

Practical No. 4: Measure the live voltage, phase voltage and phase current and line current in three phase star connected balanced load.

I Practical Significance:

In practice, large power application like Transformer, Transmission line etc. use three phase systems. In a three phase circuit loads can be connected in balanced star and delta mode. Practical will help the students to acquire necessary skills.

II Industry/Employer Expected Outcome(s):

Three-phase power is commonly used in factories and manufacturing plants to power large equipment such as compressors, pumps, conveyors, and motors, often use three-phase power to run large fans and pumps. It is necessary to formulate voltage and current relations for system parameters for testing, calculations and interpretations.

III Course Level Learning Outcome(s):

Calculate and measure basic electrical quantities and parameters.

IV Laboratory Learning Outcome(s):

LLO 1 Measure the live voltage, phase voltage, phase current and line current in three phase star connected balanced load.

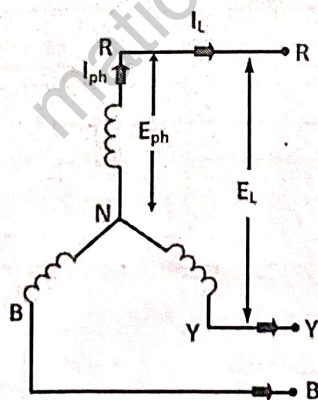
LLO 2 Determine phase voltage and line current in delta connected load.

V Relevant Affective Domain related outcome(s):

Follow safety electrical rules for safe practices.

VI Relevant Theoretical Background (With diagrams if required):

In the **Star Connection**, the similar ends (either start or finish) of the three windings are connected to a common point called star or neutral point. The three-line conductors run from the remaining three free terminals called line conductors.



In star connection line voltage is root 3 times of phase voltage.

IX Precautions to be followed:

1. Avoid loose connections.
2. Don't touch wire with wet hands.
1. Ensure the output voltage of the Autotransformer should be zero.

X Procedure:

1. Connect the circuit as shown in circuit diagram.
2. Confirm all the meters should be at zero position.
3. Set the rheostat at maximum position.
4. Set the autotransformer output voltage zero.
5. Switch ON the supply.
6. Record the reading of ammeters, voltmeters.
7. Take different readings at different input voltages.

XI Required Resources/apparatus/equipment with specification:

S. No.	Name of Resource	Suggested Broad Specification	Quantity
1	Three Phase Variac	suitable Three phase variac.	1 No.
2	Three Phase load	Suitable range	1 No.
3	A.C. Ammeter	suitable A.C. ammeter.	1 No.
4	A.C. Voltmeter.	suitable A.C. voltmeter.	1 No.

XII Actual Procedure Followed:

- 1] Connect the circuit as shows in circuit diagram.
- 2] confirm all the meters should be at zero position.
- 3] set the rheostat at maximum position.
- 4] set the autotransformer output voltage zero.
- 5] Switch ON the supply.
- 6] Record the reading of ammeter, voltmeters.
- 7] Take different readings at different input voltage.

XIII Observation and Calculation table:

Sr. No.	Line Voltage (volts)	Phase Voltage (Volts)	Line current (Amp)	Phase Current (Amp)	Ratio V_L/V_{ph}	Ratio I_L/I_{ph}
1>	108	34	108 (Amp)	108 (Amp)	3.17	1
2>	225	133	2.9 (Amp)	2.9 (Amp)	1.69	1
3>	230	152	3.7 (Amp)	3.7 (Amp)	1.51	1
4>	210	156	4.2 (Amp)	4.2 (Amp)	1.34	1

XIV Result(s):

Three phase circuit loads can be connected in balanced star & delta model connection.

XV Interpretation of results:

Three phase balanced network are used in power is disty for reasons of economy of performance.

XVI Conclusion and recommendation:

Hence, We have learned, Measure the live voltage, phase voltage and phase current and line current in three phase star connected balanced load.

XVII Practical related questions (Provide space for answers):

1. Define balanced load.
2. State the application of star connection.
3. What will be the value of neutral current for three phase star connected balanced load?
4. State the methods to measure power in three phase circuit.

1) → Balanced load is that load in which magnitude of all equidance connected in the load are equal it is called as balanced load.

2) → Star connections are mainly required for the power transmission network for longer distances.

3) $\longrightarrow$ In a balanced system the neutral current & neutral power is zero you can think of a balanced three-phase system as three single-phase systems connected to a neutral line.

4) $\longrightarrow$ To measure power in a 3-phase system, it would seem necessary to use three wattmeters each connected to neutral for a common terminal, & each responding to a line-to-line neutral voltage & a line current.