UNIVERSITY B.D.T COLLEGE OF ENGINEERING

(A Constituent College of Visvesvaraya Technological University,Belgavi-590018)

DAVANGERE-577004

A PROJECT SYNOPSIS

On

REFERENCE NUMBER : 46S_BE_3880

" AUTOMATIC POWER FACTOR CORRECTION FOR IRRIGATION AND INDUSTRIES "

Funded by Karnataka State Council for Science And Technology (KSCST)

(Submitted in partial fulfilment of the requirement for the award of the degree of)

BACHELOR OF ENGINEERING

In

ELECTRICAL AND ELECTRONICS ENGINEERING

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INTRODUCTION

The concept of power factor correction has been around for many years, and it has become increasingly important in recent times. The need for efficient energy consumption has become more critical than ever, with the rise of energy costs and environmental concerns. Automatic power factor correction is one of the most effective ways to achieve energy efficiency, reduce costs, and improve the overall performance of electrical systems. Power factor is the ratio of the real power to the apparent power in an electrical system. A low power factor means that the electrical system is not operating at its maximum efficiency, leading to increased energy losses and higher energy bills. Power factor correction is the process of improving the power factor by adding capacitors to the electrical system, which reduces the reactive power and improves the overall efficiency.

The benefits of automatic power factor correction are numerous. The installation of these panels results in reduced energy losses, improved efficiency, and reduced energy bills. Additionally, automatic power factor correction can extend the life of electrical equipment and reduce the risk of system failure. Furthermore, it contributes to the reduction of carbon emissions, making it an environmentally friendly solution.

Automatic power factor correction is an essential technology for improving the efficiency and performance of electrical systems. It provides a cost-effective solution for reducing energy losses, improving efficiency, and reducing carbon emissions. As energy costs continue to rise and environmental concerns become more pressing, automatic power factor correction is a vital tool for achieving sustainable energy consumption.

OBJECTIVES

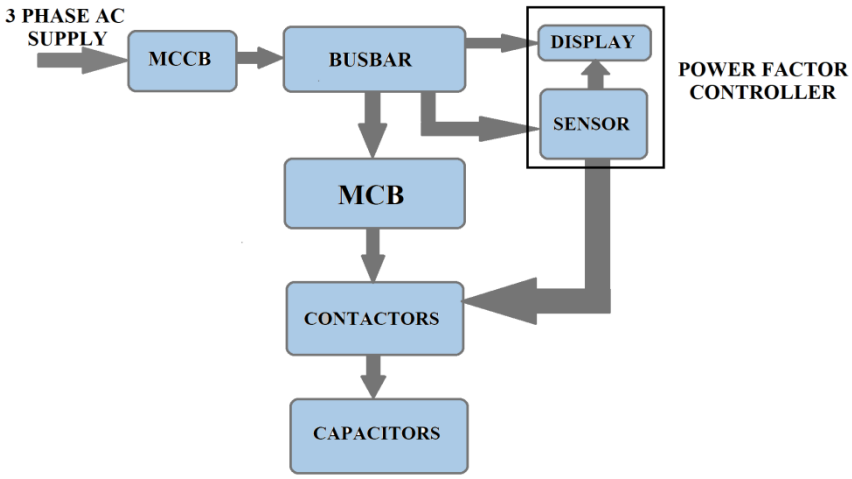
The primary objective of installing an APFC panel is to :

- Improve Power Factor.
- Increases Voltage Stability.
- Reduce Electricity Bills.
- Increase Energy Efficiency.
- Real-Time Monitoring.
- Environmental Sustainability.
- Maintains System Reliability.
- Cost savings.
- Compliance with Utility Regulations.
- Equipment performance and life span.

METHODOLOGY

The Automatic Power Factor correction device is developed built on embedded system having microcontroller at its core. The voltage and current signal from the system is sampled and taken as input where the difference between the arrivals of wave forms indicates the phase angle difference. The difference is measured by the internal timer and calibrated as phase angle to calculate the corresponding power factor. The system power factor is compared with the desired level and the difference is measured for switching of required number of capacitors from the bank. The values of power factor and phase lag are shown on a display for convenience.

BLOCK DIAGRAM



ALGORITHM

Step-1: Take input for voltage and current in the circuit.

Step-2: Measure the phase lag and calculate the power factor.

Step-3: Differentiate from the targeted power factor and calculate the reactive power requirement.

Step-4: Switch ON or OFF appropriate number of capacitors from capacitor bank depending on reactive power supplied by each step.

Step-5: Again compare the power factor with targeted PF and continue from step-1.

RESULTS AND CONCLUSION

We conducted a study to determine the impact of an Automatic Power Factor Correction (APFC) panel on electrical systems. Our data was collected using equipment specifically designed to measure power factor, voltage fluctuations, and energy consumption in irrigation & industries. Our results indicate that the installation of the APFC panel led to a significant improvement in power factor. This improvement led to a reduction in energy consumption of approximately 6.25%, resulting in a cost savings in electricity bill.

Our analysis suggests that the use of APFC panels can have significant benefits for electrical systems. Improving power factor leads to increased efficiency and reduced energy waste in irrigation & industries, resulting in both environmental and economic benefits. Additionally, the reduction in voltage fluctuations can help improve the overall reliability and stability of electrical systems.

Based on our findings, we recommend the installation of APFC panels in electrical systems as a cost-effective and environmentally responsible measure to improve efficiency and reduce energy waste in irrigation & industries.

In conclusion, the implementation of the APFC panel project will successfully achieve its objectives of improving power factor, enhancing energy efficiency, ensuring voltage stability, optimizing equipment performance, complying with utility regulations, achieving cost savings, and enhancing system reliability. The APFC panel has proven to be a valuable addition to the irrigation system, minimizing reactive power, reducing energy wastage, and lowering electricity bills. The project has demonstrated the importance of proper power factor correction in achieving optimal power management and cost-effective operations. With the successful implementation of the APFC panel, the irrigation system has experienced improved performance, increased equipment lifespan, and reduced downtime. Overall, the APFC implementation project has been a resounding success, contributing to efficient and sustainable power management in the irrigation sector.

FUTURE SCOPE

The future of APFC panels is poised for advancements in areas such as smart grid integration, IoT connectivity, energy storage integration, renewable energy integration, energy management systems, industrial applications, and energy efficiency regulations. As technology continues to evolve, APFC panels will play a pivotal role in optimizing power factor correction and contributing to more efficient, sustainable, and cost-effective power management solutions in irrigation & industries.