

Three Phase Induction Motor Run in Single Phase

Sachin Dahare¹, Shubham Wanjari², Rohit Dhakate³, Bhalchandra Bhoyar⁴, Roshan Gayakwad⁵, Prof. Akshay Pilewan⁶
Student^{1,2,3,4,5}, Project Guide⁶

Department of Electrical Engineering,
Guru Nanak Institute Of Engineering And Technology, Nagpur.
Rashtrasant tukdoji Maharaj Nagpur University, Maharashtra, India.

Abstract: : This research paper mainly focuses to develop such a design related to induction motor to run and control the 3 phase induction motor control using single phase input with the variable speed..The main principle of behind this design is to convert single phase AC source into three phases by using phase converter. In this way, the magnitude of the magnetic field in the stator is kept at an approximately with in constant level throughout the operating range/values. There is need to maintain the maximum constant torque producing capability in the overall system. In this project we have tried to reduce problem of specific limitation of 3phase supply which is required to drive 3 phase induction motor. In this project we have mentioned the experimentally verified way of how we can drive three phase induction motor by using single phase energy source by using capacitance of the compensation condenser for a conversion of single phase to three phase matrix converter so we can run three phase induction motor even with the single phase supply with the variable speed driving capability in the system.

Keyword: Three Phase Induction Motor, Capacitor. Single Phase Supply, DOL Starter, Simplified Connection.

I. INTRODUCTION

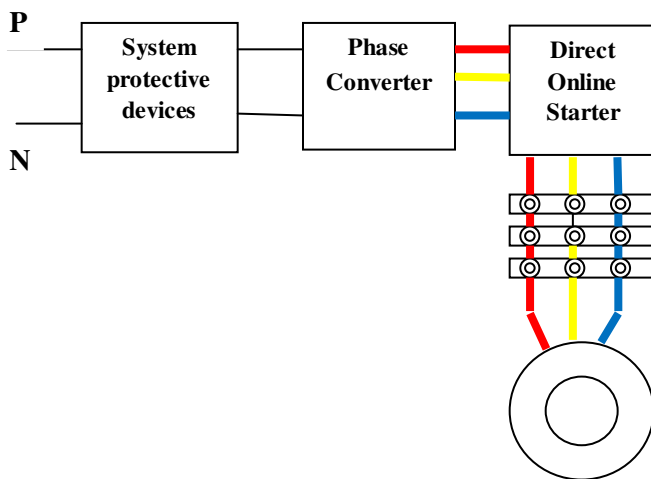
We all know that in industries there are lots of motor (rotational transformer) is use for the different application for performing lots of mechanical activities to perform manufacturing and different task in the industries, Induction motor is one of basic and simplest type of motor which use not only in industries but it also regularly use in domestically, induction motor is available in different types according to that their input requirements are also different for single phase and three motor. The ranges of motor drives that use in industries are very wide. This drives require the adjustable variable speed for different kind variable speed needed. In any drives there is the speed and position is controlled, a specific power electronic based device is needed as an interface between the input power and the motor. It also needs to adjust motor in such a way that it can set to its drive requirements. In this system there is a one converter which is used for the conversion of single phase AC supply to three phase AC power conversion, for this conversion there is voltage source indirect converter are used for the sake of boosting up in their output voltage and helps to compensate the fluctuation in the single phase power source by using the DC link capacitance. In this way design there is lots of chances of losses in both side, it means there is a possibility of losses in input as well as output side of converter in capacitor side. This kind of

problem is reduced by the method of single phase to three phases MCs is useful to solved this problems. Symmetrical component theory can express the actual relationship between the starting performances of a three phase induction motor while connected in single phase supply source. Here is a phase converter play most important role in converting single phase supply to required multiple phase or vice versa. There are lots of phase converter is use for conversion of single phase to multiple phase energy conversion for the different applications. Such a technique is used where three phase energy supply is not available or sometimes may be costly because unwell geographical condition or many times this techniques are used because of changeable work location, in this kind of remote area we can't install three phase connection and it's costlier as compare to single phases this are some basic reason to need to use such techniques in the system.

