead or lag***

Table 2

6. Calculate the power factor for each value of capacitance and record in Table 2. Indicate if the power factor is leading or lagging.

$$\text{Power factor} = \frac{\text{True power}}{\text{Apparent power}} = \frac{\text{Wattmeter reading}}{\text{Voltmeter xammeter reading}}$$

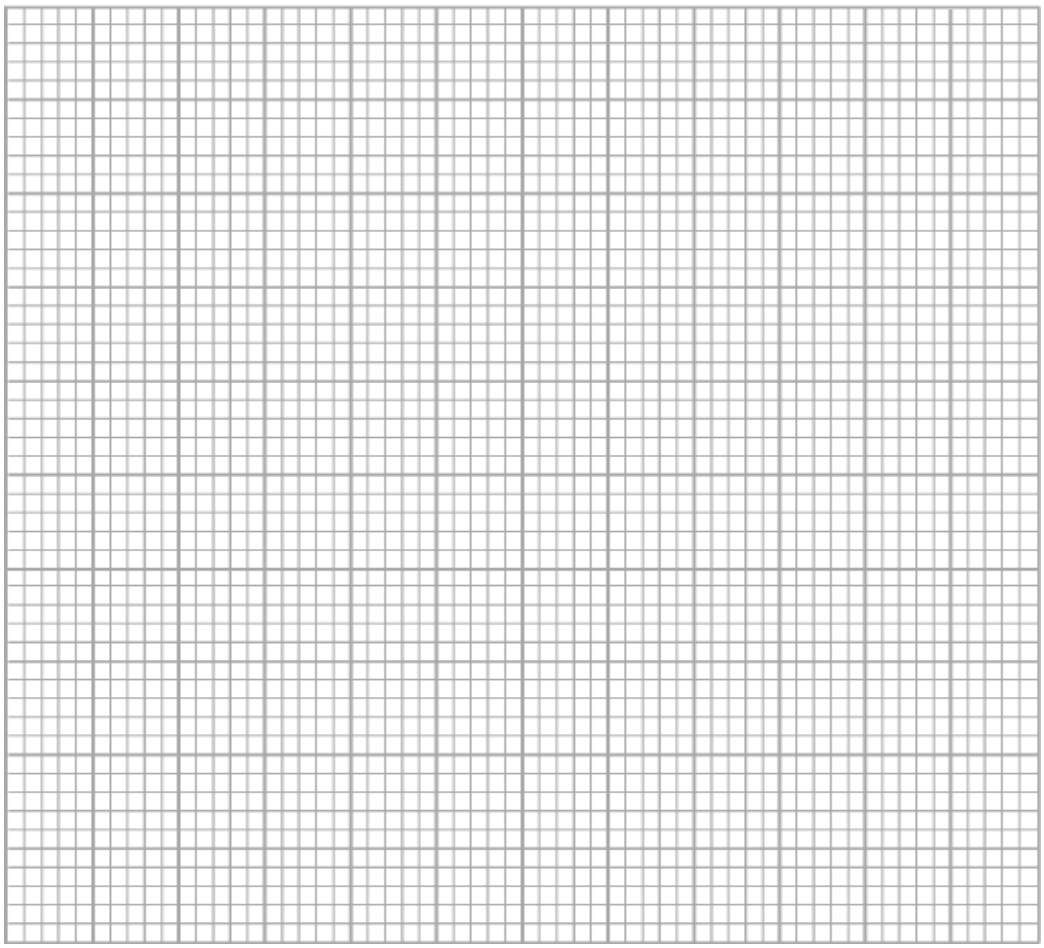
	 *Feedback*	Have your teacher/trainer check your results are correct	Teacher/Trainer Initials and Date	√

3. Completing the Skills Practice

Return all tools and equipment to their correct places and clean the work area.

Observations:

1. Draw the graphs of current and power factor versus capacitance on the same set of axes. (Use Table 2 values).



2. Calculate the capacitance of the capacitor required to produce unity p.f.

3. Draw the power triangles for the circuit when the power factor is:
   (a) 0.8 lagging
   (b) 0.9 lagging
   (c) 0.95 lagging

4. Why do the supply authorities encourage consumers to have a high power factor for their installation?

Feedback

Have your teacher/trainer check your results are correct

Teacher/Trainer Initials and Date

√