

Heaven's Light is Our Guide



Rajshahi University of Engineering & Technology

Department of Electrical & Computer Engineering

Lab Report

Course Code	ECE 1202
Course Title	Circuits and Systems II Sessional
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Name of The Experiment: Study the relationship between phase and line voltages of wye connected 3-φ balanced system.

Theory: In a balanced three-phase system, the three-phase voltages have the same magnitude and are displaced by 120 degrees from each other. In a wye-connected three-phase balanced system, there is a specific relationship between the phase voltages and the line voltages. The phase voltage (V_p) is the voltage between any phase and the neutral point, while the line voltage (V_L) is the voltage between any two phases. Due to the wye-connection, where the neutral point of the three-phase system is connected to the common point, the line voltage is equal to the phase voltage multiplied by the square root of 3 ($\sqrt{3}$). Mathematically, this relationship can be expressed as,

$$V_p = \frac{V_L}{\sqrt{3}}$$
$$I_p = I_L$$

Circuit:

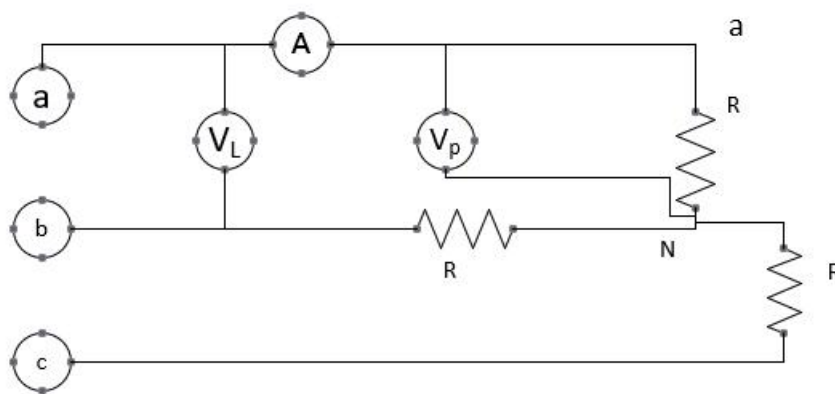


Fig. Circuit Diagram

Required Apparatus:

1. Source
2. Ammeter
3. Resistor
4. Multimeter
5. Connecting Wire

Data Table:

SL No	V _L	V _{P(m)}	V _{P(c)}	I _L	I _P	Error(%)
1	74.6	44	43.07	0.37	0.37	2.114
2	92.8	54	53.59	0.49	0.49	0.76
3	39.60	23.34	22.86	0.23	0.23	2.1

Calculation:

For 1st calculation,

$V_L = 74.6 \text{ V}$, $V_{P(c)} = V_L / \sqrt{3} = 43.07 \text{ V}$, $V_{P(m)} = 44 \text{ V}$, Error = 2.114%

For 2nd calculation,

$V_L = 92.8 \text{ V}$, $V_{P(c)} = V_L / \sqrt{3} = 53.59 \text{ V}$, $V_{P(m)} = 54 \text{ V}$, Error = 0.76%

For 3rd calculation,

$V_L = 39.60 \text{ V}$, $V_{P(c)} = V_L / \sqrt{3} = 22.86 \text{ V}$, $V_{P(m)} = 23.34 \text{ V}$, Error = 2.1%

Conclusion:

The experiment investigated the relationship between phase and line voltages in a balanced wye connected three-phase system. The results confirmed the theoretical relationship ($V_L = \sqrt{3} * V_P$). This experiment demonstrates the fundamental concept of voltage relationships in a common three-phase system configuration.