

ELECTROTECHNICH LAB.

PART 3 EXPERIMENTS

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EXPERIMENT 12.1

EXAMINATION OF RESISTANCES IN ALTERNATING CURRENT

REQUIRED MATERIALS:

- 1- Function generator
- 2- Oscilloscope (**two channels**)
- 3- AC ammeter
- 4- Y-0016/01AC module
- 5- Connection cable

EXPERIMENT:

In function generator, set a sin wave with 10 volts peak to peak and 1Khz frequency **$E_{pp} = 10V$** , **$f = 1Khz$** . Replace the Y-0016/01AC module. Short circuit the **J1** nodes. Connect the circuit as in figure 11.4. Power the circuit.

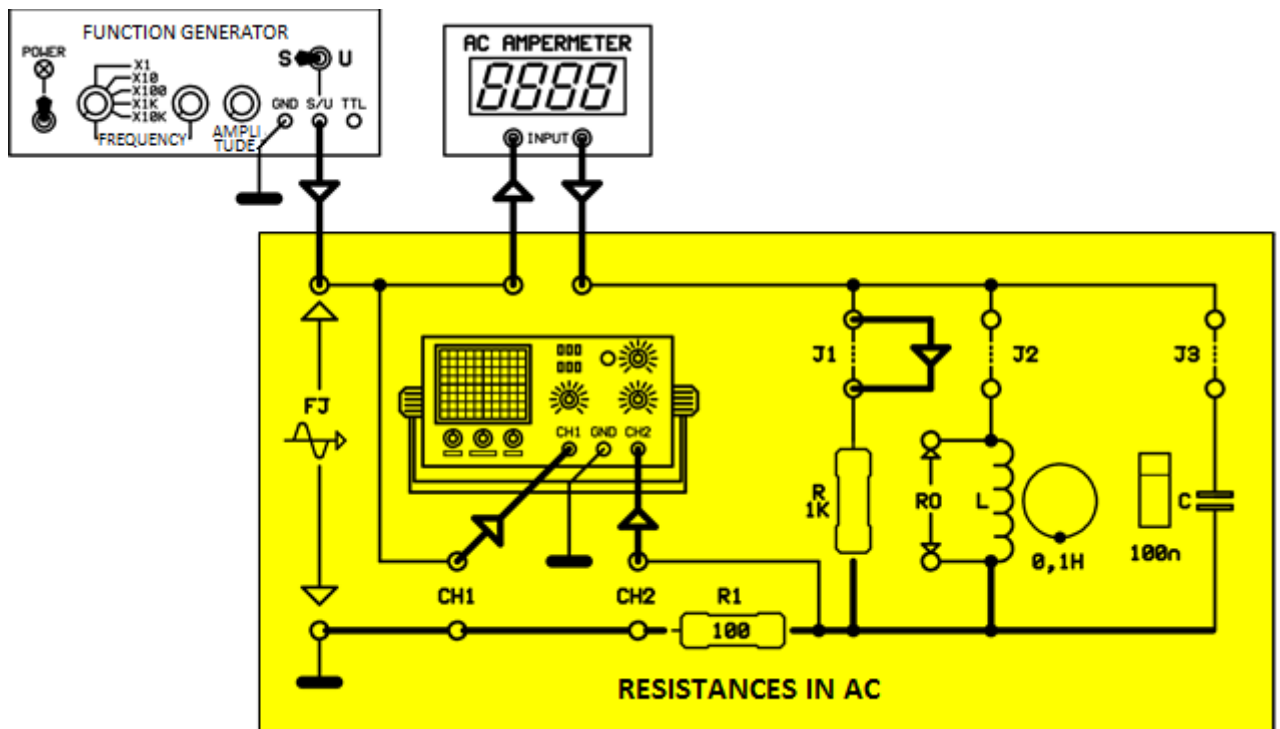


Figure 11.4

1- Plot the vector diagram of the circuit by the help of the oscilloscope.

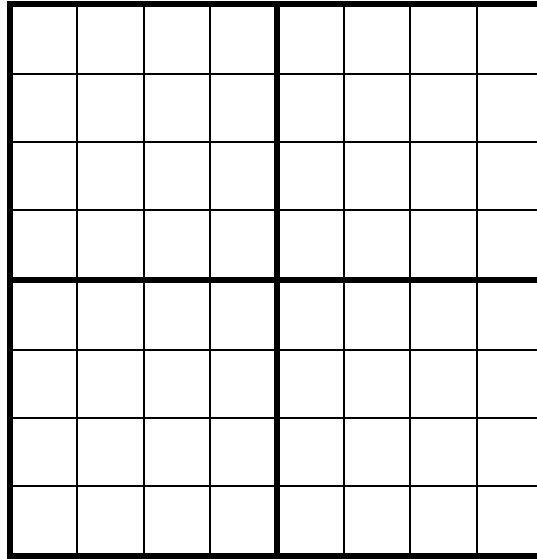


Figure 11.5

2- What is the phase angle of the circuit? Why?

