International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 04 | Apr-2018 www.irjet.net p-ISSN: 2395-0072

PROTECTION OF THREE PHASE INDUCTION MOTOR FROM OVER VOLTAGE REVIEW

Shubham V. Bhanvase[1], Akshay B. Damare[2], Santosh B. Mane[3], Prof. Dhananjay A. Kumbhar[4]

[1,2,3]UG, ENTC Engineering Department, SVERI's COEP, Maharashtra, India
[4]Assistant Professor, ENTC Engineering Department, SVERI's COEP, Maharashtra, India.

Abstract - *This paper describes protection of three phases Induction Motor from over voltage. Induction motors are used in many agricultural applications in a wide range of operating areas because of their simple and robust structure, and low production costs. Providing a protection system is very important in agriculture field. The purpose for development of this project is to provide safety to industrial motors, lift motors, pumps etc. The main purpose of our project is to protect an induction motors from fault such as overvoltage. In this project we are using a three phase supply. If any of the phases, out of the 3 phases is missing or if temperature of the motor during operation exceeds threshold value motor gets heated and hence motor get damaged. And we are using arduino for detection of this fault and a LCD display to display the input voltage.*

Key Words: **Arduino, Over Voltage, Zero Crossing Detector, Optocoupler, Power Devices, etc.**

1. INTRODUCTION

Three phase induction motors are widely used in many of the application but specifically in agriculture it suffers from the problems such as over voltage, under voltage.

This Project aim is the protection of three phase Induction Motor. There are different techniques for fault identification and protection of Induction motor. Some of fault detection using Artificial Neutral Network, Stator fault checking strategies, Microcontrollers based protection system and Programmable Logic Controller (PLC) based protection system. In this task, the technique utilized is Arduino based protection system. The circuit will take the full control of the motor and it will protect the motor from several faults, for example, over voltage and the circuit will switch on the motor under safety conditions. The circuit is completely controlled by the Arduino and the microcontroller will consistently monitors the voltages of the three phases and if the voltage goes abnormal then it will maintain the constant supply at which the motor run efficiently. With the help of voltage measurement it measures the input three phase voltage supply and calculates the required delay or firing angle of a power device and provide the trigger pulse through the Arduino. The input voltage and output voltage are shown by it over the LCD display. In this paper we are utilizing the Arduino. The protection of induction motor with Arduino has adaptability to maintain the constant three phase supply.

2. BLOCK DIAGRAM

The block diagram is shown below in fig. Arduino UNO is used with programming code which drives the whole system in conformity with their characteristic. Power supply is also used which supply the power to microcontroller.

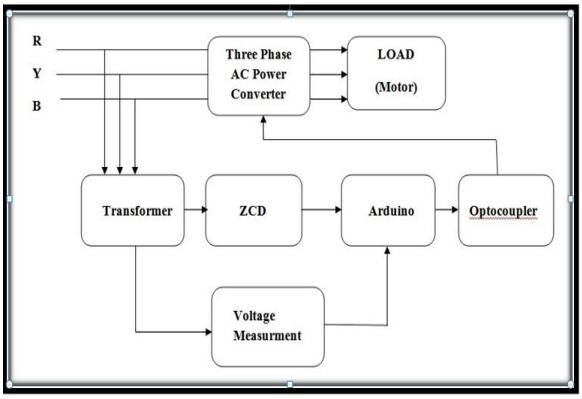

Fig:- Block Diagram

3. METHODOLOGY

3.1 Transformer:-

Used to convert the voltage down the input incoming voltage from the three phase supply. And feed to the zero crossing detector.

Fig:- Transformer

3.2 Zero Crossing Detector:-

The zero cross detector is circuit that detects the zero voltage crossing of the AC supply. And gives the digital pulses as output. So that the arduino is able to find the when to give the output.

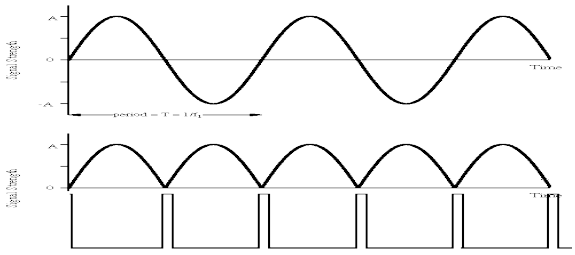

Fig:- Waveforms of ZCD.

Once the zero cross detector detects the pulse it finds out the firing angle for appropriate output and fires the SCR connected in anti parallel manner.

3.3 Voltage Measurement:-

The input supply coming from the MSEB distribution is needed to measure.

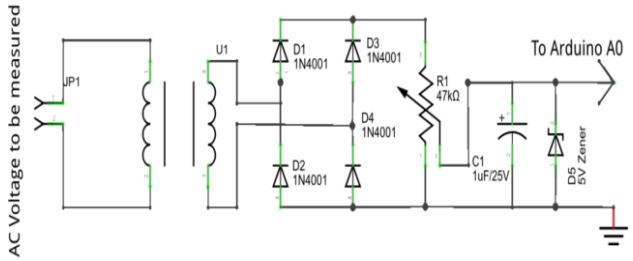

Fig:- Circuit of voltage measurement

Above figure shows the circuit diagram of the voltage measurement by using Arduino. It consists of different devices such as bridge rectifier, zener diode etc. This circuit gives the analog output which is given to the analog pin of the Arduino (A0).

