International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Design and Fabrication of Single Phasing Preventer

Ms. Shreya Sunil Burud[1], Ms. Snehal Rajendra More[2], Ms. Manali Santosh Patil[3], Ms. Pooja Pundlik Patil[4], Mrs. Snehal Sandeep Patil[5]

[1,2,3,4]Student, Electrical Engineering, Sant Gajanan Maharaj Rural Polytechnic, Mahagaon
[5]Project Guide, Electrical Engineering, Sant Gajanan Maharaj Rural Polytechnic, Mahagaon

ABSTRACT

Three phase induction motors are widely used in industries, irrigation systems, workshops, pumping stations and small-scale applications because of their high efficiency, low maintenance cost and simple construction.

However, one of the most serious problems faced by three phase motors is single phasing. Single phasing occurs when one phase of the supply fails while the motor is running. Due to this condition, the motor draws excessive current from the remaining phases and this leads to overheating, insulation failure and permanent damage of the motor winding.

To overcome this problem, a single phasing preventer is designed and fabricated in this project. The circuit detects the failure of any one phase and automatically disconnects the motor supply using a relay and contactor arrangement. The project provides a simple, economical and reliable solution for protecting three phase motors from phase failure. The designed system can be used in industries as well as agricultural applications such as irrigation motors.

INTRODUCTION

Three phase induction motors are the backbone of modern industries. These motors are used in pumps,compressors, fans, blowers, flour mills, conveyor systems and many other industrial machines.
These motors work efficiently only when all three phases are available properly. If one phase fails due to fuse failure, loose wiring connection or supply fault, the motor continues to run but it draws heavy current. This condition is known as single phasing.
Single phasing causes overheating of the motor winding and reduces the life of the motor. If this condition continues for a long time, the motor may get completely damaged. Therefore, it is necessary to protect the motor from this condition.
The main aim of this project is to design a simple and low-cost single phasing preventer which automatically disconnects the motor when any phase fails and protects it from damage.
This project is very useful for industries, workshops and agricultural irrigation motors where three phase supply is used.
The designed system is simple, reliable and easy to install.

COMPONENTS

Transformers Rectifier Capacitor Connectors Contactors Relays Connecting wires Resistors Indicators
3 phase induction motor

SPECIFICATION AND DESIGN CALCULATION:

Input supply = 3-phase, 415V AC Relay voltage = 12V DC
Transformer = 230V/12V step-down transformer
Motor used for testing = 3-phase induction motor

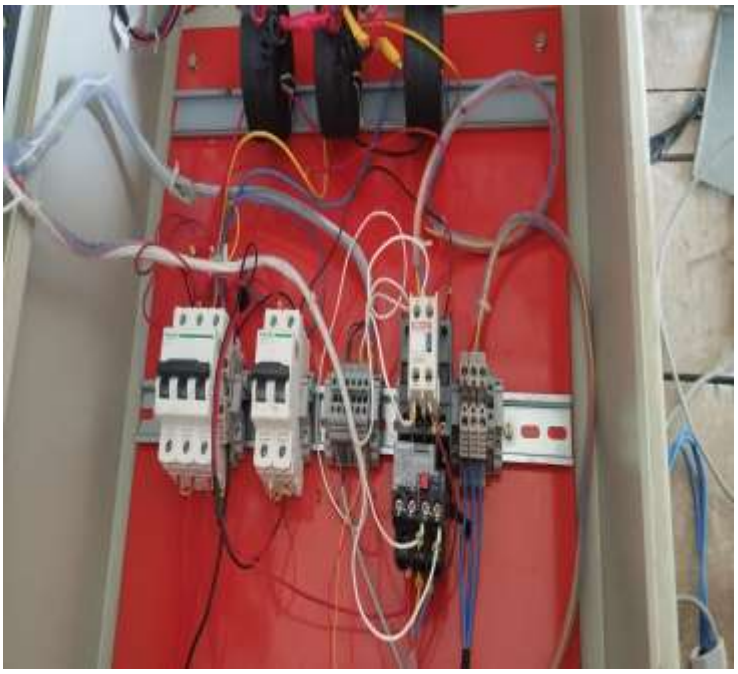
BENEFITS:

Protects motor from single phasing Increases motor life Reduces maintenance cost Automatic operation Simple design Low cost project Easy to use

WORKING

The working of the single phasing preventer is based on phase failure detection. The circuit continuously monitors all three phases of the supply. When all three phases are present, the relay gets energized and the contactor allows the supply to the motor. Hence the motor runs normally.
If any one phase fails, the circuit detects the phase loss immediately. The relay becomes de-energized and the contactor disconnects the motor supply automatically. This prevents overheating of the motor and protects it from damage. The LED indicator also shows the condition of the supply.
This system works automatically and does not require any manual operation. The response time of the circuit is very fast and the motor is protected immediately when a phase failure occurs.

FABRICATION



The single phasing preventer circuit is assembled on a PCB board. All electronic components such as resistors, capacitors, diodes and relay are mounted carefully. Proper soldering and wiring connections are done to avoid faults.

After completing the circuit, it is connected to a three-phase motor for testing. The motor runs normally when all phases are available. When one phase is removed, the circuit immediately disconnects the motor supply.

ADVANTAGES

The advantages of this project are:

Protects the motor from single phasing. Increases motor life.

Reduces maintenance cost. Simple and easy to design. Low cost project.

Automatic operation. Reliable protection system.

Suitable for industries and irrigation motors.Easy to install and operate.

Improves safety of electrical machines.

CONCLUSION

The single phasing preventer is an important protection device for three phase induction motors.This project provides a simple and effective solution to protect motors from phase failure. The designed circuit is low cost,

easy to install and suitable for industrial as well as agricultural applications.

The project works successfully and gives reliable results. This system helps in increasing motor life and reducing maintenance cost.

Hence the project is very useful for protecting electrical machines.

RESULT AND DISCUSSION:

The single phasing preventer circuit is tested using a three phase induction motor. When all three phases

are present, the motor runs normally. When one phase is disconnected, the circuit detects the fault and disconnects the motor immediately. The circuit works successfully and gives reliable results.

The project is very useful for industrial applications where three phase motors are used. The designed system is simple, economical and efficient. It provides a practical solution to protect motors from phase failure.

REFERENCES

1. Electrical Machine by B.L. Theraja
2. Basic Electrical Engineering by V.K. Mehta Industrial Motor Protection System Electrical Protection Devices
3. Pathik N. Shah1, Smith N. Patel, "Novel Setting And designing of relay for protection