Topic Skills Practice Cover Sheet

Unit Name:	UEEEL0024 Test and connect alternating current (a.c.) rotating machines
Topic Title:	Single phase motors – split phase

Skill Practice Number:	4.3
Skill Practice Name:	Split Phase Motor Connection

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

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

Topic Skills Practice 4.3

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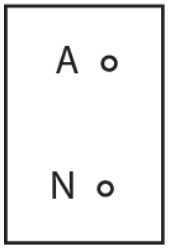
2.3 Reverse the Split Phase Motor

2.3.1 Open the motor terminal box and make a note of the winding lead connections. Then disconnect the supply conductors and winding connections.

2.3.2 Use an ohmmeter to identify the starts and ends of the start and run windings.

2.3.3 Label the terminals on the diagram below and draw in the necessary connections to reverse the motor. Indicate the run and start windings and polarities.

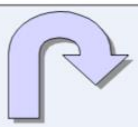
Topic Skills Practice 4.3



2.3.4 Reconnect the motor windings as per your diagram so that the motor rotation will be reversed.

2.3.5 Reconnect the supply conductors to the motor terminals.

Don't energize your circuit until your teacher/trainer has verified your connections

	 *Feedback*	Have your teacher/trainer check your circuit layout	Teacher/Trainer Initials and Date

2.3.6 Energise the circuit and indicate the direction of rotation by drawing an arrow around the rotor diagram and completing the table below:

Motor Reversal	
Did the motor run in reverse?	
□ Yes	□ No

Topic Skills Practice 4.3

	 *Feedback*	Have your teacher/trainer check your work	Teacher/Trainer Initials and Date	✓

3. Completing the Skills Practice

3.1 Skills Practice Review Questions

3.1.1 Clean your work area, return all equipment to the correct storage areas as directed by your teacher/trainer, and complete the following review questions.

1. What is the purpose of carrying out an insulation resistance test on a motor?

2. What is the purpose of carrying out a winding resistance test on a motor?

3. What would happen if both the start and run winding connections of a split phase motor were interchanged?

Topic Skills Practice 4.3

Topic Skills Practice Cover Sheet

Unit Name:	UEEEL0024 Test and connect alternating current (a.c.) rotating machines
Topic Title:	Operating principles of three phase induction motors

Skill Practice Number:	1.2
Skill Practice Name:	Connect, Run and Reverse a Three Phase Induction Motor

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

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

Topic Skills Practice 1.2

UEEEL0024 Test and connect alternating current (a.c.) rotating machines

KE-UEEEL0024 Knowledge Evidence

Topic 1. Operating principles of three phase induction motors

Skills Practice 1.2: Connect, Run and Reverse a Three Phase Induction Motor

Task:

To connect, run and reverse a three phase induction motor.

Objectives:

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

- Connect a three phase induction motor.
- Run a three phase induction motor.
- Measure phase sequence, speed and line current.
- Reverse a three phase induction motor.

Topic Skills Practice 1.2

1. Planning the Skills Practice

1.1 Equipment

- Three phase supply
- Three phase induction motor

1.2 Suggested Materials

- Tong tester
- Tachometer
- Calculator

1.3 Miscellaneous Items

- Phase rotation meter
- Connection leads
- Pens/pencils

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
Exposed Terminals	D	H	Test the equipment before touching
Electrical leakage to machine body	D	H	Test motor with tester /Insulation
Phase out of motor rising damage	M	G	Properly connect the motor
Over voltage burn out of motor winding	B	M	Use only 42 V supply

