

CONTROL PANEL OF 3-PHASE INDUCTION MOTOR FOR PROTECTION & SIMULTANEOUS OPERATION

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Abstract: Induction Motors are the major loads for in Industrial area. For different applications, starting of motors at different time with different speed is required to be done automatically. Moreover since AC motors are equally important as another part of industry, they must be protected against different types of fault. In this project, we have suggested designing a common control panel with the help of which two or more motors can be started at desired time with single control panel. This may being revolutionary step for the industries. In the same panel, we have incorporated features of speed control of induction motor by which speed of all induction motors connected with the panel can be controlled easily & in economic way. Protection feature is also added in the same panel. For this we have placed a relay which may sense over current (over loading) & single phasing phenomena & can trip the circuit breaker to protect the motors. In all, this project solves the problems of operating different induction motors, Protecting them from abnormalities & controlling their speed by using a single panel.

Keywords: - 3-Phase I.M., Panel, Relay, CT, SPP

1. INTRODUCTION

Induction motors are widely used in industries because of its extremely rugged construction, low cost and its minimum maintenance. As an electrical drive, A.C. 3-phase motors are therefore finds the wide applications in various industries. Out of the so many types of 3-phase A.C. motors, the 3-phase induction motor is used in the industries. For various applications Simultaneous operation and speed control of motors are required.

Nowadays state of art speed control techniques of Induction motor is available. By using the project we can provide speed control of 3-phase induction motor and also give a protection against different faults.

