

ABSTRACT

This study develops an automatic temperature sensor calibration system based on a drywell, using an internal RTD PT100 sensor and PID control to enhance the accuracy and efficiency of calibration within a temperature range of 35°C to 100°C. The system comprises a PT100 as the internal sensor, a heater nozzle as the heating element, a Peltier as the cooling element, and an ESP32 as the microcontroller. Users can set the setpoint and temperature through an application and monitor the calibration process via a website, enabling remote calibration. The evaluation focuses on temperature accuracy, response speed to setpoint changes, temperature stability over time, and system reliability under various operational conditions. The results indicate that the system reaches the temperature range within 60 minutes, with an average error of 0.2°C between the setpoint and internal sensor, and 1.6°C between the internal sensor and DUC. However, the temperature stability level does not yet meet the specifications required for highly precise calibration needs.

Keywords: Calibration, Drywell, PID Control, Stability.