Feedback

Have your teacher/trainer check your risk assessment

Teacher/Trainer Initials and Date

✓

Topic Skills Practice 1.2

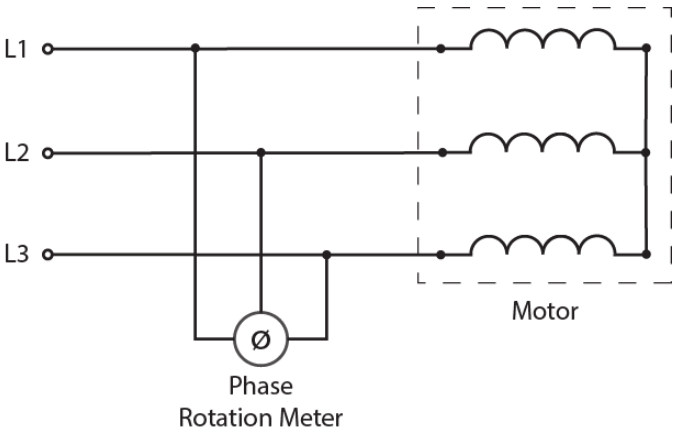
2. Carrying Out the Skills Practice

2.1 Connect the Three Phase Induction Motor

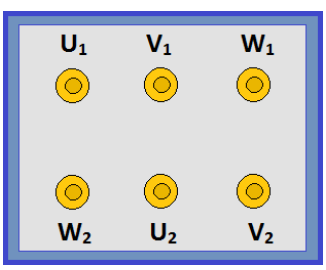
2.1.1 Examine the name-plate of the motor and record the details in the following table:

Name-Plate Details	
Rating	**Details**
Power:	44 watts
Power Factor:	0.387
Line Voltage:	41.5 V
Line Current:	1.6 A
Speed:	1365 rpm

2.1.2 Connect the three phase induction motor as indicated by the following diagram:



2.1.3 Indicate the terminal box connections on the terminal box template below:



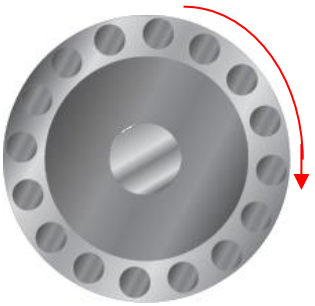
L_1 L_2 L_3

Topic Skills Practice 1.2

Don't energize your circuit until your teacher/trainer has verified your connections

	 ***Feedback*** **Have your teacher/trainer check your circuit connections**	**Teacher/Trainer Initials and Date**	✓

2.1.4 Energise the motor and indicate the direction of rotation by drawing an arrow on the rotor diagram below:



2.1.5 Now measure the phase sequence, speed and line current. Record your measurements in the following table.

Operating Parameters	
Parameters	**Measured Values**
Phase sequence:	RST
Line Current:	0.27 A
Speed:	1485 rpm

2.1.6 De-energise the circuit and disconnect from the supply.

Topic Skills Practice 1.2

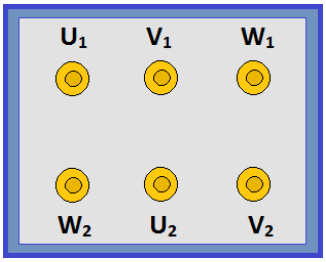
	Have your teacher/trainer check your answers *Feedback*	Teacher/Trainer Initials and Date	✓

2.2 Reverse the Three Phase Induction Motor

2.2.1 Open the motor terminal box and disconnect the supply connections.

2.2.2 Reconnect the motor windings so that the motor rotation will be reversed, by interchanging any two of the supply active conductor connections.

2.2.3 Indicate your new terminal box connections on the terminal box template below:

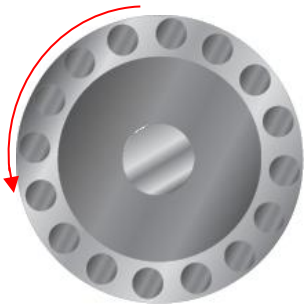


Don't energize your circuit until your teacher/trainer has verified your connections

	Have your teacher/trainer check your circuit connections *Feedback*	Teacher/Trainer Initials and Date	✓

