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A REVIEW ON A MINIMIZING PENALTY IN INDUSTRY BY APFC UNIT

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***ABSTRACT* :-** In the industrial division, number of motoring loads is running continuously. These motoring loads generate inductive load. Power consumption is increasing day by day at a very high.SoThis inductive reactive power causes a reduction in the power factor. The electricity provider has set limits; if the power factor falls below these limits, the industrial consumers will be penali sed. Power capacitors are used to compensate inductive reactance and overcome it. With great accuracy, the APFC device calculates the delay in arrival of the current signal relative to the voltage signal to read t he power factor from line voltage and internal timer. These values are calibrated as phase angle and corresponding power factor. Then the calculation for the requirement of compensation takes place in the motherboard and accordingly different capacitor banks are switched on

Keywords - Power factor. Inductive reactance, Penalty, Compensation, Capacitors Capacitor banks

I. INTRODUCTION

The paper is designed to minimize penalty for industrial units by using automatic power factor correction unit. Power factor is defined as the ratio of real power to apparent power. This definition is often mathematically represented as KW/KVA, where the numerator is the active (real) power and the denominator is the (active + reactive) or apparent power. Reactive power is the Magnetic flux is produced working power from the magnetic and inductive loads. Reactive powe r increases perceived power, which causes the power factor to fall. Low power factor forces the industry to use more energy to meet demand, which lowers efficiency. The time delay between the zero voltage pulse and zero current pulse duty produced by appropriate operational am plifier circuits operating in comparator mode are sent to two interrupt pins of the microcontroller in the proposed system.On an LCD, difference in time between the current and voltage is shown

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To actuate, the programme takes control. appropriate number of relays from its output to bring shunt capacitors into the load circuit to get the power factor till it reaches near unity. The microcontroller used in the project belongs to 8051 family. The electrical engineering and its applications are the oldest streams of Engineering. Though these systems are quite reliable and cheaper, it has certain disadvantages. The electro mechanical protection relays are too bulky and needs regular maintenance. The multifunctional is out of question. Recently, the technical revolution made technology will become more affordable it is used in more fields. The Automatic Power Factor Correction device is a highly helpful tool for enhancing active power transmission efficiency. When a consumer connects an inductive load, the power factor lags; when it drops below 0.97 (lag), the electric supply business is notified. Charge penalty to the consumer. So it is essential to maintain the Power factor below with in a limit. Automatic Power factor correction device reads the power factor from line voltage and line current, calculating the compensation requirement switch on different capacitor banks.

