

*Heaven's Light is Our Guide*



# Rajshahi University of Engineering & Technology

Department of Electrical & Computer Engineering

## Lab Report

Experiment No: 03

Name of the experiment: Study of the power measurement of a 3 –  $\phi$  balanced system using two wattmeter method.

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Course Title	Circuit & Systems II Sessoinal
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Submitted By:	Submitted To:
<b>Name : Nur Nafis Fuad</b> <b>Roll : 2210032</b> <b>Registration : 1086</b> <b>Session : 2022-2023</b> <b>Department of ECE, RUET</b>	<b>Oishi Jyoti</b> <b>Assistant Professor</b> <b>Department of ECE, RUET</b>

## Experiment No: 03

**1. Name of The Experiment:** Study of the power measurement of a 3 –  $\phi$  balanced system using two wattmeter method.

**2. Objectives:** This lab's goal is to examine and validate the power measurement of a 3 –  $\phi$  balanced system using two wattmeter method.

### 3. Theory:

In a three-phase balanced system, there are three lines from the source. So, It is obvious that, three wattmeters have to be connected to three line to measure the power draw. But calculation shows that it is enough to calculate two wattmeters to calculate total power draw from a 3 –  $\phi$  balanced system.

Here, the power draw of the system,  $P = \sqrt{3}V_L I_L \cos\Theta$  where,  $\Theta = \cos\{\tan^{-1}\left(\sqrt{3}\frac{W_1-W_2}{W_1+W_2}\right)\}$

### 4. Required Apparatus:

1. Source
2. VARIAC
3. Wattmeter
4. Ammeter
5. Resistor
6. Multimeter
7. Connecting wires

### 5. Circuit Diagram:

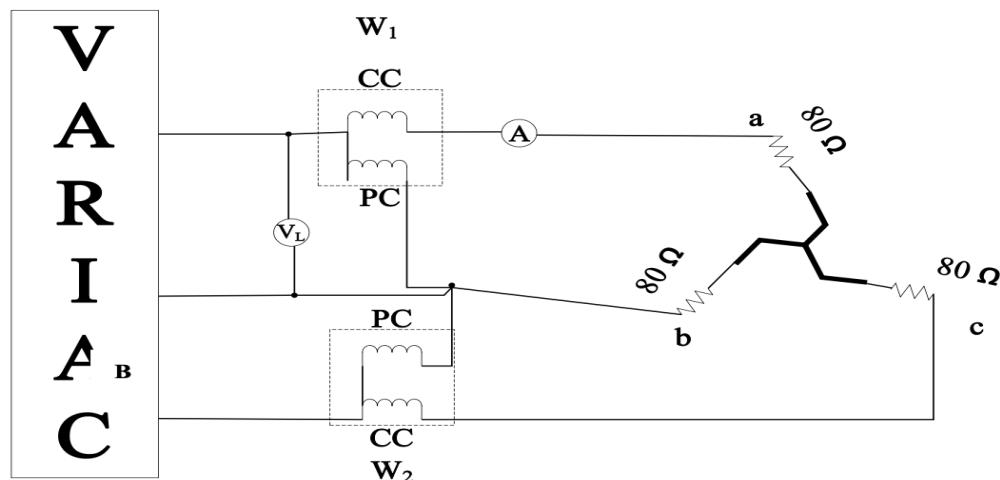


Figure: Circuit Diagram for a Balance 3 Phase System

## 6. Data Table & Result:

Sl No.	$P_1$ (W)	$P_2$ (W)	$P_t = P_1 + P_2$ (W)	$V_L$ (V)	$I_L$ (A)	$P_c = \sqrt{3} V_L I_L$ (W)	Error = $\frac{ P_t - P_c }{P_t} \times 100$ (%)
01	24	24	48	55	0.544	51.823	7.96
02	41	41	82	70	0.661	80.141	2.32
03	62	62	124	85	0.788	116.010	6.44
04	82	82	164	102	0.900	159	3.04

Result

S1	$P_1$	$P_2$	$P_t = P_1 + P_2$	$V_L$	$I_L$	$P_{(c)} = \sqrt{3} V_L I_L$	1.e
1	24	24	48	55	0.544	51.823	<del>15.14%</del> 7.96
2	41	41	82	70	0.661	80.141	<del>3.87%</del> 2.32%
3	62	62	124	85	0.788	116.01	6.44%
4	82	82	164	102	0.9	156	<del>0.94%</del> 3.04%

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## 7. Result:

Average percentage of error: 4.94 %

## 8. Discussion:

The experiment measured power in a three-phase balanced system using the two wattmeter method. The setup involved connecting a three-phase load to the supply and calibrating the wattmeters. After energizing the circuit, readings were recorded, and total power was calculated as

$$P_t = P_1 + P_2$$

Overall, the experiment confirmed that the two wattmeter method is an effective and reliable technique for measuring power in three-phase balanced systems.

## 9. Precautions:

- i. All connection should be perfectly connected.
- ii. Before connecting the instruments check their zero reading.
- iii. The terminal of the resistance should be properly connected.

## 10. Reference:

(i) Charles K. Alexandar and Matthew N. O. Sadiku, "Fundamentals of Electric Circuit", 5th Edition, 1221 Avenue of the Americas, New York