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USER GUIDE

3Ph IMPEDANCE – PHASOR

The screenshot displays the '3 Phase System' LabVIEW simulation software interface. The main window is titled '3 PHASE SYSTEM' and features a central control panel with three rows corresponding to the R, W, and B phases. Each row includes a color-coded background (red for R, white for W, blue for B) and displays various electrical parameters: Line Voltage (V_{Line}), Line Current (I_{Line}), Impedance (Z), Phase Power (P_{Ph}), Phase Reactive Power (Q_{Ph}), and Phase Angle (θ). The R-phase panel shows $Z = 240 \Omega$ and $PF = 1$. The W and B phase panels also show $Z = 240 \Omega$ and $PF = 1$. On the left side, there are controls for Power (OFF), 3Ph Supply Voltage (415.7 V), Freq. (50 Hz), Phase (0), and total system power (S, P, Q). A 'Neutral' indicator is present at the bottom left. On the right side, there are phase voltage (V_{Ph}) and current (I_{Ph}) meters, an 'EXIT' button, and a 'Faults' section showing 'No Fault'. A 'Load Configuration' section in the center-right shows a STAR connection diagram.

LabVIEW Simulation Software

INTRODUCTION

3Ph Impedance – Phasor application is written to help students to do practical exercises using LabVIEW simulation software. This application is for three phase star/delta circuits for reactive loads (LCR). You will find the intuitive controls and the layout of components very user friendly and easy to use with minimal help. The instructions below will help you to get started.

CONTROLS AND DISPLAYS LAYOUT

The screenshot shows the '3 PHASE SYSTEM' software interface. On the left, a vertical menu bar contains 'File', 'Exercises', and 'Help'. Below it are power controls (ON/OFF), a 3-phase supply voltage slider (set to 415.7 V), a frequency slider (set to 60 Hz), a phase selector (set to 0), and a STAR load configuration diagram. The main display area is divided into three horizontal sections for phases R, W, and B. Each section shows line voltage (V_{Line}), line current (I_{Line}), and phase-specific power (S, P, Q, PF, Impedance Z). A central phasor diagram shows the STAR configuration. On the right, there are buttons for 'EXIT', 'Load Configuration', and 'Faults' (set to 'No Fault').

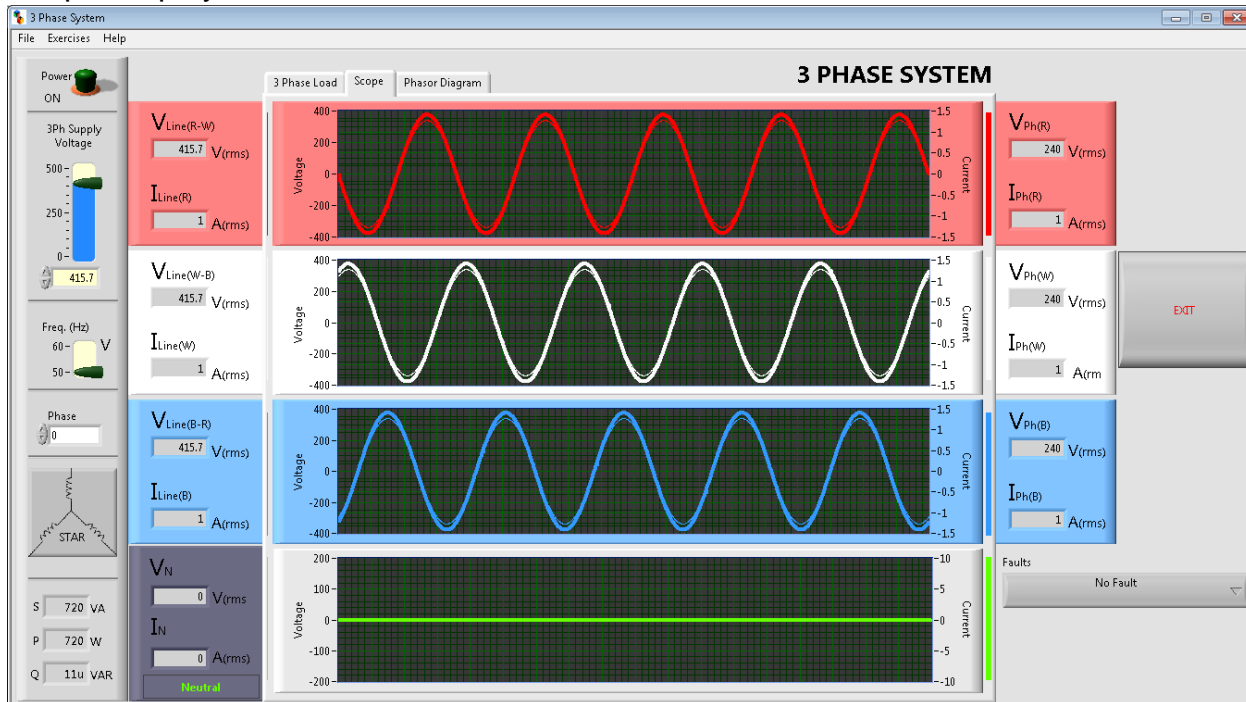
Callout boxes on the left side of the image identify the following components:

