



PIC BASED POWER FACTOR IMPROVEMENT SYSTEM

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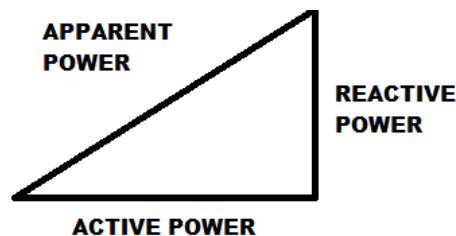
Abstract: In the company the various motoring loads are running and generating the inductive load. So the power factor in this system reduced due to the inductive reactive power. But the electric board has a standard limits regarding the power factor values and if the power factor goes below the limit; the electric company charges the penalty to the industrial users. The PIC based power factor improvement panel installed the required compensation to overcome the inductive reactance by using the capacitor bank. The PIC receives current signal from current transformer and simultaneously gives the signals to the various contactors to connect the capacitors in the line for the compensation. Thus by add the capacitor to the line will compensate the reactive power and maintains the power factor near to try to come unity. This will ignore the penalty to the industrial users and may get the incentives. In the unique methods we were using the valuable capacitor for compensation. But these were leading to excessive charging of the capacitor bank causes the voltage surges. Thus it becomes difficult to main power factor near unity by on and off operation of fixed capacitor. The contactor switched capacitors are connected and disconnected automatically disconnected the previous problem.

Keywords: Power Factor, PIC, Capacitor Bank, Improvement System.

I. INTRODUCTION

The low power factor leads to the increase in the load current, increase in power loss, and decrease in efficiency of the overall system. The various conventional methods for the power factor correction are the using static capacitors, synchronous condensers, phase advancers, etc. in all these methods, the switching of the capacitor or variation of the capacitance is manual. In this paper we are using a method of the reactive power compensation by capacitor switching with automatic using PIC controller.

POWER FACTOR THEORY



The power factor is the ratio of the active power to the apparent power i.e. KW/KVA. The active power is the real power delivered to the loads such as induction motors, candent lamps, heating loads, etc. The reactive power is used just for the purpose of producing magnetic field for the flow of active power. The apparent power is the vector combination of the active and reactive power. The load current of all motor consist of the resistive and inductive components. The inductive component need of leakage current and magnetizing current. The leakage current is totally dependent on the load current but the magnetizing equipment is nearby 20% to 60% of the full load current. The capacitors are employed to reduce inductive reactance in the induction motor thereby reducing losses in the supply.

PIC based power factor correction techniques can be applied to the industrial area, power systems and also households to make them stable and due to that the system becomes stable and efficiency of the system as well as the apparatus increases. The use of microcontroller reduces the costs.



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A poor power factor can be the getting of either a significant phase difference between the voltage and current at the load terminals, or it can be due to a high harmonic content or distorted/discontinuous current waveform. Poor load current phase angle is generally the result of an inductive load such as an induction motor, power transformer, lighting ballasts, welding machine or induction furnace. A distorted current waveform can be the result of a rectifier, variable speed drive, switched mode power supply, discharge lighting or other electronic load.

A poor power factor due to an inductive loading can be improved by the extra of power factor correction, but, a poor power factor due to a distorted current waveform requires a change in equipment design or expensive harmonic filters to gain an appreciable improvements.

II. BLOCK DIAGRAM

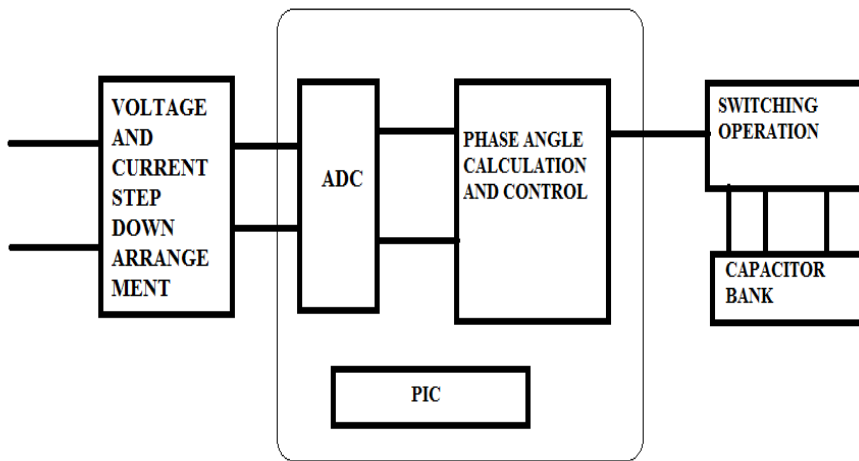


Fig.1 Block Diagram

III. WORKING

All over system may be distributed into three stages. In the first stage is concern with the step down arrangement of the incoming voltage and current signals into the PIC voltage level. Here we have used the step down arrangement of the transformer. Second stage is concerned with zero crossing level detection by using an IC (LM35G) for voltage and current, the incoming signals. Voltage signal can be acquired by using Opto-coupler at the output of P.T. for detection. Current Signal can be acquired by using Current Transformer connected at main AC line.

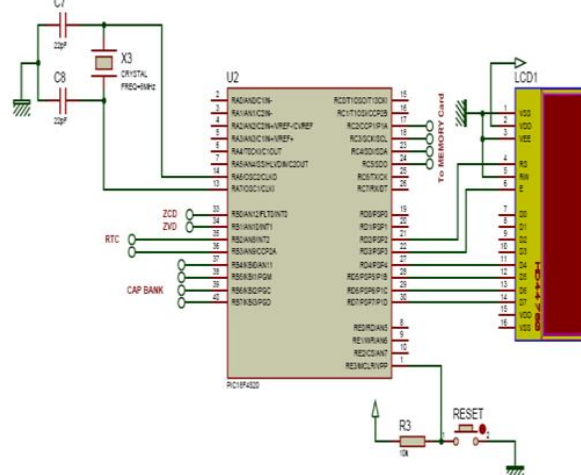


Fig. 2 Pin Connection

**IV. CONCLUSION**

It can be concluded that power factor improvement system can be applied to the industries, power systems and also households to make them stable and due to that the system becomes stable and efficiency of the system as well as the apparatus increases. The uses of PIC reduce the costs. Due to use of PIC multiple parameters can be controlled and the use of extra hard wares such as timer, RAM, ROM and input output ports reduces. Care should be taken for over improvement otherwise the voltage and current becomes more due to which the power system or machine becomes unstable and the life of capacitor banks reduces.

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BIOGRAPHY

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