

DESIN AND IMPLEMENTATION OF STARE CONNTED CAPACITOR BANK FOR INDUSTIAL AND DOMESTIC LOAD

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ABSTRACT

In the present technological revolution, power is very precious. So it is important to find out the causes of power loss the power factor. Due to industrialization the use of inductive load increases and hence power system losses its efficiency. Automatic power factor correction (APFC) device reads power factor from line voltage and line current by using zero crossing detectors, which is fed to interrupt pin of the microcontroller. Certain programming has been in microcontroller, which helps in connecting capacitor banks according to their requirments.it leads to the attainment of unity power. Automatic power factor correction techniques can be industries, power system and also households to make them stable and more efficient. The use of microcontroller reduces the cost.

I .INTRODUCTION

This paper discussed about how will be improve power factor can be compensated to using star contend capacitor bank. Effective power transmission and power utilization of the power is one of the major

Issues. Nowadays electrical and electronics which makes our work but we do not have more resources are not meet our requirements.powerfactor is the invisible factor, which is great loss of electrical energy. The project is designed to reduce power loss in domestic and industrial by power factor compensated through a capacitor adding to system, this result reduction in amount of Electrical bill for minimized. Power factor is defined as the ratio of real power to apparent power.

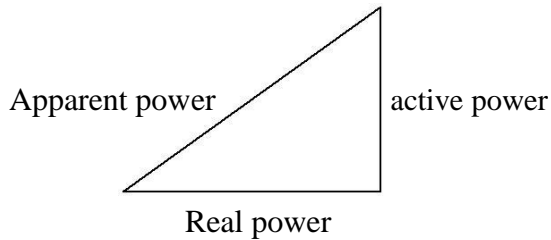
Mathematically represented as KW/KVA.Reactive power is the non working power generating by magnetic and inductive load if also deceasing power factor if cause low power factor and also deceasing efficieny. Measurement techniques have proteus ISIS and then implemented practicaly.after measurement of reactive power compensated by switching capacitor. Two parameters of load that are voltage and current are both measured transformer after sending signal to microcontroller.

Theoretically, power factor is ratio of real power

$P.F = \cos \phi =$

Before going in the cause of low power factor, relationship (active, reactive

Apparent) powers with each other could be developed power triangle

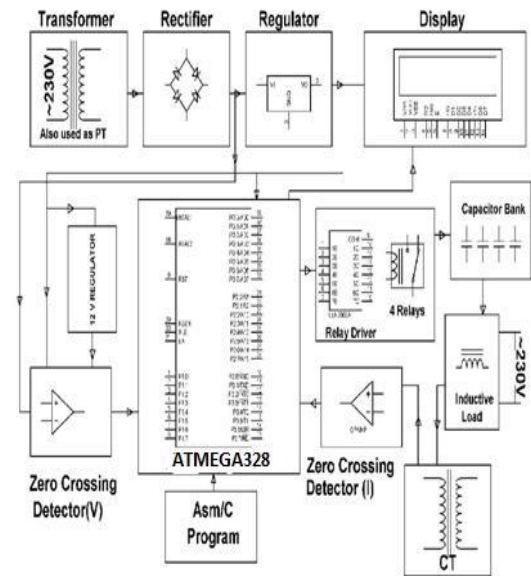


One of the major causes of this poor power factor due to inductive loads which causes a phase difference in voltage and current. Thus an improved power factor leads to reduction in VA demand and hence the user can conserve billing if improvements in power factor improve system efficiency. in forthcoming section the developed algorithm are being discussed for acquiring power factor and its compensation

II. BLOCK DIAGRAM

An automatic power factor correction device determine the line voltage and line current arrival of the current signal with respect to voltage signal from the source with high accuracy by using microcontroller inbuilt timer Determine the phase angle lag between the voltage and current signal and then determines corresponding power factor .then the microcontroller

calculates the requirement of accordingly relay automatically open when capacitor bank added until the power factor is normalized to nearest to unity power factor reached. Automatic power factor correction.