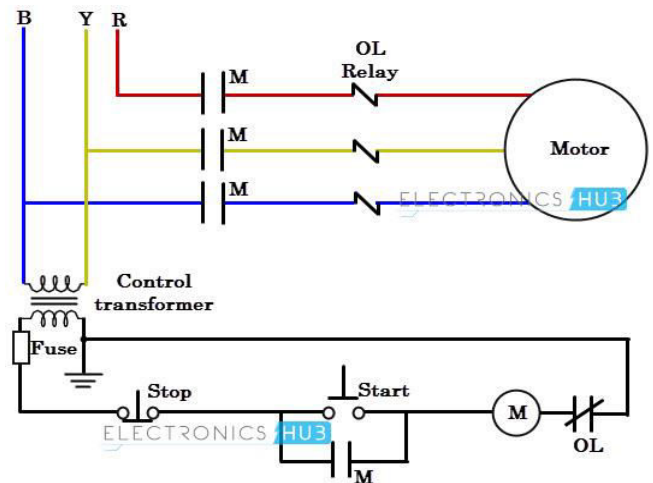
II. ARCHITECTURE OF THE SYSTEM

The main objective of this system design is to modified all regular equipments of electrical and electronics engineering in such a so that we can use them to fulfill our requirement of operating three phase motor on a normal single phase AC supply in a such place where three phase electricity connection is not available or rarely available in that condition our system will play very important role. In this system here is one phase converter which is used for to conversion of the single phase to multiple phase AC supply conversion temporary base so we can operate three phase induction motor on single phase supply as we require. This system is very simple construction and the main single phase AC supply is applied to the system which is comes from the protective devices and it fed to the phase converter where consist of fixed capacitor which most important component in the converter. This convertor used single phase supply convert it into three phases supply and fed it to the direct online starter. Direct online starter has their own importance in this system, DOL Starter is used to provide safe supply to the motor and it also protect the motor winding by high staring current which is can burn the motor. The three phase AC supply which is fed by the DOL Starter is give to the three phase induction motor. Here three phase induction motor has two windings that is stator winding and rotor windings now this windings starts their action for rotating them capacitors helps them for rotating for staring rotational torque. Here is ammeter and voltmeter and voltmeter are also such a way that we can calculate system parameter and also observe the system expectedly working or not. In this way this whole system arrangement works for the driving three phase induction motor on single phase AC supply.

A). Block Diagram



B). Circuit Diagram



III. CONSTRUCTION AND WORKING

The three phase induction motor run in single phase motor this system is design in such a way so that we can perform to run three phase induction motor by using single phase two wire system. This system is made by three phase induction motor, Dual online starter, fixed Capacitance, Miniature circuit breaker, ammeter, voltmeter, ON/OFF switch and basic arrangement of phase converter etc. this are components are connected together to achieved our main objective. The main single phase 230 V AC supply is fed the phase converter phase converter consists of capacitance the phase terminal connected to the capacitance the capacitance is the major component of phase converter, the three phase output of phase converter is connected to the DOL Starter which is use for the safely

loading of three phase supply and it helps to limit the starting very high current in the system.

When single phase 230v AC supply is provided to the system by the protective devices this input need to be convert into three phase source the phase converter is used to carry single phase and converted into multiple phase by using fix capacitance. This three phase supply is provide to the main the three phase induction motor by using DOL Starter this is equipment is one of most important components which is used to provide safe supply voltage to the rotational three phase induction motor when this three phase supply is successfully fed to the windings and finally three phase induction motor start running on applied single phase supply.

IV. PROPOSED METHOD

In this system the method that used to design the system is very simple in construction and method that proposed in this system is very normal and quick implementable. This method is basically arrangement for the three phase induction to drive on single phase AC supply. The main objective of the system is converting single phase supply voltage into the three phase system operational supply. The technique that uses to convert the single phase into three phase supply is the phase converter which major component is the fixed Capacitors which is employ in the system for the carrying phases in the system and makes the system capable to drive the system. Here is lots of other devices that use in the system one of important in them are DOL Starter for safely loading supply to the system and also to protect them from starting high current and limit them. This system is the best technique to run three phase induction motor where three phase supply not available, costlier, or the remote working area. In such area this method can use beneficial.