- Menu bar
- Input power controls
- Line Voltage, Current Display
- Load Impedance
- Load Power

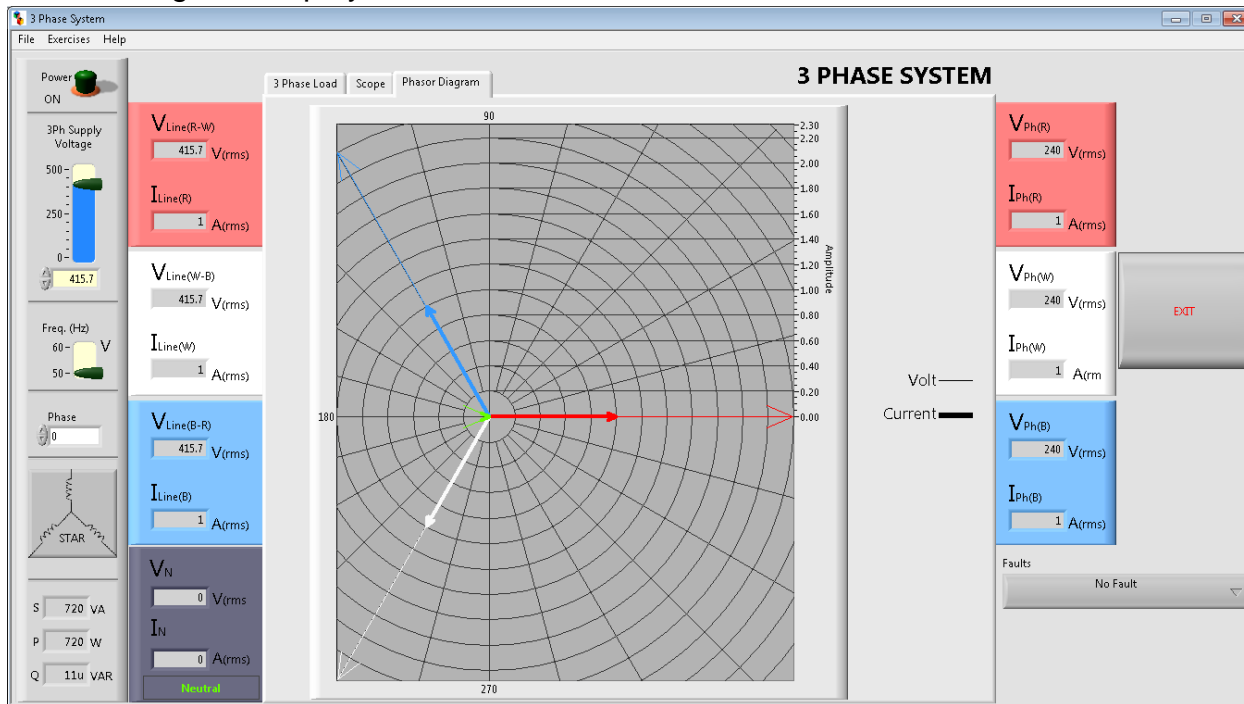
Callout boxes on the right side of the image identify the following components:

- 3Ph Load Type Tab
- Scope display Tab
- Phasor diagram Tab
- Exit / close application
- Load Configuration
- Fault Type
- Load Phase Voltage, Current Display