If both voltage and current value is measured by using transformer. After zero crossing detector used detected the value of voltage and current. If any deviation microcontroller interrupt signal caused if lagging power factor automatically relay drive circuit will be automatically open at capacitor bank operating steps based on varying load current. Current transformer is used to measure the load current for sampling purpose intelligent control using this microcontroller unit ensure even utilization of capacitor steps, minimize number of swathing operations power factor correction. The choke used in the compact fluorescent lamp will be used an inductive load

III. SIMULATION ANALYSIS

It indicates input wave form of voltage and current with stage of contrast. both of the waveforms are bolstered to zero intersection finders, which give square wave in computerized waveform are utilized by microcontroller to ascertain

control factor. Microcontroller takes choice to switch proper capacitor bank to make up for control factor.

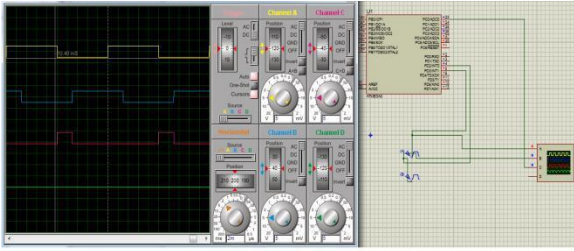
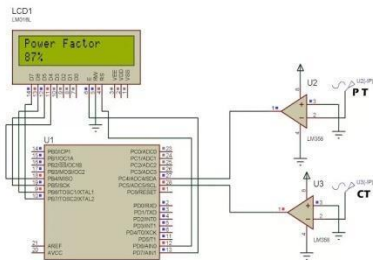


Figure given next speak to the circumstance when control power factor is exceptionally poor below the 0.7. low power factor according to standard since poor or low power factor influence reduce the efficiency of electrical power systems. Notwithstanding the expanded working cost, responsive power can require the utilization of wiring, switches, circuit breaker, transformers and transmission line with higher current limits. Poor power factor should be remunerated by capacitor bank



In the recognizing poor power factor, APFC framework when relays should be automatically on after adding requirement capacitor. In the event that expected objective to accomplished control factor is meet to nearest unity. Next shows APFC framework when accomplished the ideal power factor estimation of above 0.9 as reached. Thus we observe that before actual implementation of APFC system in real

physical world we can verify the proof of concept using proteus VSM. by installing suitable sized power capacitor into the circuit the power factor improved and the value become nearest to unity this minimize losses an improving efficiency of plant. By using APFC system efficiency of system is highly increased

IV. FLOW CHAT

Microcontroller does not execute any insuring of power factor if both the voltage and current square-wave are provided to capture module of the Microcontroller's pin. Microcontroller ensures the square wave of both voltage and current signals and checks the rising edge of both the signals either it is a voltage signal or current signal. If the current and voltage are in phase then there is no execution by the Microcontroller.

Step1: set the user defined lower and upper factor

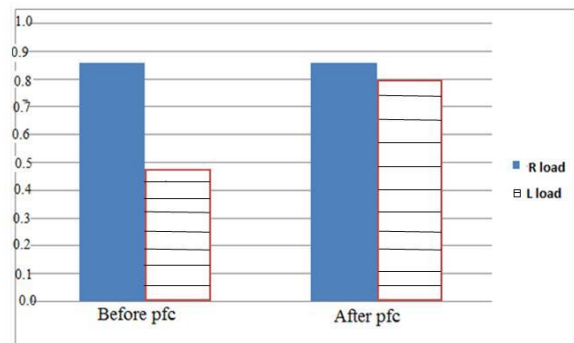
Step2: determine value for falling or raising edge of V&I