2.2.4 Energise the motor and indicate the direction of rotation by drawing an arrow on the rotor diagram below:

Topic Skills Practice 1.2



2.2.5 Now measure the phase sequence, speed and line current. Record your measurements in the following table.

Operating Parameters	
Parameters	**Measured Values**
Phase sequence:	TSR
Line Current:	0.27 A
Speed:	1485 rpm

2.2.6 De-energise the circuit and disconnect from the supply.

	Feedback Have your teacher/trainer check your answers	**Teacher/Trainer Initials and Date**	✓

3. Completing the Skills Practice

3.1 Skills Practice Review Questions

3.1.1 Clean your work area, return all equipment to the correct storage areas as directed by your teacher/trainer, and complete the following review questions.

1. What would happen to the direction of rotation if all three supply active conductors were interchanged?

Topic Skills Practice 1.2

2. What connection configuration did you use to connect the motor windings?

Star

3. Calculate the synchronous speed of a 400 V, 50 Hz, four pole induction motor.

Answer:

4. Calculate the synchronous speed of a 400 V, 50 Hz induction motor having six poles.

Answer:

5. Calculate the synchronous speed of a 400 V, 50 Hz induction motor with a rotor speed of 720 r.p.m. and a slip speed of 30 r.p.m.

Topic Skills Practice 1.2

Answer: _____

6. Calculate the synchronous speed of a 400 V, 50 Hz induction motor with a rotor speed of 2856 r.p.m. and a slip of 4.8 %.

Answer: _____

7. Calculate the rotor speed of a 400 V, 50 Hz induction motor with a synchronous speed of 3000 r.p.m. and a slip speed of 126 r.p.m.