3- Calculate the current of the circuit. (**Take $R_1=0$**).

4- short circuit CH2. In this case R_1 is omitted from the circuit. Is the value measured by ammeter equal to the value that we calculated?

5- Draw the phase diagram of the circuit?

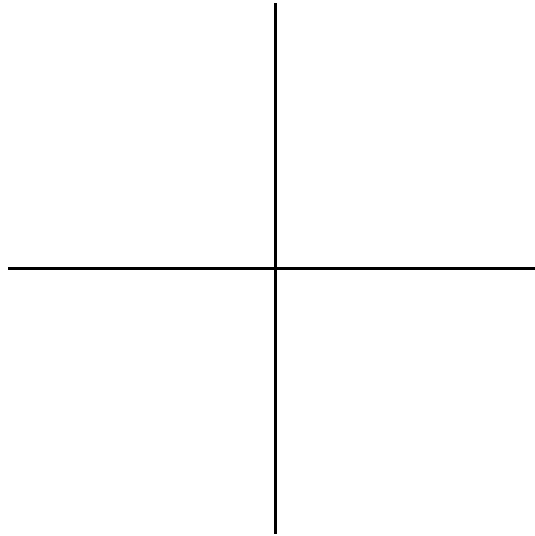


Figure 11.6

6- Change the frequency of the circuit between 250 Hz to 750 Hz. Write down the changes in phase angle, amplitudes of voltage and current. Summarize the result.

7- What is the minimum power value of the resistance "R".

NOTE: Do the experiment in different frequencies and different voltages.

EXPERIMENT 14.1

EXAMINATION OF COILS IN ALTERNATING CURRENT

REQUIRED MATERIALS:

- 1- Function generator
- 2- Oscilloscope (**two channels**)
- 3- AC ammeter
- 4- Y-0016/01AC module
- 5- Connection cable

EXPERIMENT:

In function generator, set a sin wave with 10 volts peak to peak and 1Khz frequency **$E_{pp} = 10V$** , **$f = 1Khz$** . Replace the Y-0016/01AC module. Connect the circuit as in figure 13.7. Power the circuit.

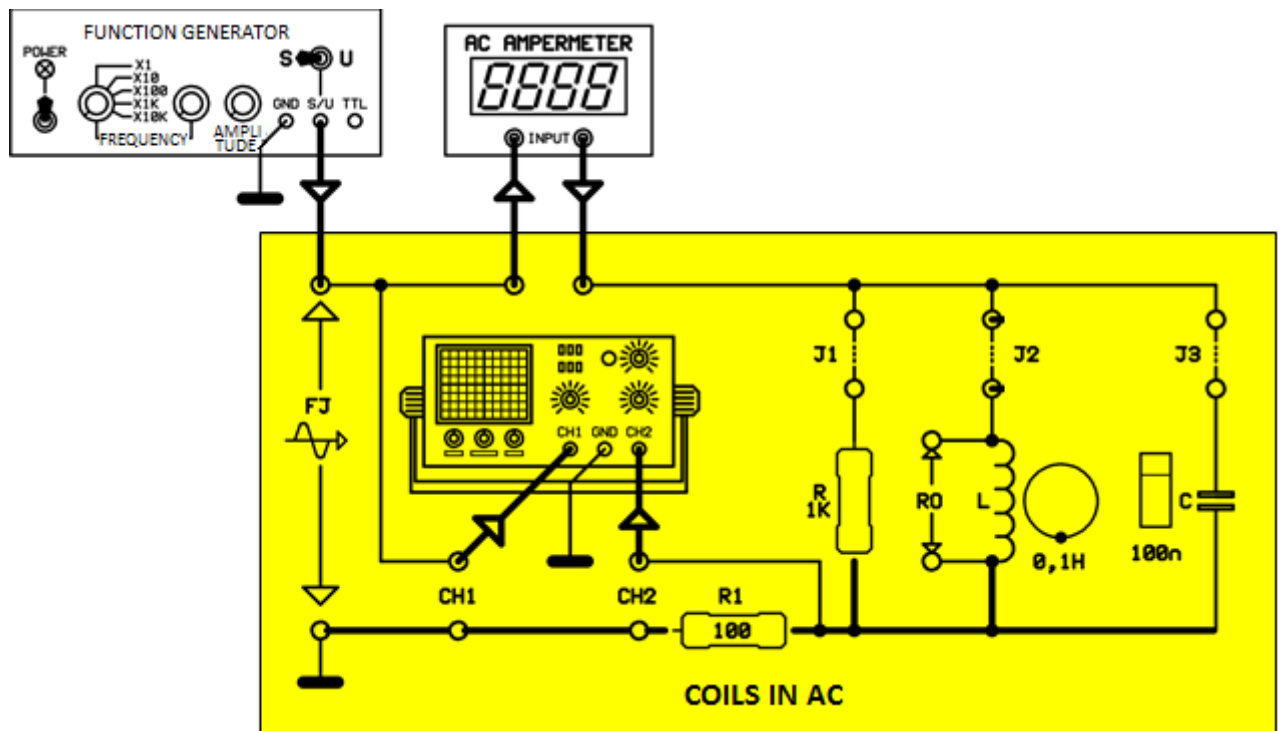


Figure 13.7

1- Measure the internal resistance of the coil.

