

Automation of Water Temperature Control System

Mr. Sangharsh Narvade¹, Mr. Harsh Nilajkar², Saurabh Kadam³

Akshad Kadam⁴, Prof. Shirdhar Gurav⁵

Students, Department of Mechanical Engineering^{1,2,3,4}

Lecturer, Department of Mechanical Engineering⁵

Zeal Polytechnic, Pune, Maharashtra, India

Abstract: *The Project title Automation water temperature control system aims is design and improve an intelligent, automation measure the water temperature. The system primarily consists of temperature sensor a microcontroller control unit and heating the water also now a days it is essential for common people to save the timing so it is best machine I could say that to save the machine. This is use in industries societies and all commercial sectors like offices and many more. the practical use of automation and control system to achieve accuracy and energy efficiency in temperature management.*

Keywords: Automation water temperature, control system, basic needs of humans, about accuracy, Temperature management

1. INTRODUCTION

In these areas, maintaining an accurate and stable temperature is essential because even minor fluctuations can significantly impact system performance, product quality, and overall safety. For instance, in food processing, improper temperature control can lead to spoilage, while in industrial operations, it may affect efficiency and output. Similarly, in laboratories, precise temperature is necessary for accurate experimental results. Therefore, implementing an automated temperature control system becomes essential to ensure consistency, reliability, and optimal performance across all these applications. An automated water temperature control system is designed to maintain water at a desired set point without the need for continuous human intervention. It operates by continuously monitoring the water temperature through sensors and comparing it with a predefined value. Based on this comparison, the system automatically adjusts the temperature using heating or cooling elements to meet the required conditions. This real-time regulation ensures accurate temperature maintenance, improves system efficiency, and minimizes manual effort. As a result, the system provides consistent performance and is highly useful in applications where precise temperature control is essential. Fig. 1. Desiccant Air Dryer.

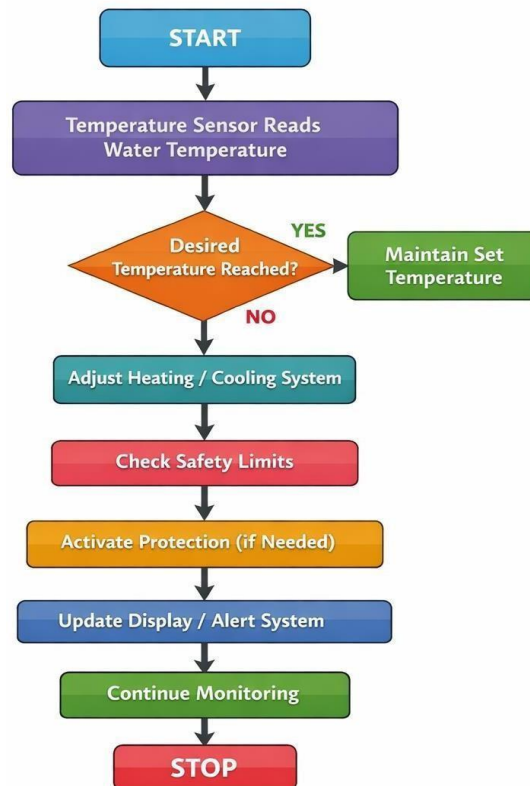
II. LITERATURE REVIEW

One of the main sources of raw materials are hydrocarbons, natural gas, and oil. In the course of their processing, various materials and oil products appear to provide the population of the planet with the necessary products of production. With the development of the regions of the Far North (Russia), there is a need to search for technologies for the extraction and transportation over long distances of hydrocarbon raw materials in the presence of various chemical compounds, such as paraffins. The extraction of these types of raw materials is a rather laborious task. Another problem is its subsequent transportation. Raw materials cannot be completely processed on site. Therefore, the crude product enters the field pipeline. The presence of impurities in the raw product has a significant impact on the durability and wear resistance of pipeline transport. It is also important to note that weather conditions play an important role in the transportation process in the far north. In areas where the average annual temperature can vary from -50 to +40 degrees Celsius, the pipeline is additionally affected by the physical properties of the metal, whose daily stretching and



compression on the pipe walls can lead to deformation and destruction of the entire pipeline. Unlike oil, if the hydrocarbon feedstock in question is natural gas and the temperature rises, the gas becomes viscous, which makes it difficult to transport it further through the pipeline. On the one hand, to eliminate these problems, automatic heating (for oil) and maintaining a predetermined temperature (for gas) on the pipeline have been developed. However, such heating of the pipeline is local in nature. Often, a heating element is installed in a certain part of the pipeline, heating it to a high value. And then reheating is applied over a long distance

III. METHODOLOGY



IV. SYSTEM DEVELOPMENT

4.1 MCB

Their primary function is to detect abnormalities in current flow and interrupt the circuit almost instantaneously to prevent overheating or potential fire hazards. The internal mechanism of an MCB typically relies on two distinct methods of protection to handle different types of electrical faults: thermal and magnetic. For protection against sustained overloads, the device utilizes a bimetallic strip that heats up and bends when a current slightly above the rated limit passes through it for a prolonged period. This physical deformation eventually triggers a mechanical latch that opens the contacts. For protection against short circuits, which involve a massive and sudden surge of energy, a magnetic coil or solenoid creates an electromagnetic force. This force immediately pushes a plunger to trip the mechanism, ensuring that the circuit is broken much faster than the thermal element could react.





shutterstock.com · 2262228587

Temperature controller (230v)

When the detected temperature deviates from a user-defined setpoint, the controller processes this error and activates an internal relay or a solid-state output to turn the heater or cooler on or off. This automated feedback loop ensures that industrial processes or domestic appliances remain within a safe and functional temperature range without requiring manual intervention. The internal circuitry of a modern 230V temperature controller usually consists of a power supply module, a microcontroller, and an output switching component. The power supply steps down and rectifies the 230V AC input to a lower DC voltage to power the sensitive digital display and the logic chips. The microcontroller then interprets the millivolt signals from the temperature sensor and compares them against the stored settings.



Water heater (1000watt): -

A 1000-watt water heater, commonly referred to as a standard immersion rod or a small-capacity storage geyser, is a functional electrical appliance designed to convert electrical energy into thermal energy to heat a specific volume of water. Operating typically on a 230V AC supply, a 1000W rating indicates that the device consumes 1 unit of electricity (1 kWh) for every hour of continuous operation. This power level is considered a medium-low rating in the heating world, making it ideal for smaller tasks like heating a single bucket of water or maintaining a steady



temperature in a compact 6-liter to 10-liter storage tank. Because the wattage is relatively modest compared to heavy-duty 3000W "instant" heaters, it places less strain on household electrical circuits and is often compatible with standard 5A or 6A plug sockets. A 1000-watt water heater, commonly referred to as a standard immersion rod or a small-capacity storage geyser, is a functional electrical appliance designed to convert electrical energy into thermal energy to heat a specific volume of water.

