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Three Phase Reactive Power Compensationand Power factor correction by Using Static VAR Compensator (SVC)

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Abstract –

In this paper, a reactive power compensation system using static VAR compensator is presented. To conform on system stability and reliability, the reactive power compensation is the fundamental way for flexible AC transmission systems (FACTS). The variations of reactive power have an effect on the generating units, lines, circuit breakers, transformers, relays and isolators. It can also cause effective voltage sags and increase losses. In the proposed system, the lead time between voltage pulse and current pulse are measured and fed to the interrupt pins of the microcontroller where the program takes over to bring the shunt capacitors to the circuit to get the reactive power compensated. Back-to-back SCRs interfaced through optical isolation from the microcontroller are used in parallel for controlling the capacitor.

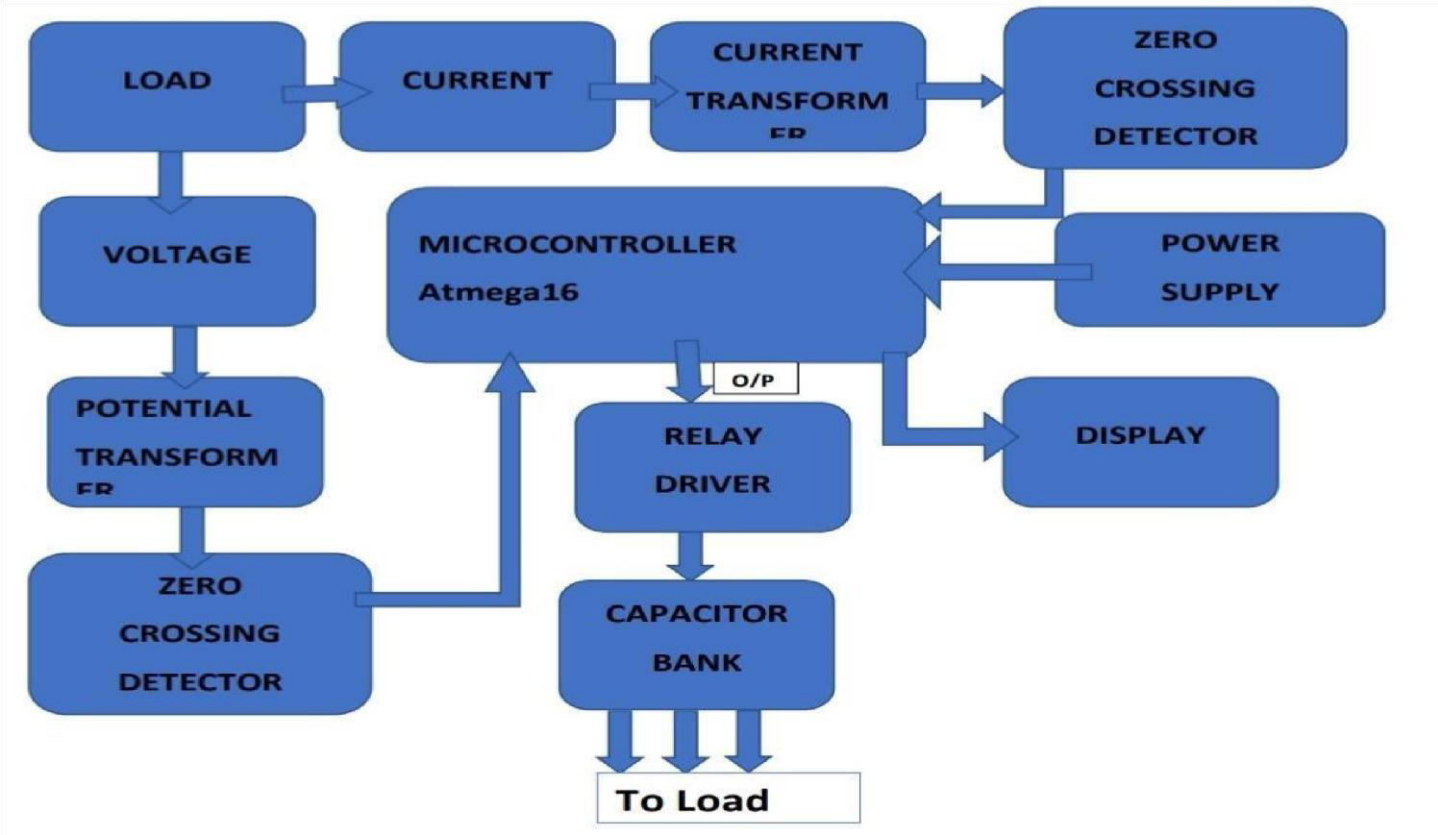
Key Words: VAR compensator, SVC, TCR, power factor, Reactive Power Compensator etc...

