Abu Dhabi University

Electric Circuits II

Lab Report 4
Y-Y and Y-Δ Connections

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Section 1

November 9, 2012

Abstract

In this lab we were educated in relationship between line and phase voltages in a balanced Y-connected 3 phase load and relationship between line and load currents in a balanced delta connected 3 phase load.

1 Introduction

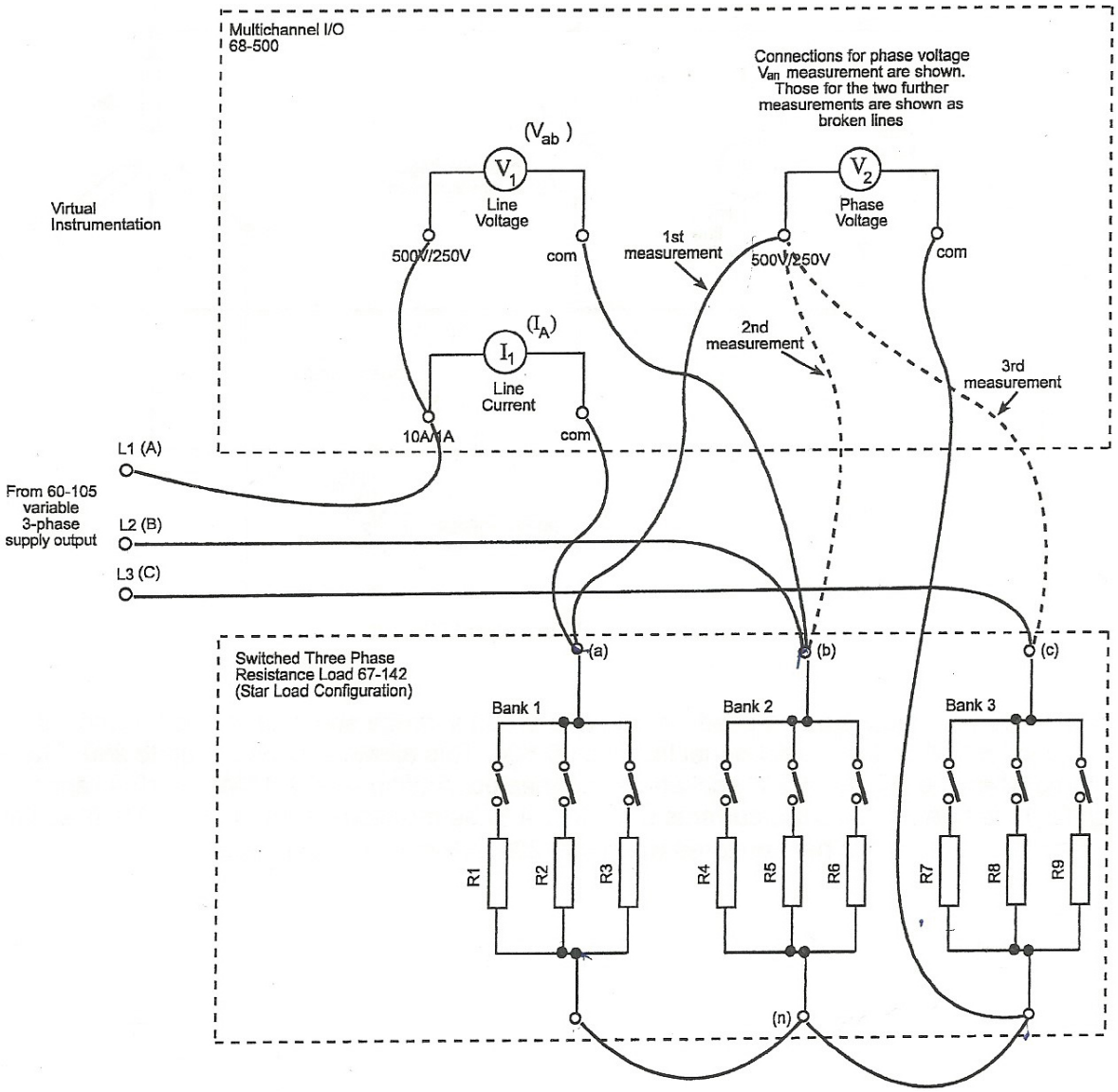
Typically a three phase power system is made of a generator with a start connected output and either a star or delta connected loads. Current relationships are considered when delta load is connected while voltage relationships when star load is connected. We try to balance the loads of transmission lines in power systems, with balanced loads the terminal voltages of the generator and the phase voltages at the load are balanced. In this we are going to find the line current, line voltage, phase voltage and phase current between/through each terminal of the supply to the neutral.