Scope Display



Phasor Diagram Display



MENU BAR

File

- Print Window. Print a screenshot of the window
- Exit. Close this application

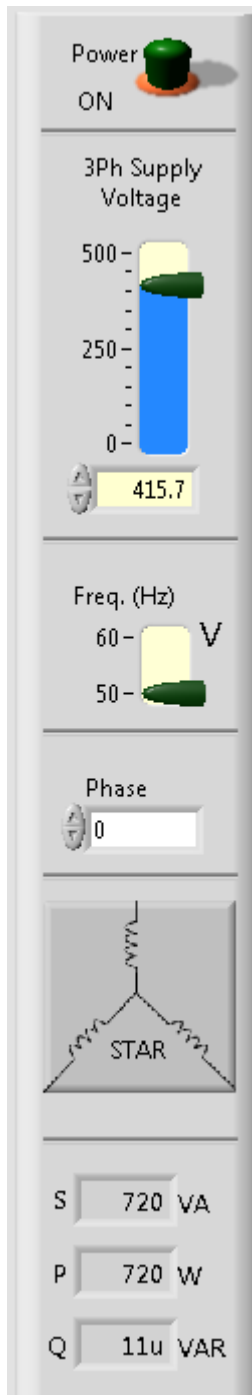
Exercises

- Student Exercises. Opens a student exercises document.
- Reactance XL. Opens a pop-up window to calculate reactance of an inductor value or to calculate the inductance of an inductor with a reactance value.
- Reactance XC. Opens a pop-up window to calculate reactance of a capacitor value or to calculate the capacitance of a capacitor with a reactance value.
- Power Factor. Opens a pop-up window to calculate power factor of a given angle or calculate the angle of a given power factor.
- Calculator. Opens the standard windows calculator

Help

- Help on This VI. Opens a user guide document
- Licence. Opens a pop-up window to show the licence information for this application. Here you can enter the licence key to activate this application.
- About LabVIEW. Opens a pop up window to show the LabVIEW software information.

INPUT POWER CONTROLS



Set the supply voltage, frequency and turn on/off the power. You can set the frequency, phase angle between voltage and current of the power supply and select supply configuration to star or delta. It also shows the power drawn from the supply.

LINE VOLTAGE, CURRENT DISPLAY

The image shows a software interface for displaying line voltage and current. It is divided into four main sections, each with a distinct background color:

- Red Section (Top):** Displays $V_{\text{Line(R-W)}}$ as 415.7 V(rms) and $I_{\text{Line(R)}}$ as 1 A(rms).
- White Section (Second):** Displays $V_{\text{Line(W-B)}}$ as 415.7 V(rms) and $I_{\text{Line(W)}}$ as 1 A(rms).
- Blue Section (Third):** Displays $V_{\text{Line(B-R)}}$ as 415.7 V(rms) and $I_{\text{Line(B)}}$ as 1 A(rms).
- Dark Grey Section (Bottom):** Displays V_N as 0 V(rms) and I_N as 0 A(rms). Below these displays is a button labeled "Neutral" in green text.

View the line voltage and current for the applied phase load.

LOAD IMPEDANCE CONTROL

The interface shows three phase settings (R, W, B) for a 3-phase load. Each phase has an impedance of 240 Ω. The power factor (PF) and phase angle (Theta) are adjustable for each phase.

Phase	Impedance Z (Ω)	Power Factor (PF)	Phase Angle (Theta) (°)
R (Resistive)	240	1 PF _(R)	33.9°
W (Resistive)	240	1 PF _(W)	27.3°
B (Resistive)	240	1 PF _(B)	-40.4°

OR

Adjust the impedance of each phase for the load. You can select the type of load for each phase by adjusting the power factor or phase angle. The power factor can range from 0 to +1. The phase angle can range from -90 to +90 degrees. If the power is 1 or phase angle is 0 degrees, it will be pure resistive load.

