INTELLIGENT AUTOMATIC POWER FACTOR CORRECTION

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ABSTRACT

The proposed model automatically corrects the power factor without any human presence. It consist of a micro controller which detects the power factor value , if the power factor goes low during peak hours it automatically connects capacitor banks to improve it. The main aim of the model is to maintain the power factor as high as possible which helps to increase the efficiency of the system.

INDEX ITEMS - At mega 32 micro controller capacitor banks LCD screen, current transformer, potential transformer, rectifier

INTRODUCTION

The power factor correction of electrical loads is a problem common to all industrial companies. Earlier the power factor correction was done by adjusting the capacitive bank manually. The automated power factor corrector using capacitive load bank is helpful in providing the power factor correction. Proposed automated project involves measuring the power factor value from the load using microcontroller. The design of this auto-adjustable power factor correction is to ensure the entire power system always preserving unity power factor. The software and hardware required to implement the suggested automatic power factor correction scheme are explained and its operation is described. APFC thus helps us to decrease the time taken to correct the power factor which helps to increase the efficiency. Majority of the loads in the industries are highly inductive in nature such as induction motors, AC/DC drives, welding machines, arc furnaces, fluorescent Lightings, electronic controls and computers. There may be a few resistive loads for heaters and incandescent bulbs. Very rarely industries may have capacitive loads such as synchronous motors. Net industrial load is highly inductive causing a very poor lagging power factor. If this poor power factor is left uncorrected, the industry will require a high maximum demand from Electricity Board and also will suffer a penalty for poor power factor. Standard

practice is to connect power capacitors in the power system at appropriate places to compensate the inductive nature of the load.

The automatic power factor corrector as the name suggests it automatically corrects the power factor by connecting capacitor banks accordingly to the requirement. The voltage and current is measured the cosine of the angle between voltage and current is measured by the help of a micro controller.

The signals of voltage and current are given to the diode and zener diode combination where is it converted to a square wave the phase difference is taken by the micro controller. The micro controller generates a signal to connect the capacitor banks, which improves the power factor.

BASICS
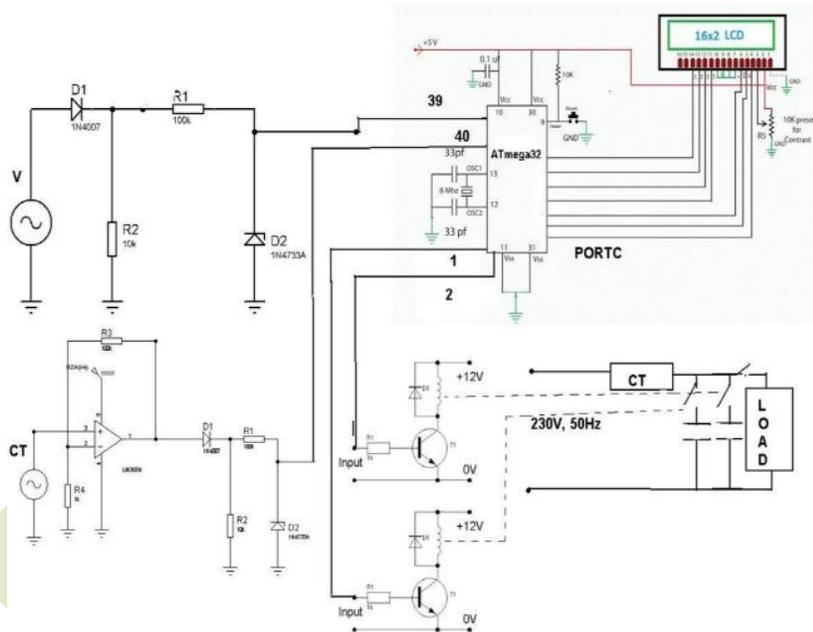
The circuit diagram is as shown in the fig above.

The potential transformer measure the voltage level and gives it to the diode and zener diode with current limiting resistors .the signal is converted to a square wave.

The current transformer measure the current level .since the current level is very low it is amplified to a bigger value with the help of an operational amplifier. The same signal is given to the diode and zener diode arrangement; it is converted to a square wave. Both the square wave signals are fed to the micro controller as input , the phase difference is taken between the square waves and the cosine of the value is taken , which gives the power factor. The switching devices are transistors for the capacitor banks .During peak hours if the power factor becomes low , the

micro controller sends a high signal to the base of the transistor, the transistor acts as a closed switch , automatically the capacitor banks get connected which improves the power factor .

The lcd is used to display the power factor that is the old value and new value .

MARKET SURVEY

Power factor correction is common problem to all industries. In industries most of the loads are inductive, and inductive loads draw more power which intern reduces the power factor. There are more draw backs of power factor if it is low. During peak hours the industries are forced to slowdown their production, if they continue they have to pay a penalty for low power factor to the electricity board, hence there is a demand for power factor correction to increase the efficiency.

SPECIFICATIONS

► Transformer – 2nos – primary- 230v

Secondary- 12v

► PT & CT – (230-12)v & 5A

► Bridge rectifier

► Regulator IC – 7805

      78L12

► Capacitors

► Capacitor bank – 400 micro farad

► Relay

► LED- 2nos

► LCD- 16*2

ADVANTAGES

1. reduces the cost by decreasing the power drawn from the supply
2. As it operates automatically, manpower are not required

APPLICATIONS

1. Automated Power factor Correction can be used for the industries purpose in the future.
2. It can be used in household purpose for higher efficiency.

CONCLUSION

The proposed model helps correct power factor automatically without any human presence .it adjusts automatically to the increase and decrease in power factor, it helps the industries to continue even during peak hours.

REFERENCE

[1] *en.wikipedia.org/wiki/Power factor correction*

[2] Jones, L. D.; Blackwell, D. (1983) "*Energy Saver Power Factor Controller for Synchronous Motors", IEEE Transactions on Power Apparatus and Systems, Volume: 5, Issue: 5, Pages: 1391-1394.*

[3] Keith Harker (1998). "*Power System Commissioning and Maintenance practice." London: Institution of Electrical Engineers*.

[4] Stephen, J. C. (1999). "*Electric Machinery and Power System Fundamentals." 3rd.ed. United State of America: McGraw-Hill Companies, Inc.*

[5] Barsoum, Nader (2007) "*Programming of PIC Micro-Controller for Power Factor Correction" IEEE Conference on Modeling & Simulation, Pages: 19-25.*