More the inductive the circuit nature is, more energy losses and less power factor. Less the inductive the circuit nature is, less energy losses and less power factor. Less the Capacitive the circuit nature is, more energy losses and less power factor. More the Capacitive the circuit nature is, less energy losses and less power factor.

2 Experiment Set-up

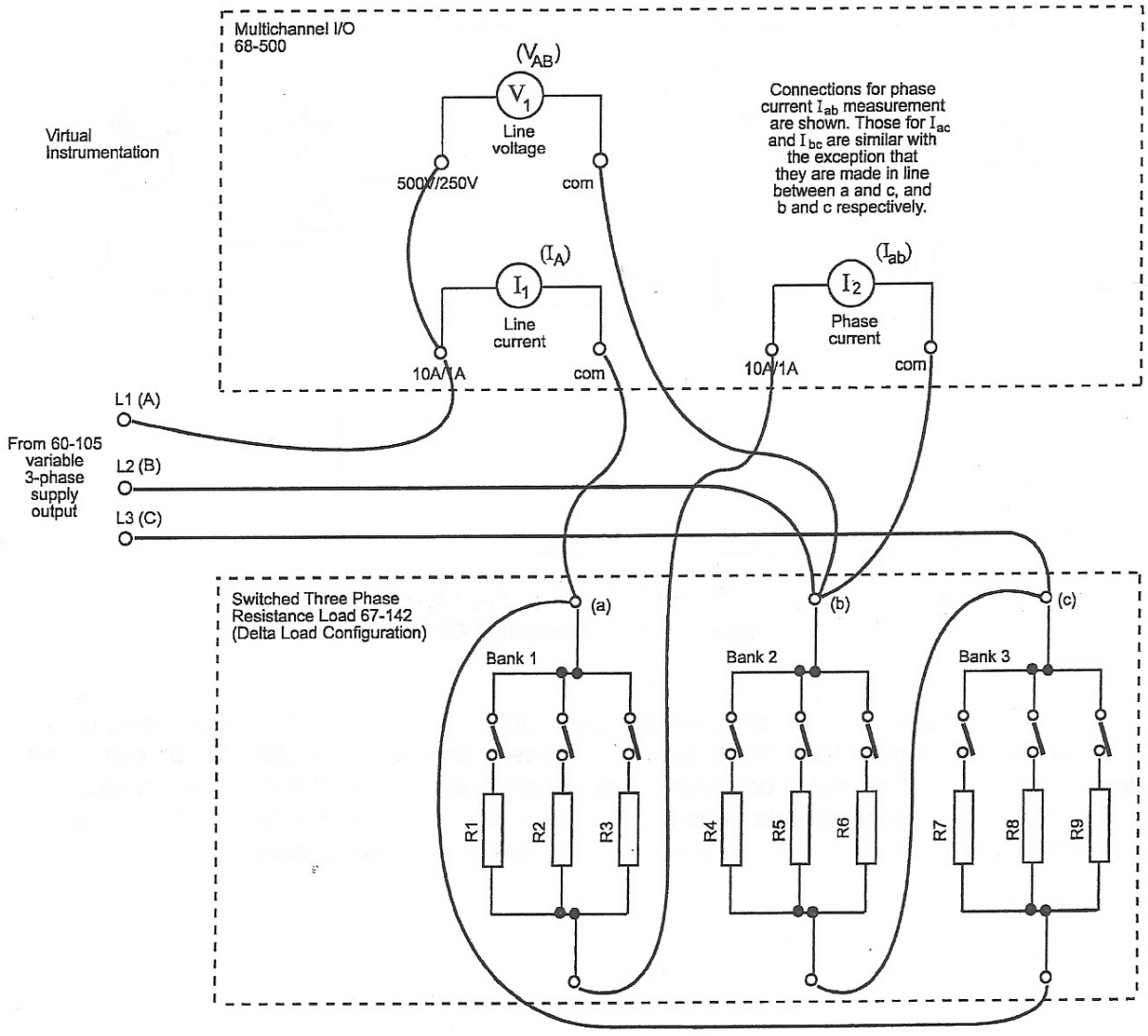
2.1 Experiment 1: Y-Y Connection

The experiment was set up according to the circuit diagram below. The resistors were connected in such a way that they were in star/Y connection with the star/Y connected 3-phase source.



2.2 Experiment 2: Y-Δ Connection

The experiment was set up according to the circuit diagram below. The resistors were connected in such a way that they were in Delta connection with the star/Y connected 3-phase source.

