

Lab Work No. 3: Signal Conditioning of a PT100 Temperature Sensor

Objective

To ensure that the PT100 temperature sensor operates under optimal conditions and produces an electrical signal suitable for measurement.

Equipment

This laboratory work is carried out using the Proteus simulation software. The sensor used is the **RTD-PT100** available in the Proteus component library.

III.1 Introduction

Measurement signal conditioning consists of making the signal obtained from a sensor (its electrical output signal) suitable for use in a measurement system. The selection of a signal-conditioning circuit is an important step in the design of a measurement system. Indeed, the combination of the sensor and the signal conditioner determines the electrical signal and its characteristics. The design of the signal conditioner has a significant influence on several performance parameters of the measurement system, including sensitivity, linearity, and immunity to certain interfering quantities.

III.2 PT100 sensor in a Wheatstone bridge

The PT100 sensor is connected to a Wheatstone bridge circuit used for temperature measurement and signal conditioning. The circuit consists of the following components:

- 1) A platinum PT100 temperature sensor.
- 2) Two $10\text{ k}\Omega$ resistors.
- 3) A 100Ω resistor, denoted by R_Z .
- 4) A 12V DC voltage source.

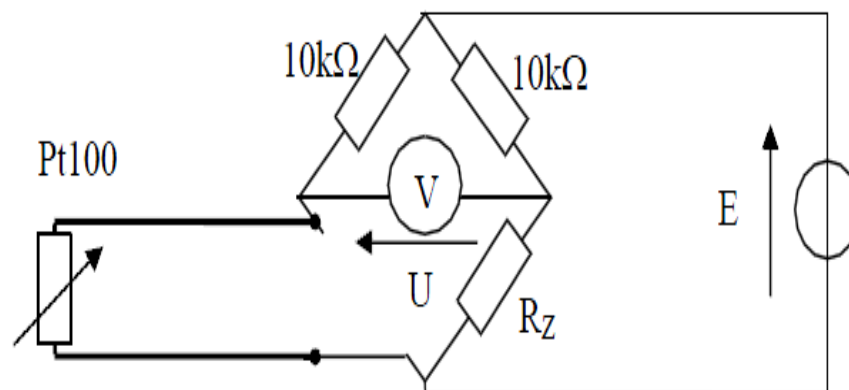


Figure III.1: Electrical circuit diagram of the PT100 sensor and the Wheatstone bridge.

III.3 Experimental Procedure

Implement the PT100 sensor circuit in the Wheatstone bridge configuration shown in the figure above using Proteus simulation software. The required components can be found in the Proteus component library by searching for the following keywords: RTD-PT100, RESISTOR, and mV. Assemble the circuit according to the block diagram shown below.

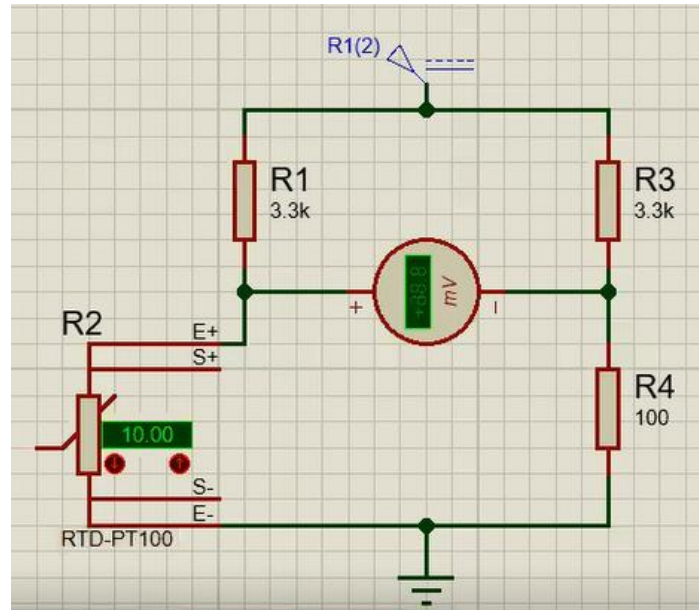


Figure III.2: PT100 Sensor Signal-Conditioning Circuit.

Record the variation in the bridge's unbalance voltage and enter the results in the following table:

Temperature measured by the PT100 (°C)	Voltage (V)
0	
20	
30	
40	
50	
60	
70	
80	
100	

Table III.1: Results of the Signal-Conditioning Circuit.

III.4 Questions

1. What type of circuit configuration is used?.....

2. Why:.....

3. What is the purpose of this circuit

4. Plot and determine the equation $V=f(T)$

[illegible]