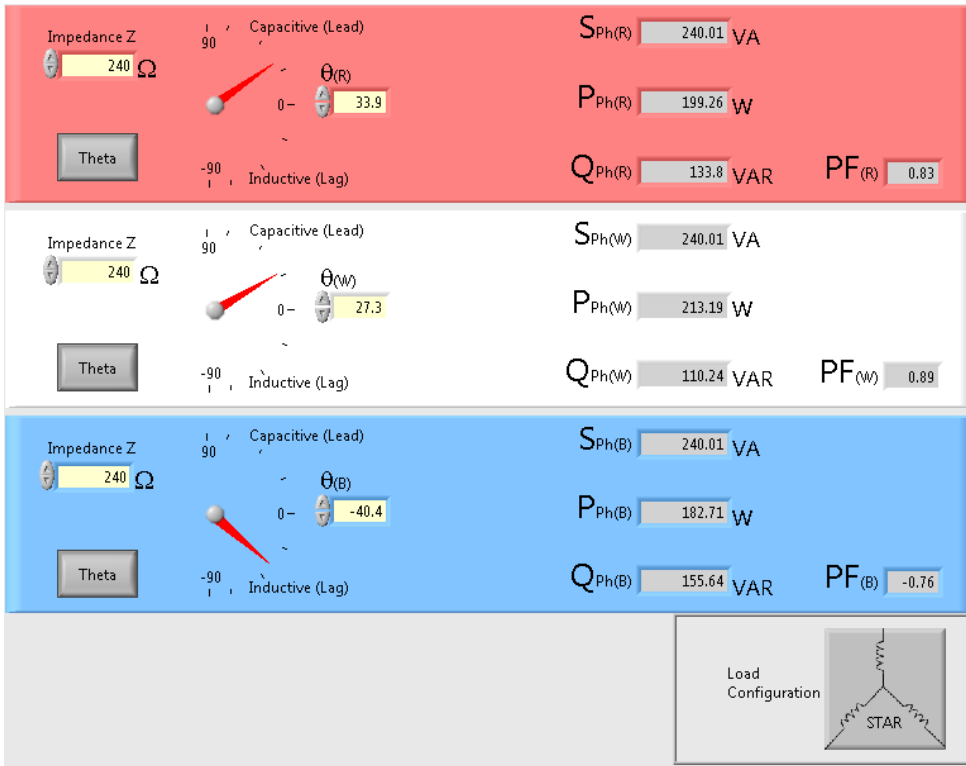
LOAD POWER

The power meter displays the following values for each phase:

Phase	S_{Ph} (VA)	P_{Ph} (W)	Q_{Ph} (VAR)	PF
R	240.01	199.26	133.8	0.83
W	240.01	213.19	110.24	0.89
B	240.01	182.71	155.64	-0.76

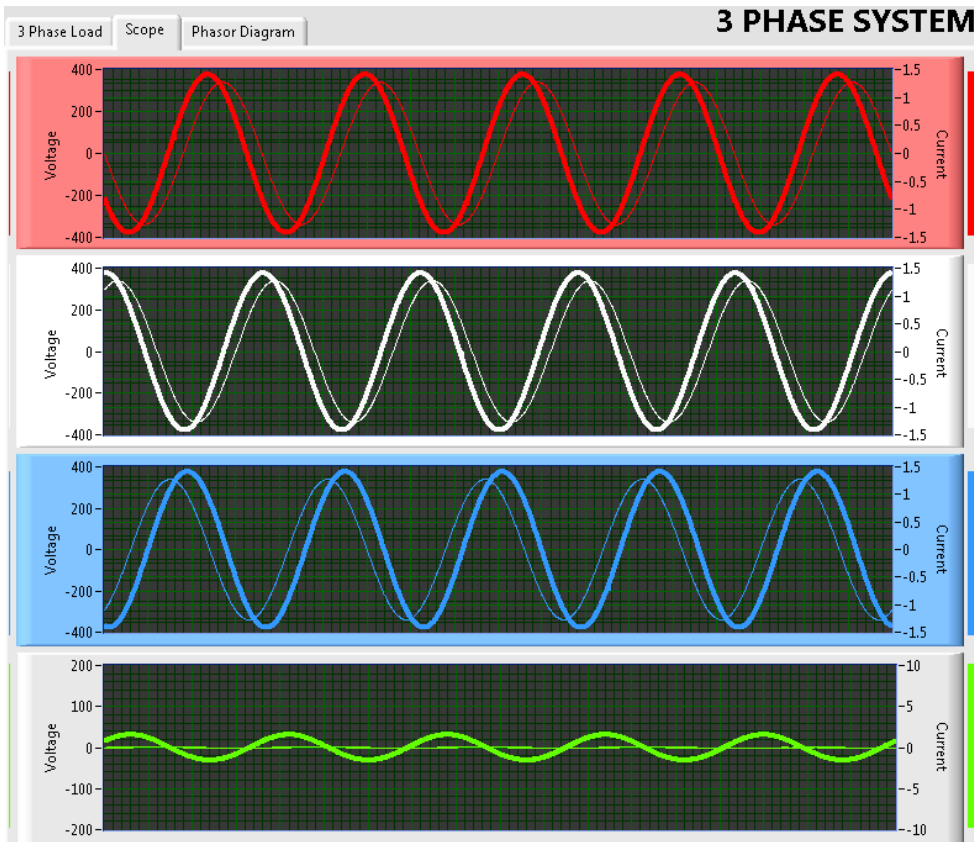
View the power meters for each phase and the power factor phase angle.