2- Short circuit the j2 nodes. Now coil is connected to the AC source draw the vector diagram of the circuit as seen in oscilloscope.

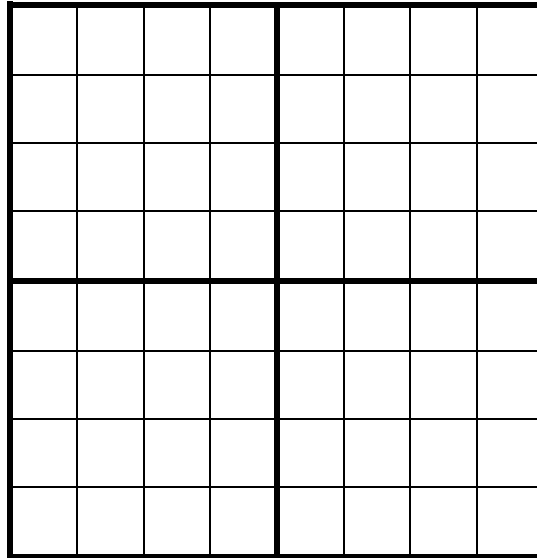


Figure 13.8

3- what is the phase angle of the circuit? Why?

4- Calculate the inductive reactance of the coil.

5- Calculate the circuit current.

6- Short circuit the CH2 nodes. Now R1 has no effect to the circuit. Compare the calculated and the measured current. Is there a difference, why?

7- Draw the phase diagram of the circuit?

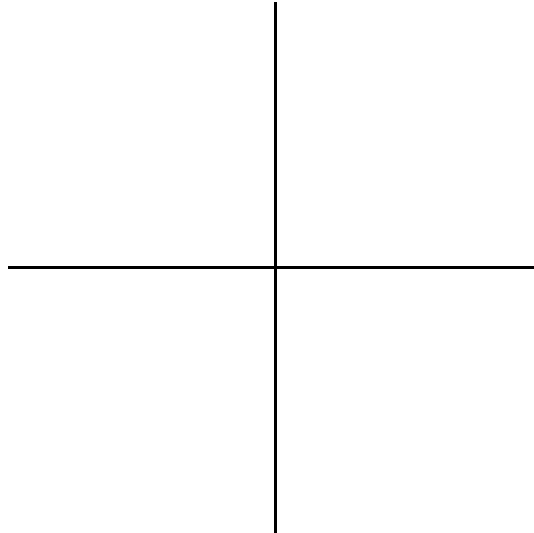


Figure 13.9

8- Calculate the apparent power, real power and reactive power in the circuit?

NOTE: Do the experiment in different voltage and frequency values.

EXPERIMENT 16.1

EXAMINATION OF THE CAPACITANCE IN THE AC CIRCUIT

REQUIRED MATERIALS:

- 1- Function Generator
- 2- Oscilloscope (**two channel**)
- 3- AC ampermeter
- 4- Y-0016/01AC module
- 5- Enough connection cable

EXPERIMENT:

Adjust the function generator output sinusoidal, peak to peak voltage 10 volts and the frequency to $F=1$ KHz. Put the Y-0016/01AC module on to its place. Make the **J3** nodes short circuit. Make the circuit connections as shown in Figure 15.7. Apply the power to the circuit.