3.4 Arduino:-

Arduino is the main basic block of this project. This has all the controls about the different inputs. That is, it takes the various inputs and process on that and gives the output.

Fig:- Arduino Board

First the Arduino takes the input on the analog A0 pin and measure the incoming supply voltage. Then the according to the measured voltage the Arduino finds firing angle for the power devices nd gives the pulse as output.

3.5 Optocoupler:-

In electronics, the opto-coupler, also called an isolator, is a component that transfers signals between two protected circuits by using light as sourse.

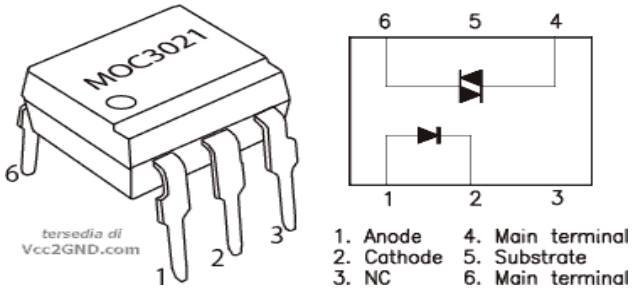

Fig:- Optocoupler

Theoptocoupler protect high voltages from intaducinging the circuit receiving the signal. Commercially available opto-isolators withstand input-to-output voltages up to 10 kV and voltage transients with speeds up to 25 kV/µs.

3.5 Three Phase AC Power Convertor:-

This block consists of the Power devices such as power SCR.

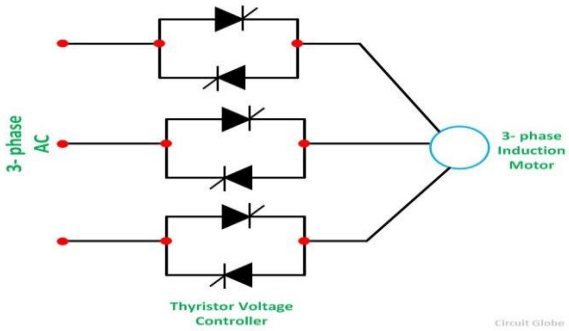

Fig:- Antiparallel SCR

The providing Gate pulses by the Arduino to the SCR according to the firing angle calculated by the Arduino it conducts. And gives the constant outputs to the load.

4 Result:-

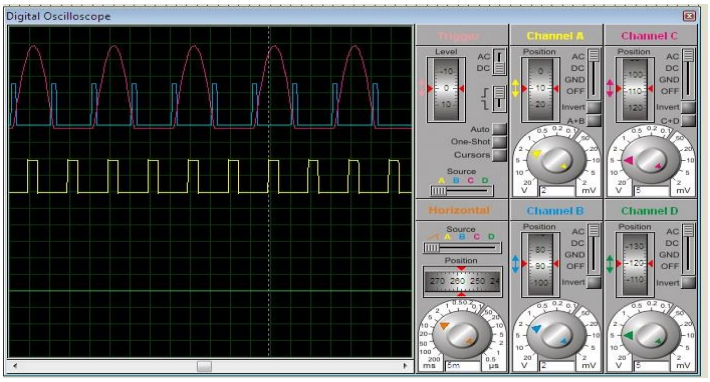

Fig:- pulses to SCR by Arduino.

5. CONCLUSION

The earlier proposed systems for three phase motor safety was deals with only break the connection and remove supply, if it goes above particular level. This system will stop motor operation completely.

Proposed project in this paper is modified version of earlier system. With the help of ZCD, SCR, voltage measurement, Controller we have maintained firing angle such that motor will get constant RMS voltage irrespective of input supply fluctuation. Motor will be get protected from the problem of supply overvoltage without stopping its operation.

REFERENCES

1. S. Nandi and H.A. Toliyat, "Condition Monitoring and Fault Diagnosis of Electrical Machines- a Review", in proc, 34th Annual Meeting of the IEEE Industry Applications, pp.197-204, 1999.

2. D. Vernon Fawcett," The IEEE paper on Protection of large three phase motors"IEEEtransaction,Jan.1967, Volume: IGA-3 Issue: 1.

3. B. S. Payne, A. Ball and F. Gu, "Detection and Diagnosis on Induction Motor Faults using Statistical Measure", International Journal of Condition Monitoring and Diagnostics Engineering Management, Vol. 5, No.2, pp. 5-19, Apr.200.

4. Y. Demir, M. Aydin." A Novel Dual Three-Phase Permanent Magnet Synchronous Motor With Asymmetric Stator Winding". IEEE Transactions on Magnetics, Volume: 52, Issue: 7, July 2016.