V. LITERATURE REVIEW

Kartik Basu :

This research paper is base on the method to achieve control on three phase induction motor by using simple single phase AC supply. The main objective of this design based on the conversion of single phase AC supply to the three phase AC supply without using any costlier method, here new electronically controlled capacitor is used with an electronic switch connected in series with the series by fixed capacitor in this way the conversion single phase alternating supply converted into three phase alternating supply this method is

called phase converter. This conversion is essential to drive the three phase induction motor by single phase induction motor phase induction motor. The fixed capacitor which used in this system is achieved minimum unbalanced voltage at almost all loading conditions. This method is tested on different condition which can be occurred in the operation for the knowledge of in future occurring fault and their solution. This method is compares with the old conventional method to find pro and cons of both the technology this method is developed for area where three phase connection not possible such as working area which changes according to need.

Mohammad Jannati :

This research paper includes the information of an technique which is use to avoid limitation which occur due to unavailable three energy source in undeveloped villages where technology need but lack of resources, to avoid such a problem this paper propose the technique by using it we can

run three phase induction motor on single phase AC supply this paper gives the information about the vector control of star connected poly phase induction motor under the stator winding three phase open phase fault. This method is totally based of the indirect rotor field application technical concept. This method is carries the term phase comparator which makes possible to the three phase induction motor on single phase AC supply.

VI. HARDWARE REQUIREMENT

- Three Phase induction motor
- Starting Capacitance Bank
- Running Capacitance
- MCB
- Dual online starter
- Voltmeter
- Ammeter
- Testing tools
- ON/OFF Button
- CT
- Connecting wires
- Indicators
- Etc.

VII. APPLICATION

- This system can be use in domestically
- It can be used in hospitals
- It can be used in small shops where motor need
- small industries
- Automobile sector/gear shop.
- Etc.

VIII. CONCLUSION

After testing the modal of this system it is found that the single phase supply that employ to the phase converter is the one of unique way multiple phase conversion by the simple Single phase AC supply and this system of running three phase induction motor on single phase supply system can be used in such a place where 3 phase supply is not easily available or costlier.

IX. ACKNOWLEDGMENT

The review paper is carried out at Guru nanak institute of engineering & technology from department electrical engineering under the guidance of Prof. Akshay Pilewan.

X. REFERENCES

1. Habermann, R. , 'The single-phase operation of a three-phase motor with a simple static phase converter', Trans. American Institute of Electrical Engineers, 73, pt. 3 (1954)
2. Brown, J. E. and Jha, C. S. , 'Starting of a three phase induction motor connected to a single phase supply system', Proc. IEE, 106A (1959)
3. Jha, C. S. , 'The starting of single phase induction motor having assymetrical stator windings not in quadrature', Proc. IEE, 109A, pp. 47–58 (Feb. 1962)
4. Mukherjee, P. K. and Sharma, C. L. , 'Phase converter for three-phase induction motor across single phase supply', J.I.E. (India), 51, pp. 383–387 (Aug. 1971)
5. Krause, P. C. , Analysis of Electrical Machinery, McGraw-Hill, Chap. 9 (1987)
6. Baily, Walter (June 28, 1879). "A Mode of producing Arago's Rotation". Philosophical Magazine. Taylor & Francis. 3(1): 115–120. Bibcode:1879PPSL....3..115B. doi:10.1088/1478-7814/3/1/318.
7. Jump up to:^a Vučković, Vladan (November 2006). "Interpretation of a Discovery" (PDF). The Serbian Journal of Electrical Engineers. 3 (2). Retrieved 10 February 2013.
8. The Electrical engineer, Volume 5. (February, 1890)
9. The Electrician, Volume 50. 1923
10. Official gazette of the United States Patent Office: Volume 50. (1890)