

Over Voltage\Under Voltage System Protection System

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Abstract: *The reliability and stability of electrical power systems are highly dependent on the protection mechanisms implemented to safeguard both the equipment and consumers. One of the most common and critical issues in electrical distribution networks is voltage fluctuation, which includes conditions of over-voltage and under-voltage. These fluctuations can lead to severe damage to electrical appliances, reduced efficiency, and even complete system failure. To address this issue, the Over Voltage and Under Voltage Protection System is designed to continuously monitor the supply voltage and automatically disconnect the load whenever the voltage exceeds or falls below the safe operating limits. Once the voltage returns to the normal range, the system restores the connection automatically, ensuring both safety and continuity of operation.*

This proposed system primarily employs a microcontroller or comparator circuit that senses the voltage level through a potential divider and analog-to-digital conversion process. When an abnormal voltage level is detected, the controller activates a relay mechanism to isolate the connected devices from the main supply. Additionally, visual indicators such as LEDs or LCD displays are used to provide real-time voltage status information to the user. The system can be implemented for single-phase or three-phase power lines depending on the requirement.

The main advantage of this system lies in its automatic operation, low cost, and high reliability. It effectively prevents the burning of motors, transformers, and sensitive electronic devices due to irregular voltage levels. Moreover, it reduces maintenance costs and enhances the overall lifespan of electrical equipment. The system can be further improved by integrating Internet of Things (IoT) technology for remote monitoring and control through mobile applications, enabling real-time fault reporting and enhanced user convenience..

Keywords: Over Voltage Protection, Under Voltage Protection, Voltage Monitoring, Power Supply Safety, Microcontroller, Relay Circuit, Comparator, Voltage Sensor, Automatic Disconnection, Electrical Protection System, Voltage Stabilization, Power Quality, Fault Detection, Load Protection, IoT-based Monitoring, Smart Grid, Voltage Control, Power Distribution, Electrical Safety, Automation System