1.1 Block Diagram

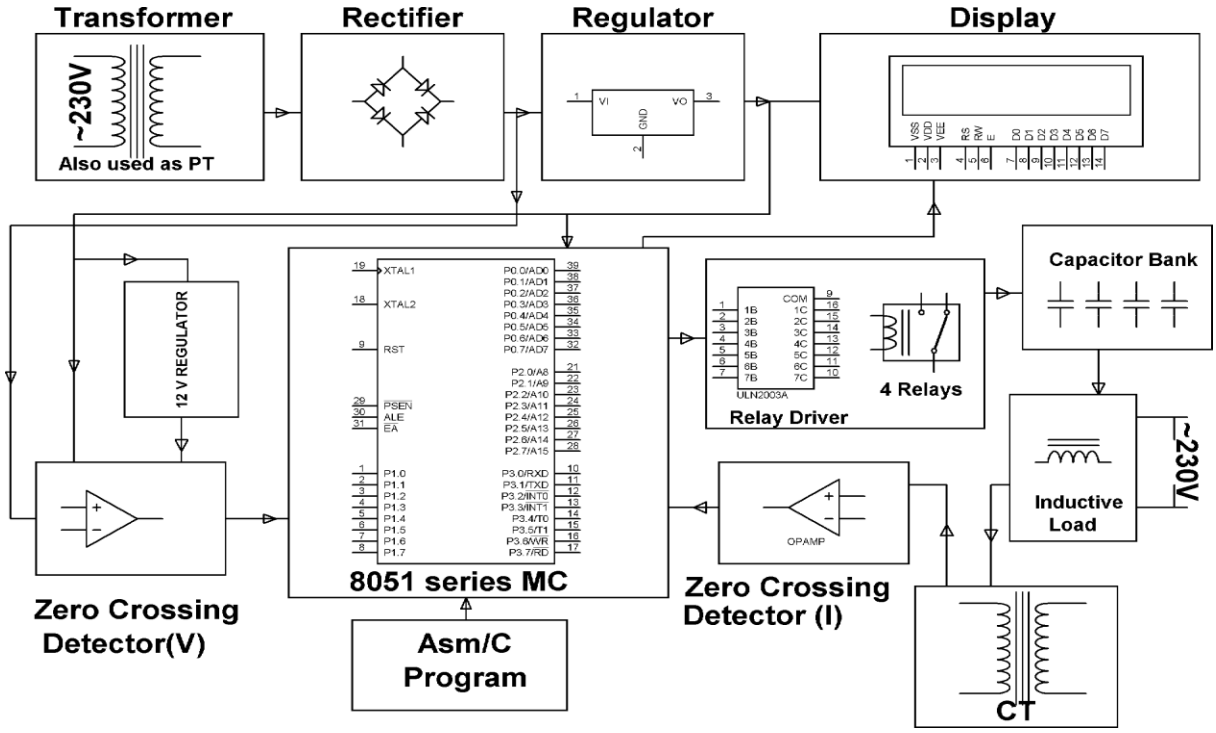

Fig 1.1 Block Diagram Of Power Factor Improvement

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Automatic Power Factor correction device is developed basing on a micro controller 8051. A zero cross detector is used transform the voltage and current sampled into a square wave. The V and I sample signals are sent to micro controller at INT0 and INT1 and the difference between the arrival of wave forms indicate the phase angle difference. High accuracy measurements are made of the difference by using internal timer. This time value is calibrated as phase angle and corresponding power factor. The values are displayed in the 2x16 LCD modules after converting suitably. The capacitor banks are switched as per the calibration in steps.

II. ALGORITHM OF THE PROJECT

(a) Altering phase of two signals

Step-1:- Timer0 set and run till Timer1 is set or vice-versa. Step-2:- Two signals (current & voltage) are introduced.
Step-3:- Phase angle between the two signals altered by incrementing or Decrementing delay between two.
Step-4:- Delay of 0.1 ms is given while incrementing or decrementing.

Step-5:- Accumulator stores the number of incrementing or decrementing operations. Step-6:- Delay is called according to the number stored in the accumulator.
Step-7:- The signals, altered in phase are sent to the motherboard for power factor detection.

(b) Phase angle Detection:

Step-1:- Microcontroller started on interrupt mode. Step-2:-INTX0 & INTX1 are enabled.
Step-3:-INTX0 given VOLTAGE (V), INTX1 given CURRENT (I) from sampling circuit. Step-4:-Timer measures time interval between two interrupts.
Step-5:-Time interval calibrated .

Step-6:-Calibrated data is converted from HEX to BCD, then to ASCII for display on LCD.

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III. ADVANTAGES OF IMPROVED POWER FACTOR

a. Reactive power decreases
b. Avoid poor voltage regulation
c. Overloading is avoided
d. Copper loss decreases
e. Transmission loss decreases
f. Improved voltage control

- Efficiency of supply system and apparatus increases

3.1 ADVERSE EFFECT OF OVER CORRECTION:

- Power system becomes unstable
- Resonant frequency is below the line frequency
- Current and voltage increases

3.2 APPLICATIONS OF POWER FACTOR

Our paper is a model of static power factor correction method. By increasing the capacity and the ratings of the components it can be used for the following purpose------

1. In industries
2. At substations
3. on the transmission line
4. for commercial purpose

IV. CONCLUSION

Power factor correction techniques can be used to stabilise industries, power systems, and house hold appliances. As a result, the system becomes stable and both the system's and the apparatus's efficiency rises. Using a microcontroller lowers costs. Many parameters may be managed thanks to the usage of microcontrollers, which also minimizes the need for additional hardware like a timer, RAM, ROM, and input/output ports. Avoid overcorrecting as this may increase voltage and current, making the machine or power system unstable and shortening life of the capacitor banks.

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Hardware -