2. Circuit Diagram & Analysis

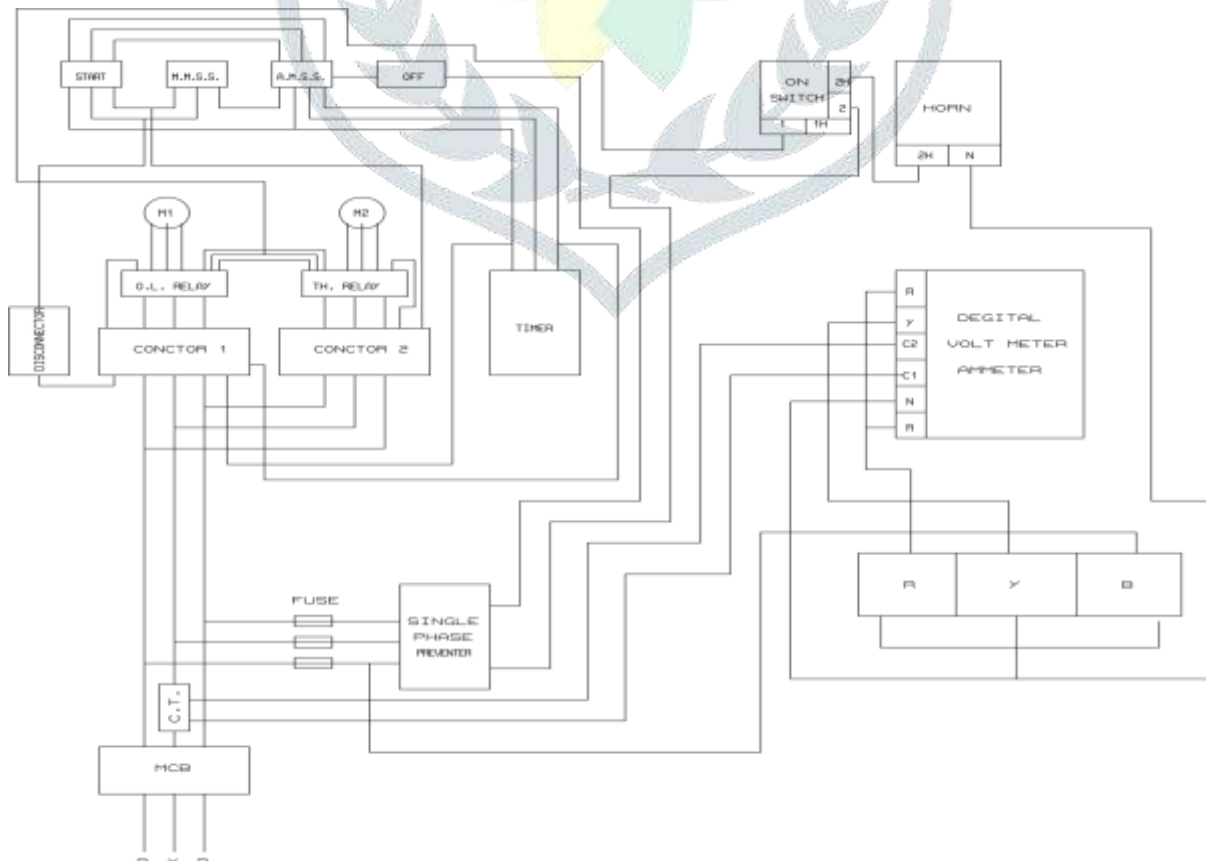


Figure 1 Wiring diagram

At initial stage we completed our circuit with the help of two induction motor.

Our main reasons behind this project is to give motor,

1. Protection – Overload, over current, Single phasing & thermal
2. Speed controlling
3. Simultaneous operation

For this entire thing used, diff. Types of relays, timer, variac, single phase preventer, connector, disconnecter.

And to operate this all equipment we used switch like manual switch, automatic switch and toggle switch and measure voltage and current we used voltmeter and ammeter. For any fault we used siren for give information about the fault. We put three LED for check healthiness of three phase supply. For start operation we put ON & OFF push button.

Now, when we connect panel to the three phase supply and motor, then we have to give supply to panel. For this we need to press ON push button and so the panel start.

Then three phase supply reached to the MCB. At initial condition the MCB need to remain at OFF position. But for do this operation we have to ON MCB. After this supply reached to the SPP (Single Phase Preventer) through the current transformer. Which measured current and indicate us through the ammeter?

Single phase preventer check the sequence of the supply to circuit. If LED of single phase preventer is ON then sequence is correct. Single phase preventer work either single phasing occurs due to any fault in line.

Contactors energized when three phase supply reached to the contactors. We used two selector switches. One is manual mode selector switch from which we operate motor manually and another is automatic mode selector switch from which we operate motor automatically.

For first step, we select manual mode switch. By this switch we manually operate one by one motor to change its position. Then for another operating mode we automatic mode switch into the circuit. In this mode we need put automatic selector switch at just ON condition. This switch connects to the timer circuit which has 10 sec. Time delay.

So, when we operate automatic switch motor will switch automatically from one by one because of time. When we need to disconnect circuit disconnecter will be providing on contactor which is disconnect the circuit.

For fault like over current, overload we provide overload relay and thermal relay. Overload relay operate due to heavy load in the circuit and thermal relay operate when fault occur and temperature of circuit will be rise.

We provide main switch on model which is toggle type switch. From that we ON or OFF circuit at any time and put a horn for indication of fault. When fault occurs horn will blow and we have an indication of fault.