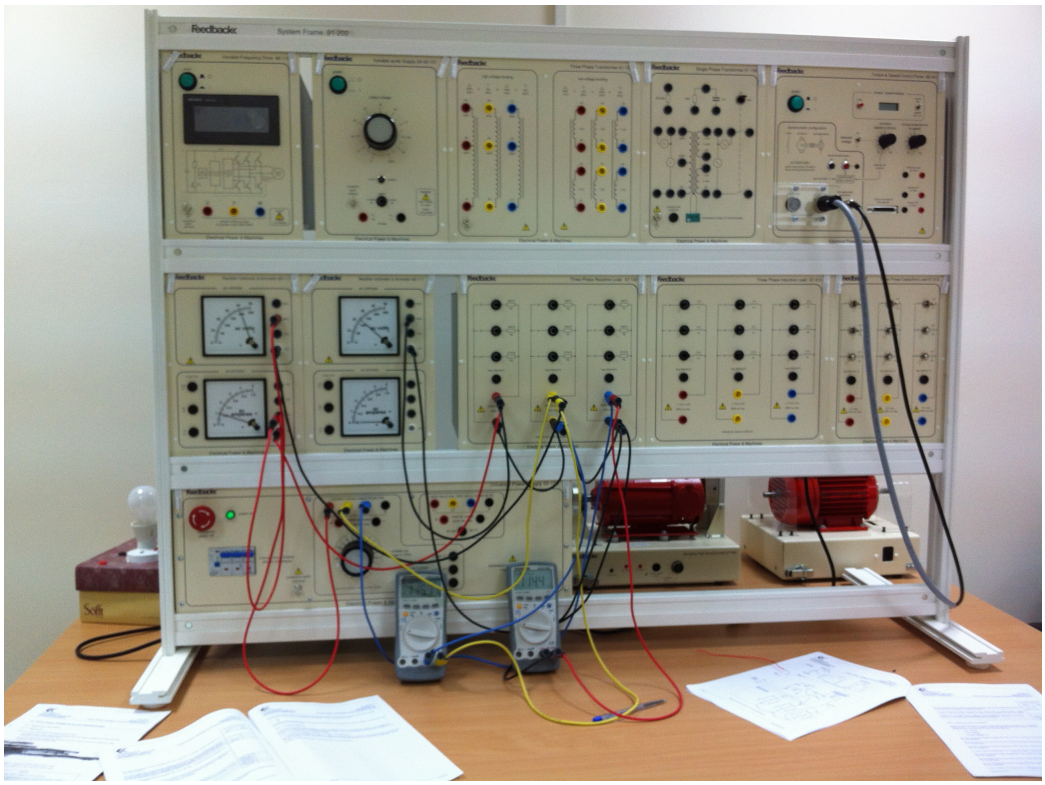


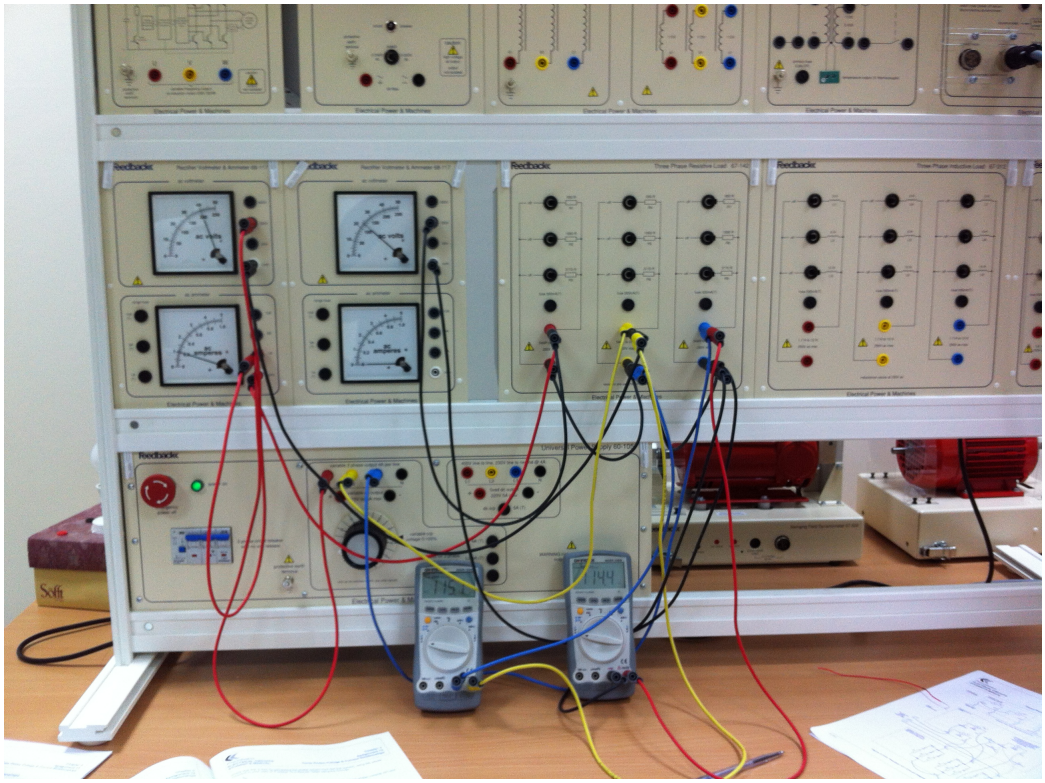
3 List of Equipment used

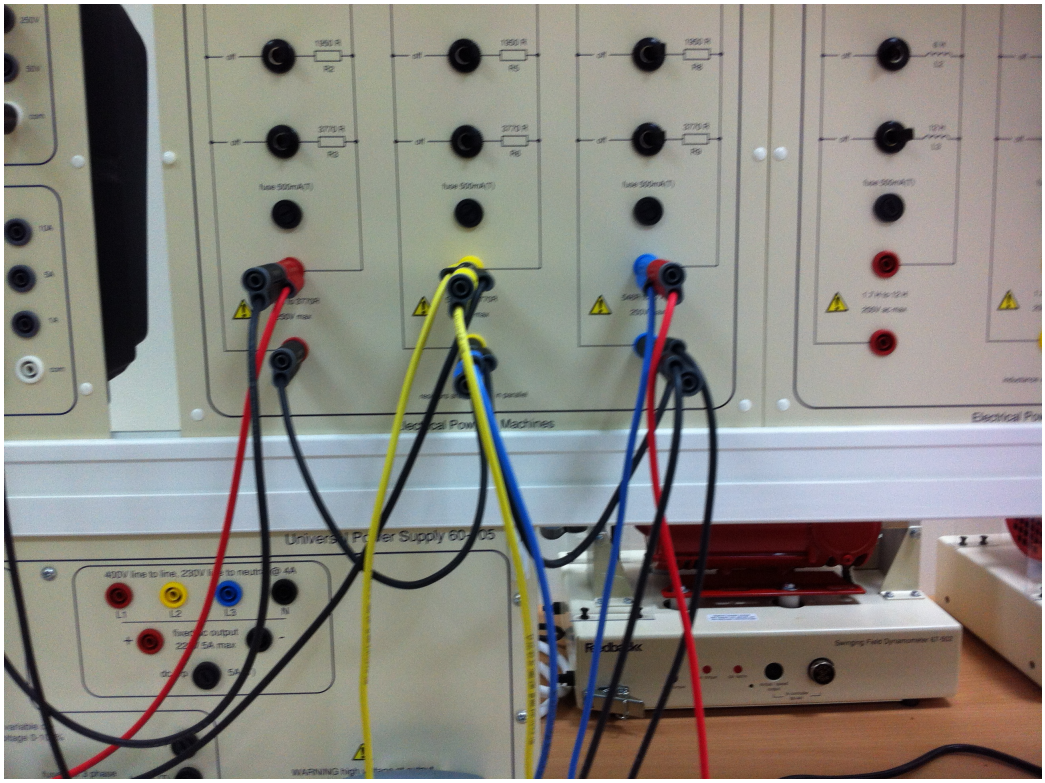
- Resistor Bank Load
- Connecting Wires
- Phase Analyser
- Multi-meter.
- Analogue AC Voltmeter.
- Analogue AC Ammeter.

