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THREE PHASE INDUCTION MOTOR PROTECTION SYSTEM

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Abstract:

Induction motors are used in many industrial applications in a wide range of operatingareas because of their simple and robust structure, and low production costs. Providing aprotection system is very important in industries. The purpose for development of this project is to provide safety toindustrial motors, lift motors, pumps etc. The main purpose of our project is to protect aninduction motors from faults such as single phasing, overvoltage, over temperature andunder voltage. In this project we are using a three phase supply by using three singlephase transformers. If any of the phases, out of the 3 phases is missing or if temperatureof the motor during operation exceeds threshold value or if the voltage exceeds/dropsthreshold value motor stops immediately. If any of the phases is not available thecorresponding transformer stops supplying power to the circuit. Themain relay which is powered through a set of four relays gets disconnected because ofone relay not being powered. And we are using a microcontroller for detection of these faults and aLCD display toshow which type of fault is occurred.

Keywords:- Arduino Nano,Transformer,Relay Board, LED 5mm,Temperature Sensor, Bridge Rectifier IN4007,Diode IN4007,Potentiometer.,

1. Introduction

There are an extensive variety of ac motor and motor characteristics in existence, as a result of the numerous duties for which they are utilized. All motor require protection, but luckily the more fundamental issues influencing the decision of protection are free of the kind of motor and the over load to which it is connected. Induction motor when supply with higher voltage than evaluated then induction motor over heated. In our project a variable resistance is utilized when supply voltage is lower than rated then voltage drop over the resistance is higher than it protect the motor from this fault. At the point when supply voltage is lower than voltage drop over the resistance is lower than specified value and motor fails to start. At the point when supply is just a single phasing, this is single phasing issue and supply voltages rated and at the end of the day motor fails to start. In case of motor overheating lm sensor is utilized which sense the temperature of winding in the exceed the specified the limit then once again the motor fails to start. It is highly desired that three phase induction motor works freely from all type of fault. Induction motor is most widely utilized motor. It requires less maintenance as compared to other electrical motors. The primary goal of the work is to make a cheap and reliable protection system for three phase induction motor system. The protection system should protect the from voltage unbalancing, single phasing, under voltage, over voltage and thermal protection. Further to enhance system to run the motor under single phasing.

Classical monitoring for enlistment motor are for the most part given by some combination of mechanical in electrical monitoring equipment. Mechanical types of motor detecting are also limited and ability to identify electrical fault, for example stator protection failure. Furthermore, the mechanical parts of the gear can cause issues throughout operation and can decrease the life and the efficiency of the system. We describe the system for monitoring and controlling of induction motor. A low cost of the system proposed to monitor the parameters of the induction motor, for example, voltage, current, temperature of the winding, speed of the motor and power factor. Continuous monitoring is done for every one of these elements and warning the message is sent to in charge person if there should be set limited value this provision in proposed system facilitated the action to be taken before actual fault occurs on motor. What's more, henceforth enhancing the execution of the motor by maintaining a strategic distance from its tripping took after by fault. What's more with the monitoring, the speed control of the motor is performed. On the off chance that an over-load occurs i.e. Current exceed the maximum limit the relay circuit will turn on the buzzer.

2.Principle

The system uses a 3-Phase power supply where 3-single phase transformers are linked to it. If any of the phases is not accessible the equivalent transformer ends supplying power to the circuit. This directs to one of the 4-relays getting switched OFF.The major relay is powered through a set of 4-relays gets detached because of one relay not being power-driven. Thus the main relay delivers 3-phase supply to the motor gets disconnected. A thermistor is connected to the induction motor body to sense the temperature. If the temperature rises then supply to the 4th relay is disconnected.Further this project can be developed by using current sensors to protect from the over load and phase sequence sensor to protect the motor from applying wrong phase sequence.

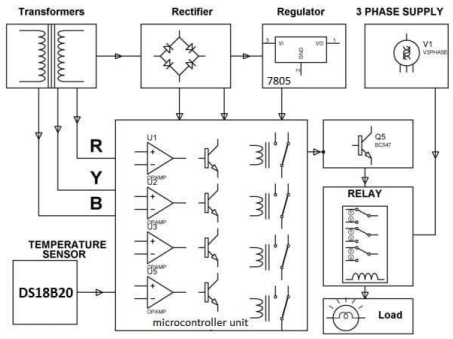

Fig:- Block Diagram of Three Phase Induction Motor Protection System.

Objective:

- To Protect Three phase induction motor from voltage drop, rising in temperature.

Component:

- Arduino Nano.
- Transformer.
- Relay Board.
- LED 5mm.
- Temperature Sensor.
- Bridge Rectifier IN4007.
- Diode IN4007.
- Potentiometer.
- Resistor.

- Capacitor.
- Voltage Regulator.
- Bulb 10W.

3. Advantage:

- Improve the system Operation.
- Controller based system so reliable operation.

4. Application:

- Protection of Pump
- Protection of Indction motor

5. Future Scope :

- Single Phase and high temperature protections are easily achieved by this simple circuit using comparator and relay circuit.
- Further it can be enhanced by using current sensor for over load protection phase sequence for protecting the motor from applying the wrong phase sequence.
- It can also modify as once the temperature comes to the normal position it will automatically come to normal operation of the motor

6. Conclusion :

Induction motor protection system is against the single phasing and the high temperature is achieved by simply interrupting the power supply to the load effectively by the use of comparator and relaysby using this we make simple protection system.Protection of three phase induction motor from single phasing, over current provide to smooth running of motor improves its lifetime and efficiency .To make run induction motor efficiently and to protect it from various faults sensing circuit have been designed. These sensing circuit sense the fault occur in induction motor,These faults are monitored by the protection system and if any fault occurred in an induction motor automatically turned off.

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