Step3: measuring displacement both V&I

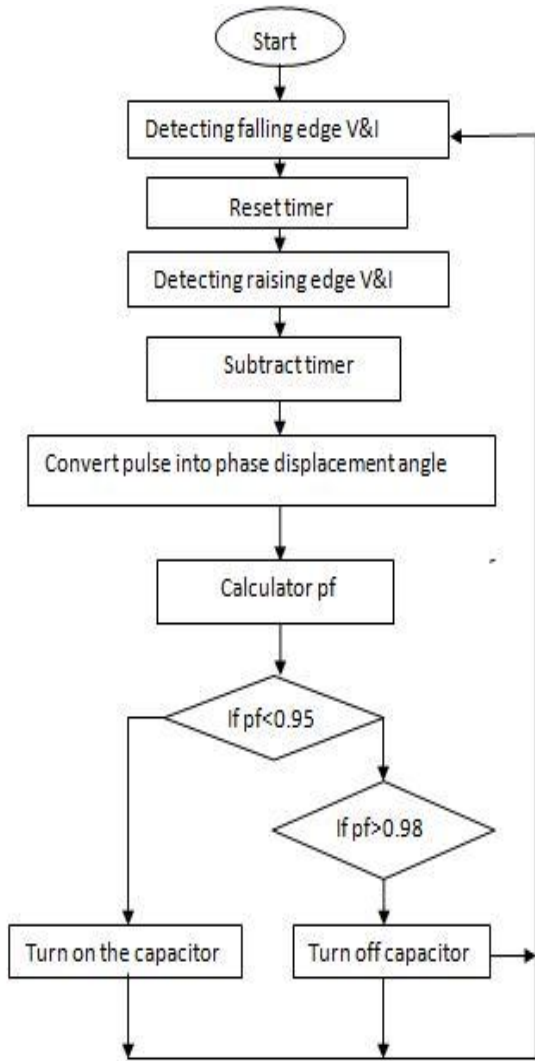
Step4: calculated power factor

Step5: lagging pf automatically capacitor turns ON at near to unity power factor

Step6: leading pf when captor bank offend after compensated inductive load



Shown estimation of power factor. Inductive load should be lagging nature and restive load unity nature. Analysis of before operating at inductive load poor power factor value 0.5-0.6. identified to signal automatically relay drive circuit on compensation reactive power after increasing power factor near to unity.



V. PROTOTYPE IMPLEMENTATION

Beginning from left to right first thing is AC supply from service organization, the voltage transducer/transformer is connected in parallel to the principle with the end goal that greatness and period of AC voltage by

exactness rectifier and zero intersection identifier separately. The present transducer/transformer (CT) is associated in arrangement with load and capacitor bank so the greatness and period of AC current is estimated by exactness rectifier and zero intersection locator separately. The microcontroller is the core of this venture which decides the two extents and stage contrast of AC voltage and current of principle control. In light of these deliberate esteems utilizing the essential equations examined beforehand, every one of the three powers and power factor of load is computed.



Benefits power factor correction

- ☐ Reduction of power consumption due to improved energy efficiency.
- ☐ Reduced power consumption results less greenhouse gas emissions and fossil fuel depletion by power stations.
- ☐ Reduction of electricity bills.
- ☐ Extra kVA can be accessible from the existing supply only.
- ☐ Reduction of I^2R losses in transmission and distribution equipment.
- ☐ Reductions of voltage drop in long cables.

VI. CONCLUSION

This project provides one of the techniques used to overcome power losses due to low power factor associated with common households and small industrial units. In this project, AC load and current was measured by sampling rectified sine wave. During the phase difference between the voltage and current is measured and the signal is fed to the microcontroller. Based on this analysis, corrective algorithm was established to achieve power factor close to unity. This

algorithm incorporates switching capacitances in line automatically through relay in order to compensate the lagging power factor. This method is very efficient as it reduces the cost by decreasing the power drawn from the supply and also it is fully automatic, so human power is not required. It can be used for the industrial purpose.

VIII. REFERENCE

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