# Wi-Fi Controlled 3 Phase Induction Motor Starter with Single Phasing Fault Protection


*Submitted by*

**Deepakkumar M & Manoj kumar C**

Department of EEE

Loyola-ICAM College of Engineering and Technology,

Loyola Campus, Nungambakkam, Chennai-34

*Under Supervision of*

**Dr. A Inba rexy**

Associate Professor & Vice Principal

Department of EEE

Loyola-ICAM College of Engineering and Technology,

Loyola Campus, Nungambakkam, Chennai-34

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## Abstract


**This project focuses on starting a 3-phase induction motor using the Wi-Fi module, along with single phasing protection. A starter is a device which is used to limit the starting current by supplying reduced voltage to the motor at the time of starting. Three phase induction motors are extensively used in industries and laboratories. Almost 80% of the motors are 3 phase Induction Motors. It is well known that the three-phase induction motor will continue to operate when a disturbance of some sort causes the voltages supplied to the motor to become single phase. Single phasing simply means that one of the line connections of a motor is not connected, resulting in the motor running on a single phase. A single-phase condition subjects the motor to an excessive voltage imbalance, often meaning high currents and motor heating. Even though the motor will continue to operate in this condition, the motor will heat up very quickly and it is essential for the motor to be removed from service by opening of the motor circuit breaker or some other type of protective device.**



Key words - Single Phasing fault, Star Delta Starter


## I. Introduction

The current drawn by a motor from the mains, depends upon the rotor current. The rotor current under running condition is given by the expression At start slip S=1 , therefore rotor current .This current is very large as compared to its full load current. Thus, when a squirrel cage induction motor is directly connected to the supply mains; it draws very large current (nearly 5 to 7 times of the full load current) from the mains. This heavy current may not be harmful for the motor because it occurs for a short duration of time, but it causes the following effects: (i) It produces large voltage drop in the distribution lines and thus affects the voltage regulation of the supply system.(ii) It adversely affects the other motors and loads connected to the same lines. Hence it is not advisable to start large capacity induction motors by direct switching. Rather, such motors should be started by means of some starting device known as starter. The function of a starter is to limit the initial rush of current to a predetermined value. A starter also has some

protective devices to protect the induction motors against overloading. This method is based upon the principle that in star connections, voltage across each winding is phase voltage i.e., 1/ 3 times the line voltage, whereas the same winding when connected in the delta will have full line voltage across it. So, at start, connections of the motor are made in star fashion so that reduced voltage is applied across each winding $I_{SC}/\sqrt{3}$ = Starting line current, Starting line current by direct switching with stator winding in delta = $\sqrt{3}*I_{SC}$. Star delta starters are another device that may be used to reduce current demand during motor startup. It is often used for starting three-phase induction motors, but can only be used when starting the motor without load and when the required starting current is relatively low. The Internet of Things involves the numerous physical devices worldwide connected to the internet, collecting and sharing data. Due to the production of super-cheap computer chips and the availability of wireless networks, it's possible to turn any object or thing into a part of the IoT.

Our project's primary objective is to minimize human effort, time saving and efficient resource utilization. By using IOT induction motors in industries can be started from remote locations using WIFI internet communication. We faced difficulties integrating IOT with electrical contractors.

$$I_2 = \frac{SE_{2s}}{\sqrt{R_2^2 + (Sx_{2s})^2}}$$

The current drawn by a motor from the mains during motor running condition

$$I_{2s} = \frac{E_{2s}}{\sqrt{R_2^2 + (x_{2s})^2}}.$$

The current drawn by a motor from the mains during starting of the Motor

## II. Schematic

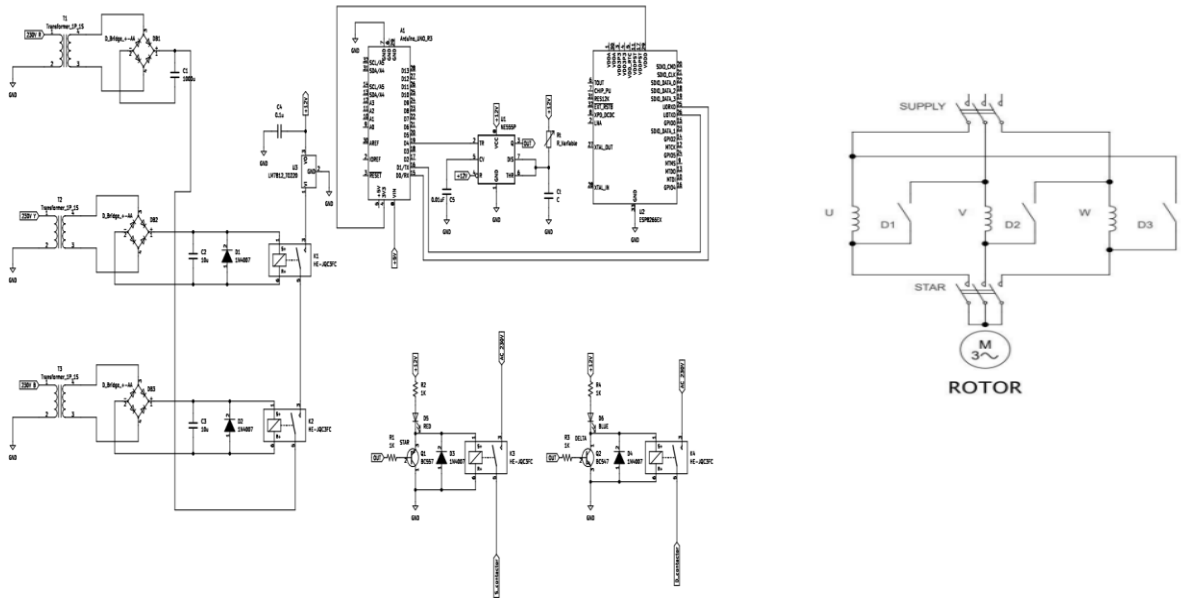


*Fig 3(a) The Schematic diagram of whole Wi-Fi Controlled 3 phase induction motor starter with single phasing protection circuit*

## III. Experimental setup

1. 5Hp Three phase Induction motor
2. Star delta starter
3. Single phasing protection circuit
4. Step down transformers
5. Microcontroller
6. Wi-Fi module
7. Laptop

The motor is energized from three phase supply mains of 230 $V_{ph.}$ The supply is given to the star delta starter through the single phasing fault preventer circuit. The control is given to the relays through microcontroller (ATMega328p) Arduino UNO R3. The ON/OFF signal is given from the mobile through Wi-Fi to the ESP8266 Wi-Fi module.


Fig 3(a) Experimental setup

## IV. Conclusion

Our project will help the industry and laboratory to start their 3-phase induction motor from their desires location if the Wi-Fi connection is established.

In this new modern world, IOT is a vital for communication between devices. For this technology cost and maintenance is a major factor to be considered. We have to find new innovation to reduce these factors. Hence, we came up with a project which can minimize the cost and maintenance factor ofthe vehicle.

We use wireless communication because the data is transmitted faster and at high speed. Our project will help to revolutionize by reducing man power and provides an initiative towards industrial automation.

WISA also protects the induction motor from single phasing fault. Single phasing is a very dangerous fault to the electrical motor and which damages the motor stator winding rapidly.

## References


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