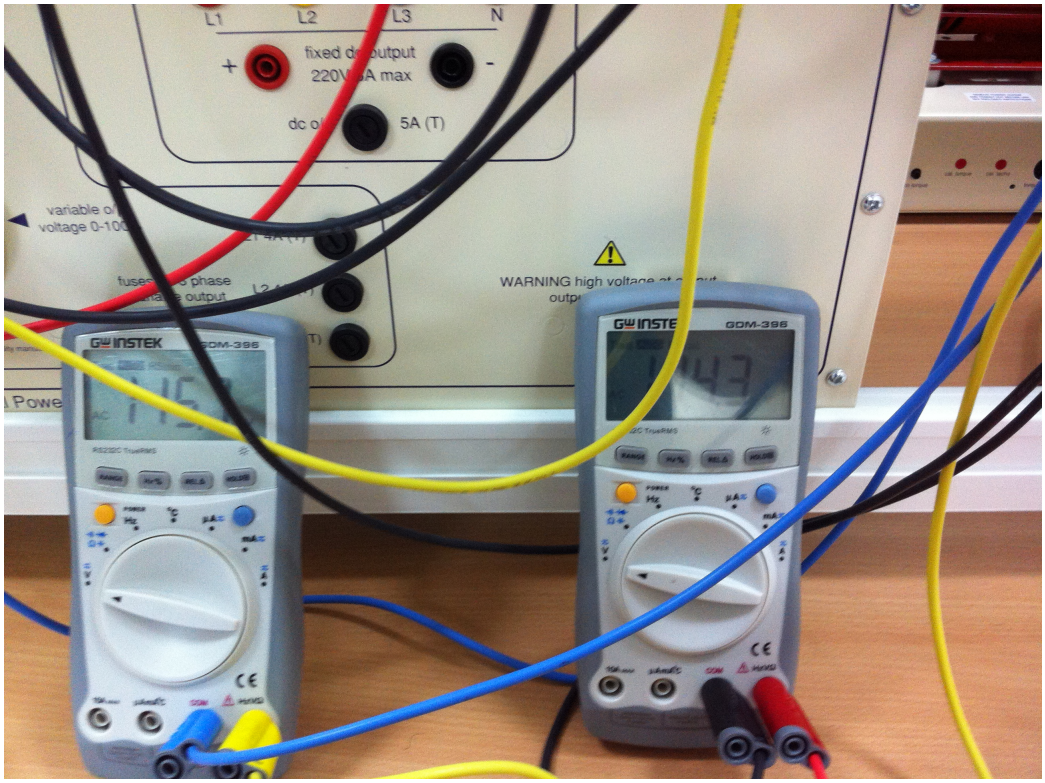
4 Procedure

- Connect the circuit as shown in the manual.
- Turn ON or OFF the power supply after the circuit is connected.
- Check and record the values onto the lab manual.