I. INTRODUCTION

FACTS actually is the application of power electronic equipment, with one or multiple functions, to regulate and control the electrical parameters that govern the operation of transmission systems including voltage, current, impedance, phase angle and damping of oscillations. FACTS controllers can cause rapid changes of the important system parameters mentioned above. Their presence, therefore, can significantly affect the operation of traditional distance schemes when either series or shunt connected FACTS devices introduce new dynamic controls into the power systems. They would inevitably affect the characteristics of a protective relay in a transmission line to some extent.

II. WORKING OF METHODOLOGY

For the use of Microcontroller, the power is rectified and regulated at the 5V. The input as well as output is detected by using the zero-crossing detector and it gives signal to the microcontroller. Zero crossing detector is a voltage comparator that compares the output voltage with reference to the input voltage. If Inductive load is connected in the system, then the zero-crossing detector will give signal to the microcontroller. Microcontroller will give the signal to the relay drivers or the thyristor Switches through the opt coupler. These switches are directly connecting the load to the capacitor bank. Capacitor bank will compensate the reactive power in the output that will result in the power factor correction in the system. Capacitor bank is consisting of the number of capacitors that are connected to the load in parallel. The LCD Display will display the power factor of the output side. SVC is an impedance comparing device which comes in the family of FACTS, that is used to compensate the reactive power and correct the power factor in the system.



SVC

SVC is a device that regulates the voltage in the power system and use to connect the large loads to improve the power quality. During the lagging power factor, the voltage is low, SVC applies to inject the reactive power in it. And when the voltage is high the SVC absorbs the reactive power in the line.

OPERATION OF SVC

A static VAR compensator (SVC) is a set of electrical devices for providing fast-actingreactive poweronhigh-voltageelectricity transmissionnetworks. SVCs are part of theFlexible AC transmission system device family, regulating voltage, power factor, harmonics and stabilizing the system. A static VAR compensator has no significant moving parts (other than internal switchgear). Prior to the invention of the SVC, power factor compensation was the preserve of large rotating machines such assynchronous condensersor switched capacitor banks.

V. CONCLUSION

The main aim of this paper is to study the AC Transmission system. Our main objective was to create an enhanced circuit that will improve the power factor. The Flexible AC Transmission system achieved by improving the power factor reduces the output voltage fluctuations providing us with a more efficient and stable transmission system. This proposed system increases the power factor by nearing its value to 1 with the help of the capacitor bank in the circuit. Microcontroller based thyristor driven static variable compensation gives the better results than the conventional types of compensation techniques like synchronous condensers.

VI. FUTURE SCOPE

As we know that the demand of power is increasing every day and we only have limited sources of energy.so, thispaper proposes improves power factor and increases the efficiency of any system connected parallel to it. this circuit can be used in industries instead of using the old traditional technique such as big synchronous generators which are costlier and damage prone.it comparison to these techniques our is more reliable and cheaper. This will help us to sustain more power for our future needs in more efficient way.it can be used in industries to improve the power factor of industrial loads.it might as well be used for domestic purposes where we need to improve the power factor of the system.it is a reliable and compact design used for improvement of power factor and also cheaper than the traditional techniques used for this purpose.

VII. REFERENCES

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