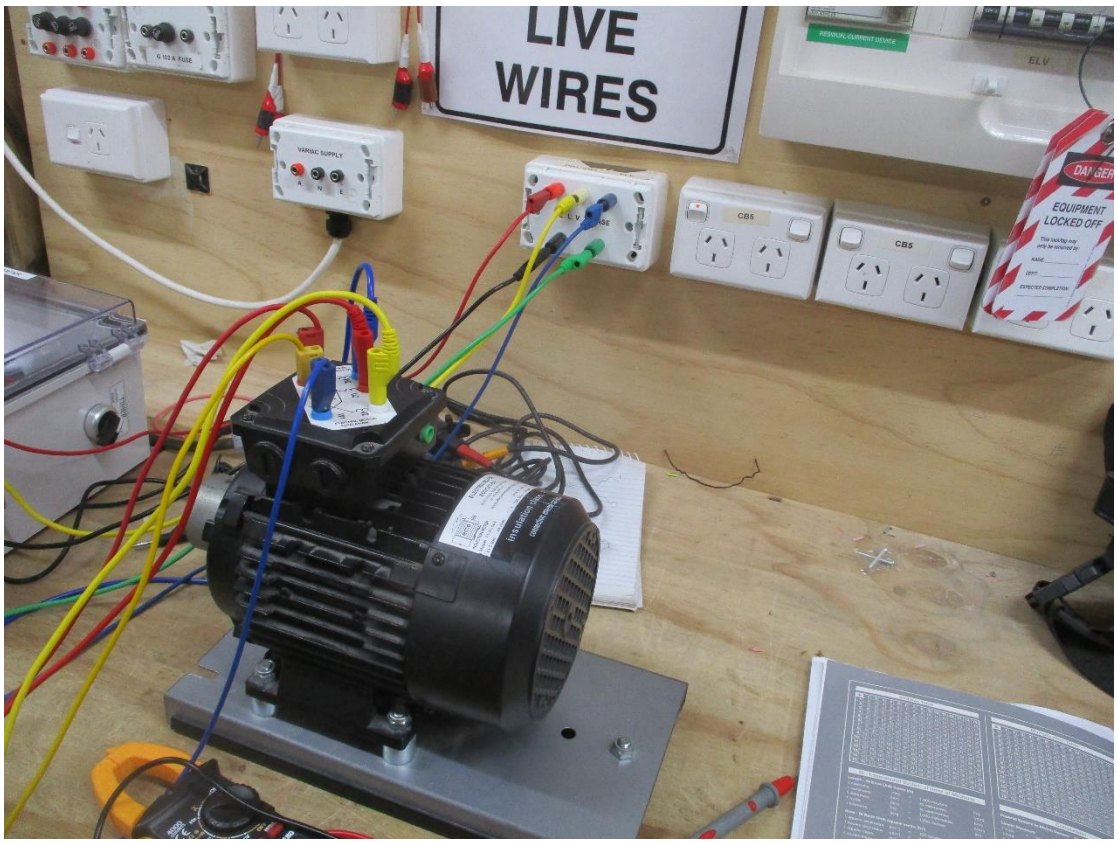
Answer: _____

8. Calculate the rotor speed of a 400 V, 50 Hz induction motor with a synchronous speed of 1500 r.p.m. and a slip of 4%.

Topic Skills Practice 1.2

Answer: _____

Practical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WIRES
EQUIPMENT
LOCKED OFF
CB5
CB5

Topic Skills Practice Cover Sheet

Unit Name:	UEEEL0025 Test and connect transformers
Topic Title:	Transformer operation

Skill Practice Number:	2.1
Skill Practice Name:	The Transformation Ratio

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

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

Topic Skills Practice 2.1

1. Calculate the transformation ratio of an 11 kV to 400 V step-down transformer. Show all working in the space provided below and correctly round answer to three significant figures.

Answer: _____

Topic Skills Practice 2.1

2. Calculate the transformation ratio of a 28 kV to 330 kV step-up transformer. Show all working in the space provided below and correctly round your answer to three significant figures.

Answer: _____

3. Calculate the transformation ratio of a 230 V to 10 V step-down transformer. Show all working in the space provided below and correctly round your answer to three significant figures.

Answer: _____

4. Calculate the number of turns on the primary winding of a 20:1 step-down transformer if the secondary winding has 60 turns. Show all working and give your answer in the spaces provided below.

Answer: _____

Topic Skills Practice 2.1

5. Calculate the number of turns on the secondary winding of a 1:10 step-up transformer if the secondary winding has 190 turns. Show all working and give your answer in the spaces provided below.

Answer: _____

6. Calculate the number of turns on the secondary winding of a 24:1 step-down transformer if the secondary winding has 200 turns. Show all working in the space provided below and correctly round your answer to three significant figures.

Answer: _____

7. Calculate the primary voltage of a 32:1 step-down transformer if the secondary voltage is 400 volts. Show all working and give your answer in the spaces provided below.

Answer: _____

Topic Skills Practice 2.1

8. Calculate the primary voltage of a 1:11 step-up transformer if the secondary voltage is 2.8 kV. Show all working in the space provided below and correctly round your answer to three significant figures.

Answer: _____

9. Calculate the secondary voltage of a step-up transformer having 281 turns on the primary winding, 1870 turns on the secondary winding, and a primary voltage of 100 volts. Show all working in the space provided below and correctly round your answer to three significant figures.

Answer: _____

10. Calculate the primary current drawn by a 1:20 step-up transformer if the secondary current is 12 amperes. Show all working and give your answer in the spaces provided below.

Answer: _____

Topic Skills Practice 2.1

11. Calculate the primary and secondary currents of a 40:1 step-down transformer used to supply a 28 W resistive load, if the transformer has a primary voltage of 230 volts. Assume 100 % efficiency, show all working in the space provided below and correctly round each answer to three significant figures.

Answer: _____

12. Calculate the primary current drawn by a 230 V to 12 V step-down transformer used to supply a 70 W resistive load. Show all working in the space provided below and correctly round your answer to three significant figures.

Answer: _____

	 *Feedback*	**Have your teacher/trainer check your answers**	**Teacher/Trainer Initials and Date**