

Lab N 01: Electrical measurements

1. Objectives of the Lab:

At the end of this practical work, the student will learn the following knowledge:

1. Recognize the various electronic components constituting an electrical circuit;
2. How to take measurements of voltages and electrical currents (and others) in a circuit;
3. Use the multimeter (voltmeter, ohmmeter, etc.), and take safety precautions;
4. Visualize a voltage (or more) on the oscilloscope.

2. Theoretical part:

- The average value of a voltage $U(t)$ (or a current) is given by the following formula:

$$U_{moy} = \frac{1}{T} \int_{t_0}^{t_0+T} U(t) dt$$

T: period of the signal $U(t)$.

- The effective value of a voltage $U(t)$ (or a current) is given by the following formula:

$$U_{eff} = \sqrt{\frac{1}{T} \int_{t_0}^{t_0+T} |U(t)|^2 dt}$$

T: period of the signal $U(t)$.

3. Course question:

For a signal $U(t) = V_{max} \sin(\omega t) + B$, with: V_{max} : the amplitude of the signal and ω : pulsation of the signal ($\omega = 2\pi f$).

Calculate the average value U_{moy} and the effective value U_{eff} as a function of A. Give the numerical value of U_{moy} and U_{eff} for $V_{max}=6V$, $B=2V$ and $f=100Hz$.

U_{moy}	U_{eff}
.....	
.....	
.....	
.....	
.....	
.....	
.....	
.....	
.....	
N.A. :	
	N.A :

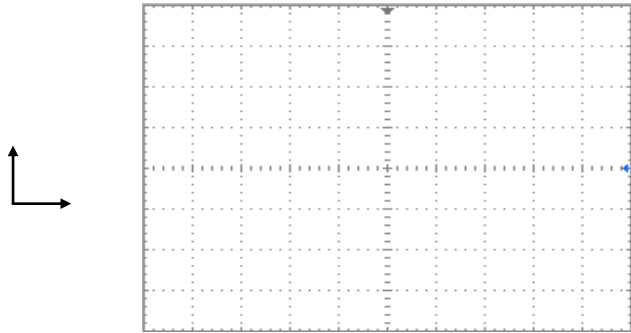
4. Practical part:

Adjust the GBF (Low Frequency Generator) so that it delivers the following signal:

$$U(t) = 6 \sin(2\pi \cdot 100 \cdot t) + 2 \text{ [V]}$$

V_{max} =.....V	Forme=.....	Fréquency=.....Hz	B=.....V
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Visualize the voltage $U(t)$ across the GBF using the oscilloscope in DC mode and take measurements using the “measure” button on the oscilloscope.



T =..... [...]

 F =..... [...]

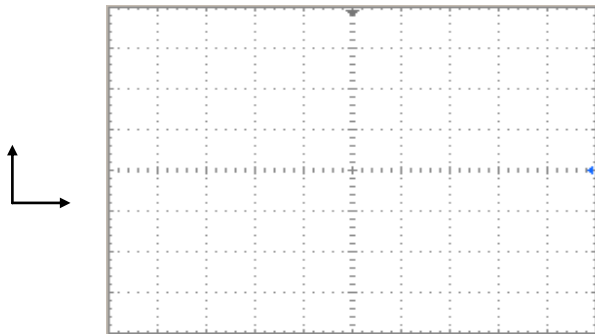
 V_{max} =..... [...]

 V_{min} =..... [...]

 V_{moy} =..... [...]

 V_{eff} =..... [...]

Visualize the voltage $U(t)$ across the GBF using the oscilloscope in AC mode



T =..... [...]

 F =..... [...]

 V_{max} =..... [...]

 V_{min} =..... [...]

 V_{moy} =..... [...]

 V_{eff} =..... [...]

5. Take measurements with the voltmeter:

$$U(t) = 6 \sin(2\pi \cdot 100 \cdot t) + 2 \text{ [V]}$$

Note: We always choose the largest caliber of the value to be measured

Measure the voltage across the GBF using the voltmeter in DC mode

$V_{DC} = \dots \dots \dots V$ it represents ☐ U_{moy} ☐ U_{eff} ☐

Measure the voltage across the GBF using the voltmeter in AC mode

$V_{AC} = \dots \dots \dots V$ it represents ☐ U_{moy} ☐ U_{eff} ☐

complete the following table

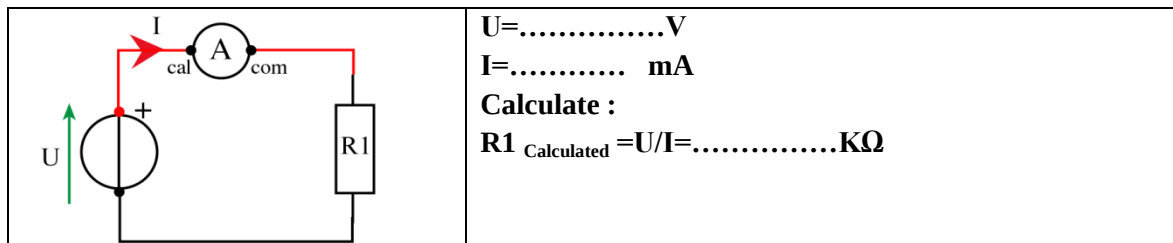
	Theoretical (Q3)	Oscilloscope(Q4)	Voltmetre (Q5)
V_{moy}			
V_{eff}			

What are your comments.....

6. Take measurements with the ammeter:

Now we will carry out the following experiment : $U=5V$, $R1=1K\Omega$

Create the following circuit:	Take the following measurements:
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7. Take measurements with the Ohmmeter:

Using the multimeter, measure the value of the resistance available:..... Ω

..... Ω

	Color Code	Nominal value	Tolerance	value range
R_1		 Ω	 Ω	between : Ω and Ω
R_2		 Ω	 Ω	between : Ω and Ω

Comments.....