LOAD TYPE TAB CONTROL



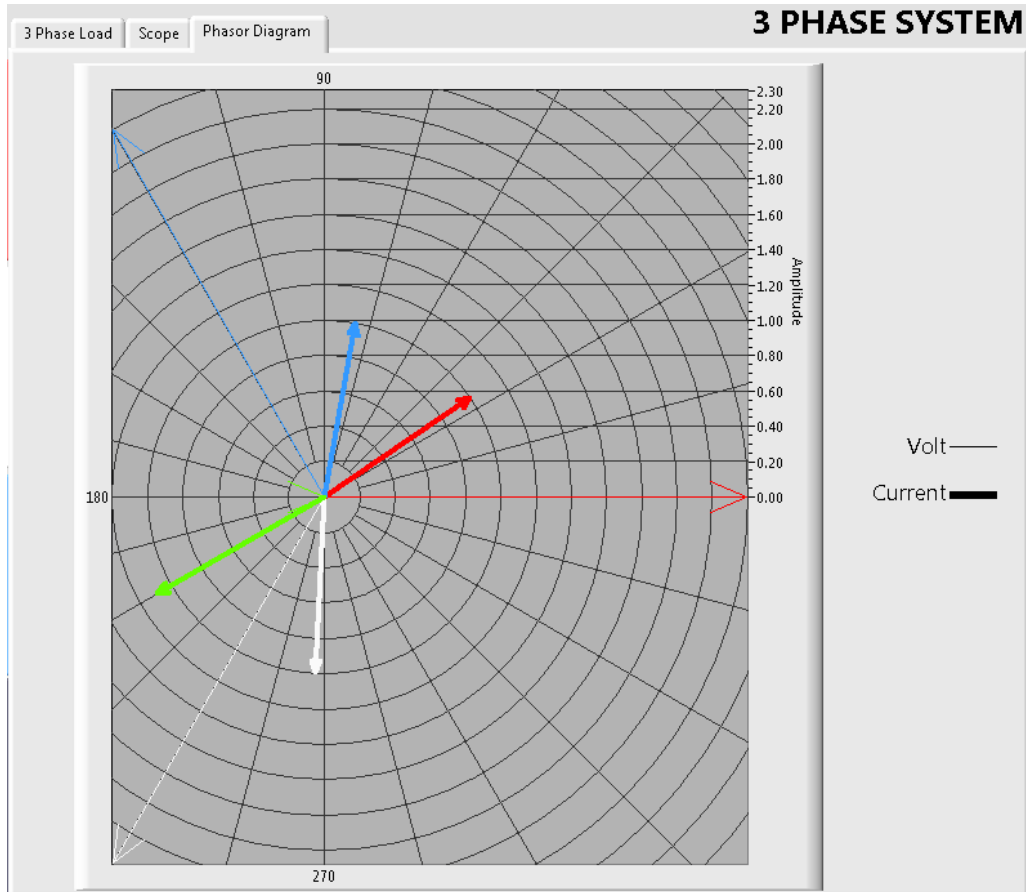
This tab selection allows you to adjust and view the load type and configuration.

SCOPE TAB CONTROL



This tab selection allows you to view the load voltage and current waveforms on a scope and view the phase angle between voltage and current for each phase.

PHASOR DIAGRAM TAB CONTROL



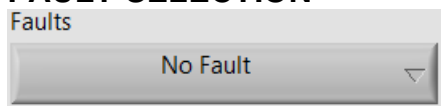
This tab selection allows you to view the phasor diagram of all the vectors including the neutral voltage and current in star load configuration or delta circulating current in delta load configuration.

EXIT BUTTON



Click this button to exit and close this application.

FAULT SELECTION



Click this drop list to select the fault type.

USING THE SIMULATION APPLICATION

STEPS

1. Set the load impedance for each phase.
2. Adjust the power factor / phase angle values of each phase load.
3. Select the frequency of the power supply
4. Set the power supply voltage.
5. Turn on the power supply
6. Adjust the supply voltage and observe the line / phase voltage and current values.
7. Record the volt and current meter readings from the display area.
8. Draw the vectors in your notebook based on the type of load and the readings you recorded in step 7.
9. Select the phasor diagram tab to show all the vectors in the phasor diagram
10. Compare your vector plots with the phasor diagram. If different, then check your plot and explain why you have a different plot.

Enjoy learning phasors!

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