

Lab 3. Potentiometric Protractor

Name-Surname :

Date :

Student No. :

Group :

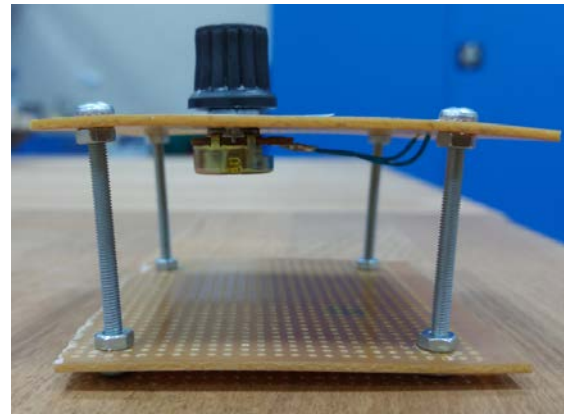
Tools

ATTENTION! – You must bring your Digital Multimeter. Other equipment and samples will be given during the experiment.

- **Potentiometric Protractor:** Potentiometric protractor is a device to measure angular displacement. It consist of a potentiometer mounted on a board and a protractor. Its input is angle in degrees and the output is corresponding resistance value in ohms. Note that, the potentiometric protractor can be used to measure angles less than 300 degrees due to the structural limitations. The input is applied by turning the knob and the output is measured from terminals A and B. As shown in Figure 1.



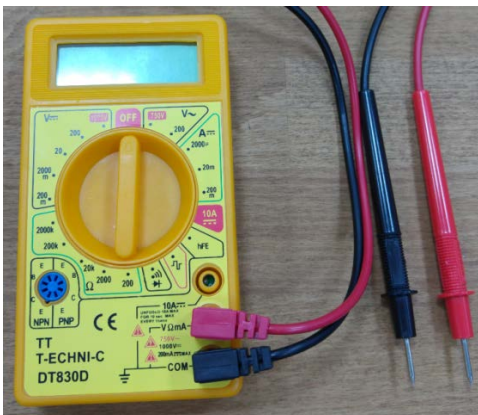
(a)



(b)

Figure 1. Potentiometric protractor. a) top view, b) side view.

- **Digital Multimeter:** Multimeter is an electronic measuring instrument that can combine several measurement functions in a unit. Ohmmeter function will be used in the scope of this experiment. Red probe is connected to "V/ Ω /mA" terminal and black probe is connected to "com" terminal as shown in Figure 2a. In order to measure resistance, switch is configured to ohmmeter section (marked with Ω) as shown in Figure 2b. Ohmmeter section includes a resistance value range. Before measurement, suitable resistance value is selected from value range in ohmmeter section.



(a)



(b)

Figure 2. a) connection of probes, b) configuration of ohmmeter.

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Instructions

1. Configure multimeter settings and connections to measure resistance of approximately 10K.
2. Connect "com" terminal of multimeter to "B" terminal of potentiometric protractor.
3. Connect "V/ Ω /mA" terminal to "A" terminal of potentiometric protractor.
4. Determine input range of measurement gauge.

Min.	Max.

5. Determine output range of instrument.

	Min.	Max.
Angle		
Ω		

6. Find the linear mathematical model of instrument.

7. According to mathematical model, what is sensitivity and offset of gage?

Sensitivity	Offset

8. Measure offset of the instrument.

Offset

9. Make five angular measurement in the range of instrument (5 angle input and 5 resistance value).

Angle	Ω

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Homeworks

1. Include a photo of your offset measurement.
2. Briefly describe purpose of the experiment.
3. Briefly describe your measurement set up.
4. Redo tables and add necessary table headings.
5. Plot angle-resistance variation graph using the measurement taken at Instruction 9.
6. Using the measurement taken at Instruction 9, calculate the nonlinearity of gauge and comment about validity of linear model.
7. Compare and comment about model and reality differences.

* *You can access report format from website [lcetin.github.io](https://github.com/lcetin)*