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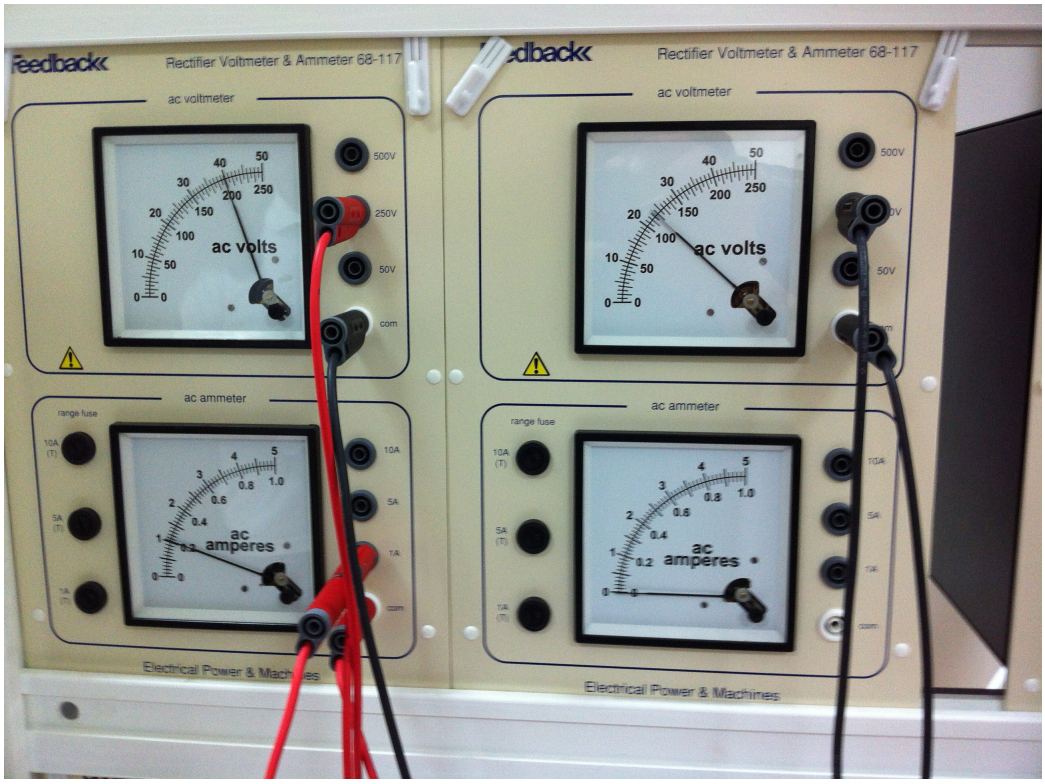
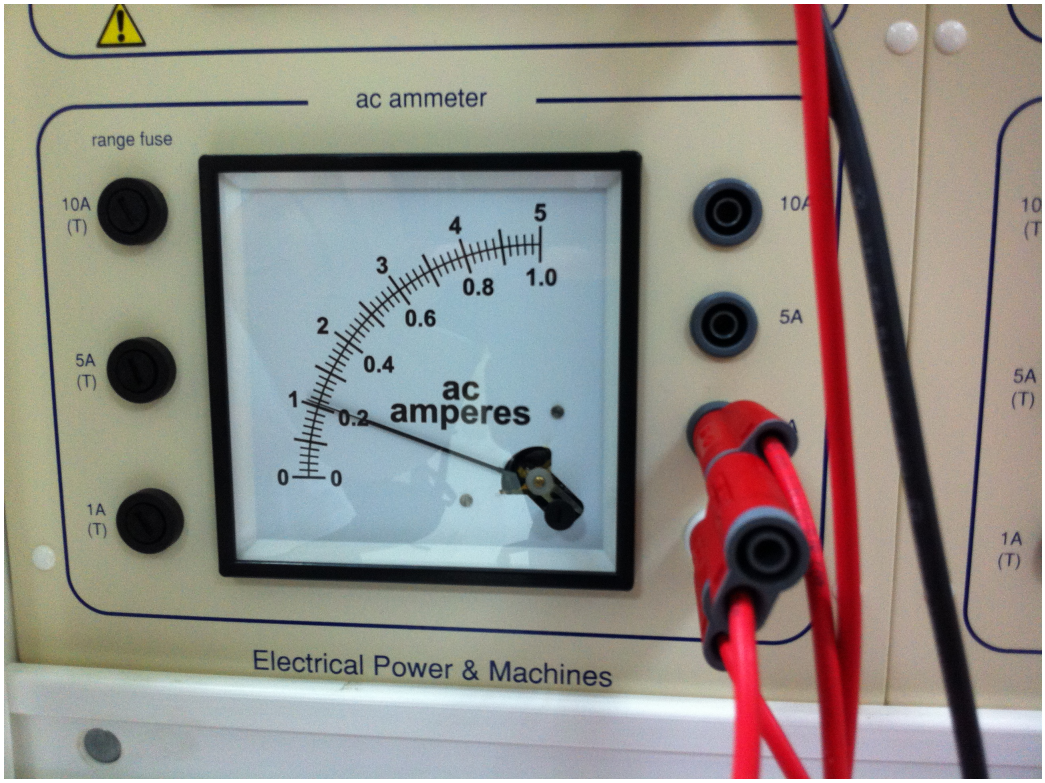

Feedback
Rectifier Voltmeter & Ammeter 68-117
ac voltmeter
ac volts
ac ammeter
ac amperes
range fuse
Electrical Power & Machines