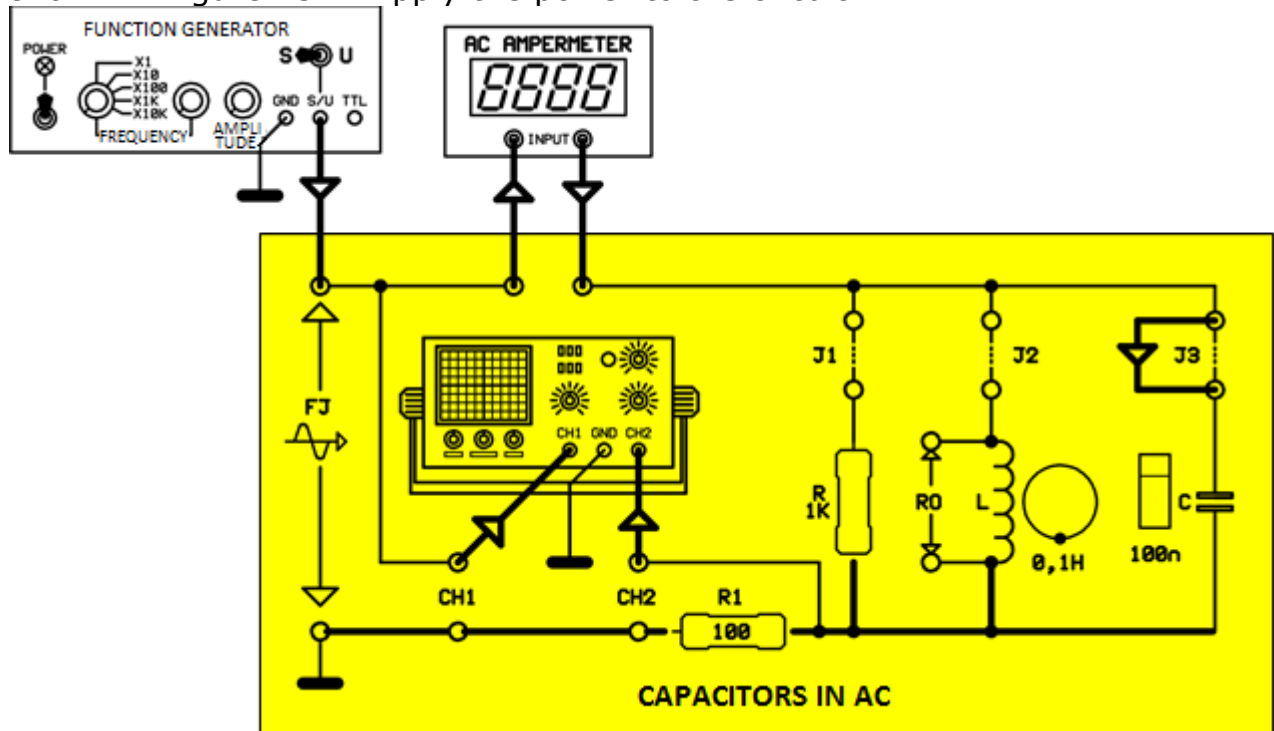


Figure 15.7

1- Plot the vector diagram of the circuit seen on the oscilloscope.

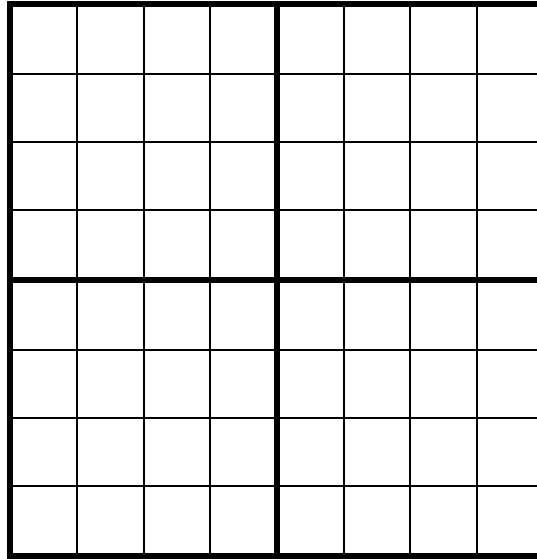


Figure 15.8

2- What is the phase angle of the circuit? Why?

3- Calculate the capacitive reactance of the capacitor.

4- Calculate the circuit current.

5- Short circuit the CH2 points. Now R1 has no effect on the circuit. Compare the current calculated and read from the amperemeter. If there is a difference explain the reason.

6- Plot phase diagram of the circuit.

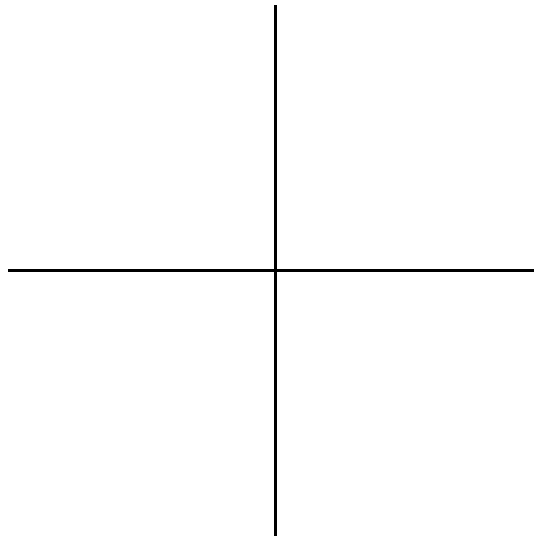


Figure 15.9

7- Calculate apparent, active and reactive power of the circuit.

NOTE: Repeat the experiment for different voltage and frequency values.