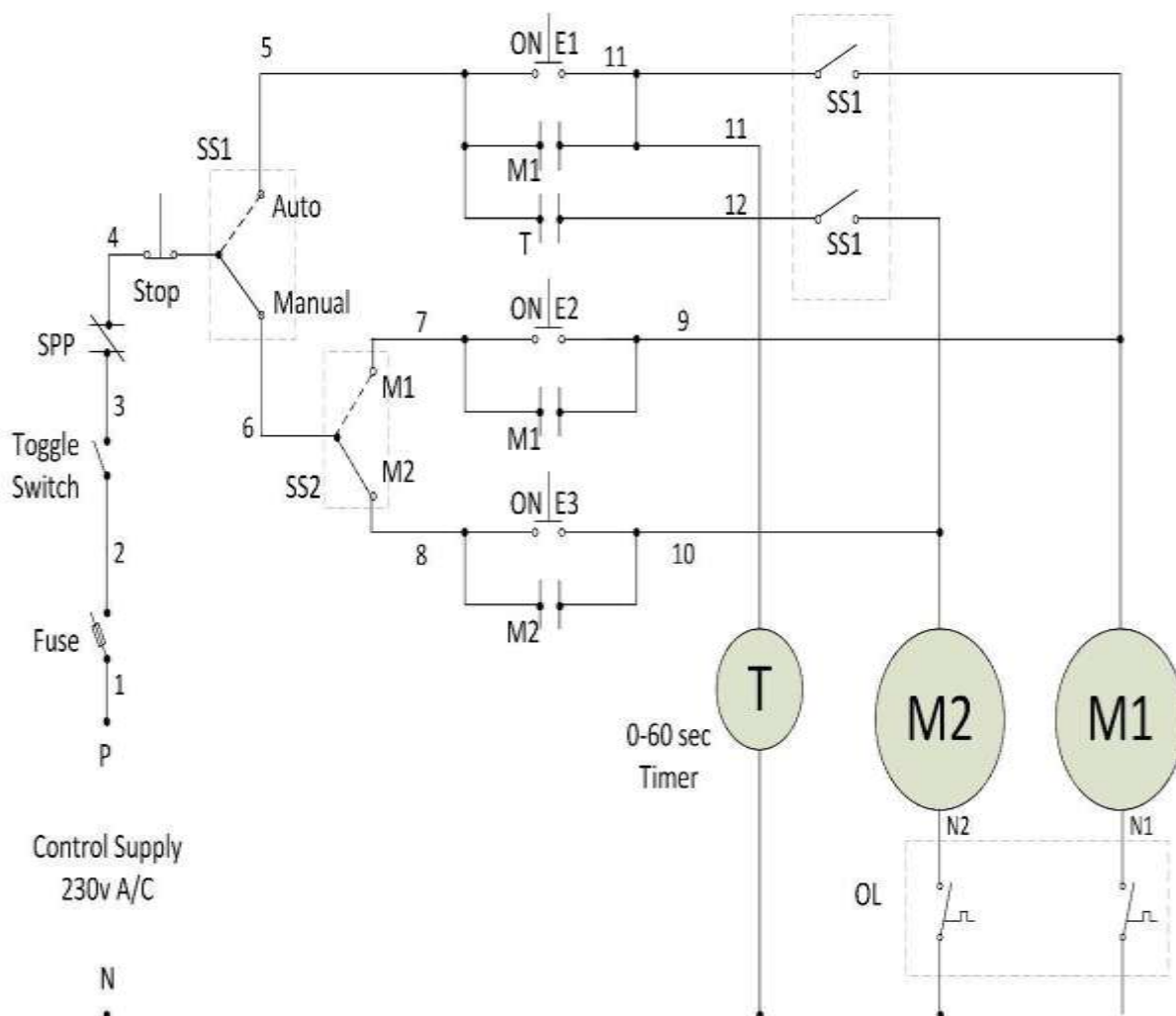


Figure 2 Control wiring diagram

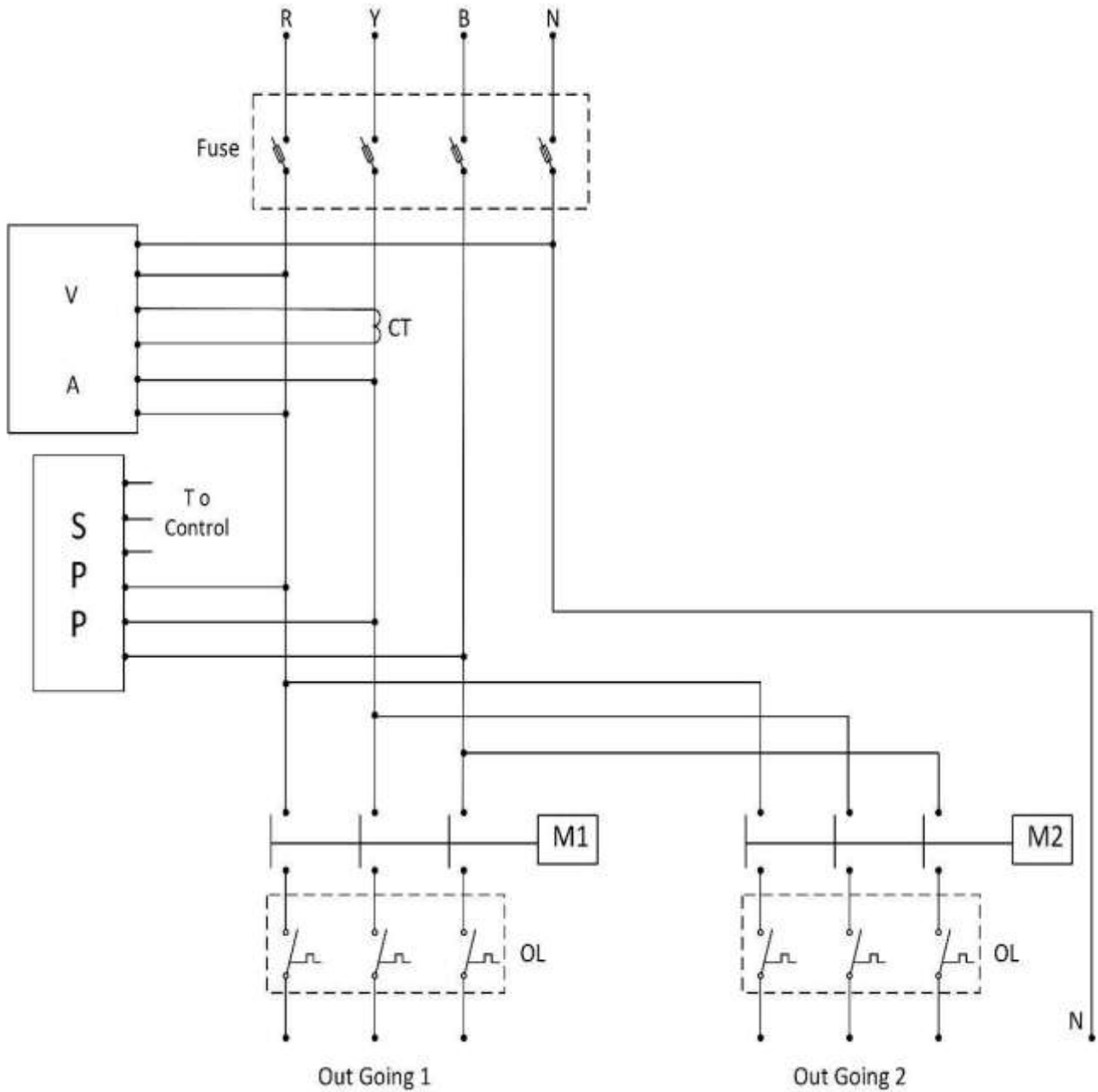


Figure 3 Power diagram

3. Implementation of Hardware



Figure 4 Hardware model

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4. Advantages

- It protects 3-Phase induction motor against overvoltage, Overload, Thermal, over current, single phase preventer.
- Required less maintenance and Cost is less.
- Easy and automatic operation.
- Easily replace any faulty part from the circuit.
- Not so complicated.

5. Conclusion

- By analyzing the control circuit and wiring diagram we can control of three phase induction motor easily using variac. And using proper electrical connection of the control elements we operate more than two motor simultaneously.
- We also provide over voltage & over current protection to the induction motor/
- Using relay, temperature sensor, MCBs and other equipment's.
- This panel has many application is simultaneous operation, speed control & protection of induction motor.
- So if we use this type of control panel individual protection is not needed because it capable of to provide the protection against general all type of faults.

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