ac ammeter
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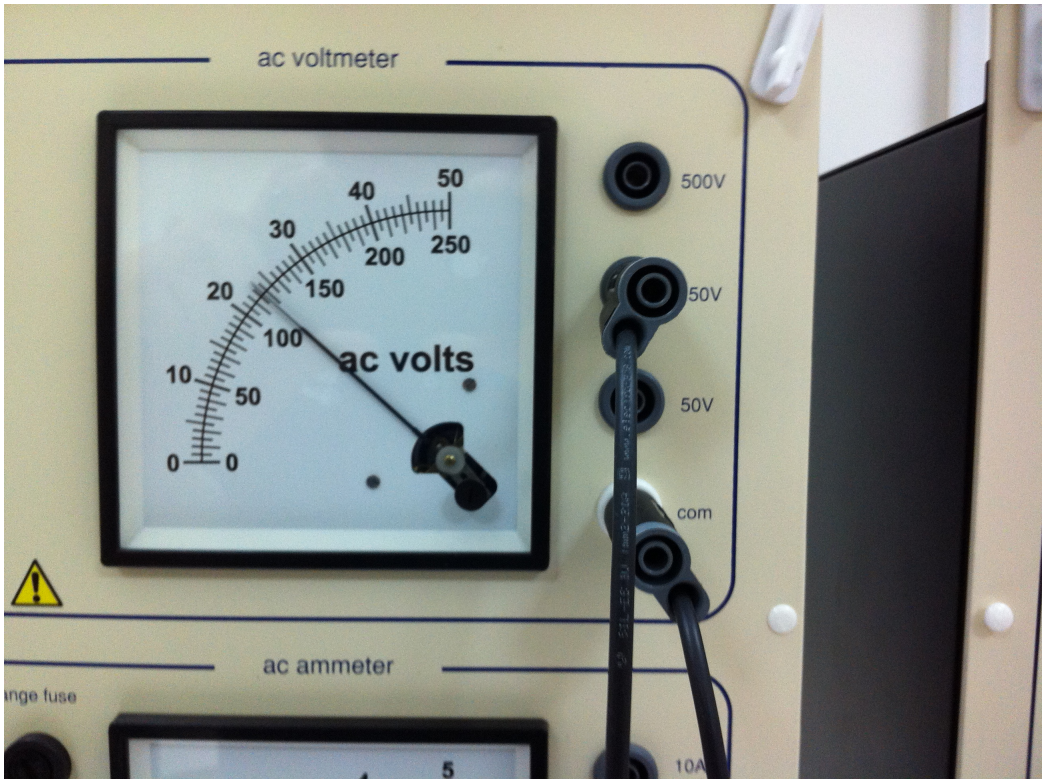
Electrical Power & Machines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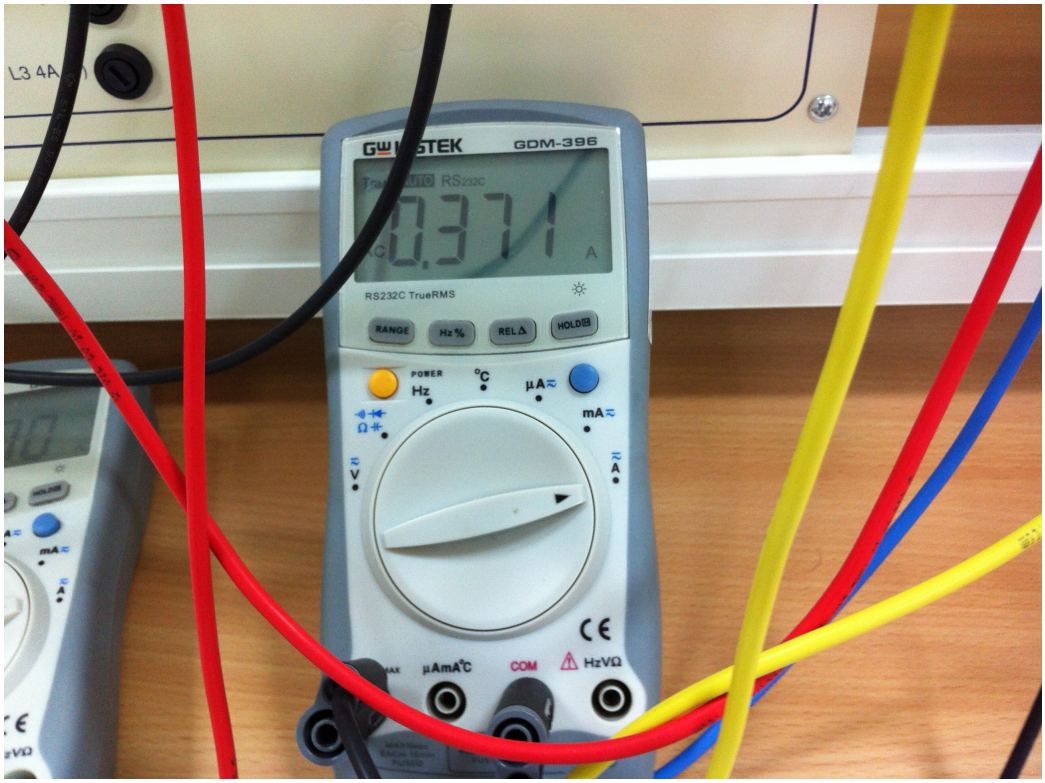
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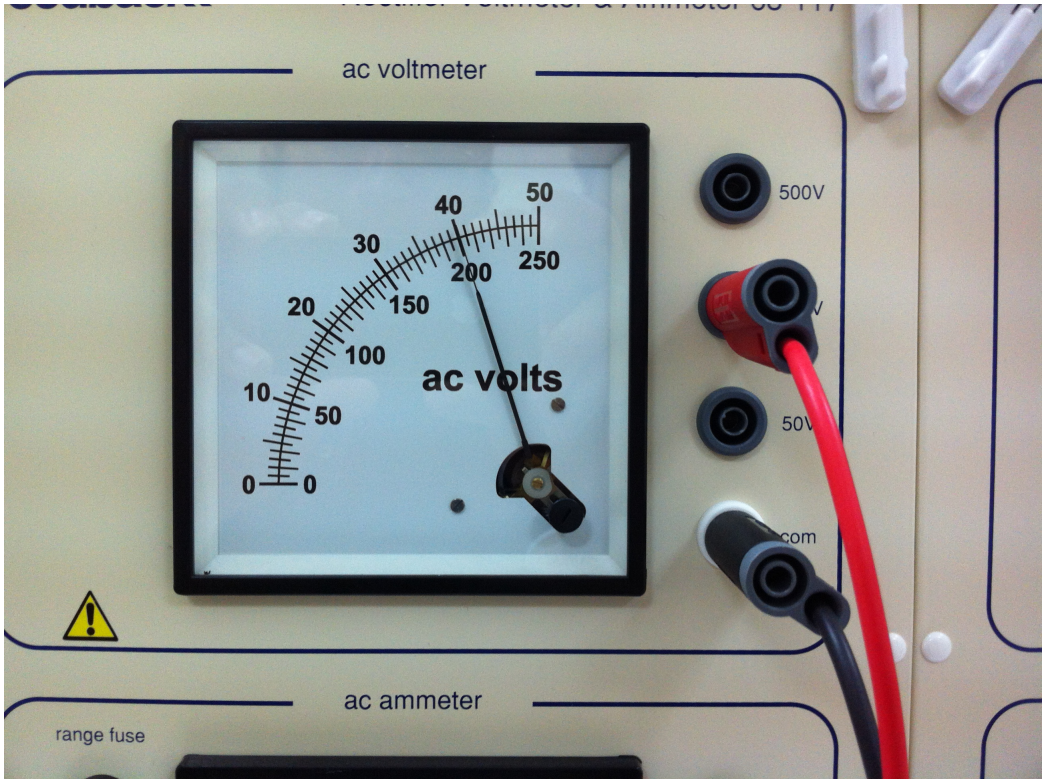
ac voltmeter
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ac ammeter
range fuse

5 Results and Discussions

At the end of the exercise we got the following results:-

- In a balanced three phase sytem, a Y connected device carries the whole line current, and $1/\sqrt{3}$ times the line voltage.
- A Y connected supply and load provides a neutral point.
- In a balanced three phase system, a Delta connected device carries $1/\sqrt{3}$ times the line current and the whole line voltage. That is, the magnitude of the line current is $\sqrt{3}$ times the magnitude of the phase current.
- A Delta connected supply and load has no neutral point.

Phase Resistance	Line Current	Line Voltage	Phase Voltage Van	Phase Voltage Vbn	Phase Voltage Vcn
548 Ω	0.2 mA	200 V	118 V	116.2 V	115.2 V
640 Ω	0.18 mA	200 V	120 V	115.6 V	114.6 V
759 Ω	0.19 mA	200 V	120 V	115.7 V	114.6 V
950 Ω	0.12 mA	200 V	120 V	115.7 V	114.7 V

Phase Resistance	Line Current	Line Voltage	Phase Current Iab	Phase Current Iac	Phase Current Ibc
548 Ω	0.64 mA	200 V	0.38 mA	0.366 mA	0.368 mA
640 Ω	660 mA	200 V	0.32 mA	0.314 mA	0.317 mA
759 Ω	480 mA	200 V	0.27 mA	0.266 mA	0.268 mA
950 Ω	380 mA	200 V	0.21 mA	0.213 mA	0.214 mA

6 Conclusion

- The line voltages are at a phase difference of 120 from each other. eg. Van = Vp∠0, Vbn = Vp∠-120, Vcn = Vp∠-240.
- The Root Mean Square Value of a voltage or current is given by Xrms = Xpeak/$\sqrt{3}$
- Y-Y connection is typically very easy to handle with.

7 Team Dynamics

Everybody in the group contributed equally in making Lab report, doing the experiment and concluding results analytically.

Report/Member	Weight/Grade	Mirza Mohsin	Ali Raza	Bilal Arshad	Muhammad Obaidullah
Abstract	10%	100%	0%	0%	0%
Introduction	20%	0%	50%	0%	50%
Procedure Part 1	10%	75%	0%	0%	25%
Procedure Part 2	10%	0%	75%	0%	25%
Procedure Part 3	10%	0%	0%	75%	25%
Results Part 1	10%	75%	0%	0%	25%
Results Part 2	10%	0%	75%	0%	25%
Results Part 3	10%	0%	0%	75%	25%
Conclusion	10%	0%	0%	100%	0%
Claimed Contribution		**25%**	**25%**	**25%**	**25%**
Contribution Validation Penalty		**0%**	**0%**	**0%**	**0%**
Overall Contribution		**25%**	**25%**	**25%**	**25%**
Overall Grade with Quality	**100%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**