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# Review on Automatic Star Delta Starter using Relay and Adjustable Timer

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**ABSTRACT:** Induction motors are mostly used preferable in industries. In this project we apply low voltage to start induction motor. This is completed by using star to delta conversion. Star/Delta starters are probably the most preferable reduced voltage starters used in industries 50 Hz industrial motors. Star delta starter will use to apply current after some time full current will be applied. Since in star connection current is same in different phases while line voltage is the root three times the phase voltage the voltage will be reduced if the motor starts in star mode. In delta connection the applied voltage is same the line voltage. In this project using relay and automatic star delta starter we have designed star delta starter By feeding the motor with (58%) of the full load current to limit the starting current surges by starting the motor at reduced voltage and then have full supply voltage get reconnected if they run up to near rotated speed. This method is referred to as Soft starting the motor.

**KEYWORDS:** Star-delta starter, Relay, Adjustable electronic starter, and Induction Motor

## I. INTRODUCTION

Induction motors are mostly used due to their low-cost, strong construction, fast pick-up, low maintenance expenditure and good efficiency. For running and starting of induction motor the direct on line (DOL) starter or star-delta starter is with low voltage protection provided and single phasing. Induction motors are very sensitive to low voltage and single phasing during which they draw a inrush current and can be produce fire out unless switched of within few seconds of occurrence of fault. This makes the requirement of a sensitive protective device essential to avoid firing of induction motors under faulty conditions. The circuit of an automatic star delta starter, incorporating the important features given below,.It is meant to be used in conjunction with a direct on line starter. Automatic start on resumption of proper conditions Single phasing prevention 24-hour programmable off timer An induction or asynchronous motor is a type of AC motor where power is supplied to the rotor by means of electromagnetic induction, rather than a commutate or slip rings as in other types of motor. These motors are widely used in industries, particularly motors which are rugged and does not have brushes as poly phase motors. Single-phase versions are used in small appliances. By knowing the supply frequency we can determine speed of motor, so they are most widely preferred in constant-speed applications, although variable speed versions, using variable frequency drives are becoming more common. Squirrel cage type induction motor are most commonly used.

## II. LITERATURE SURVEY

There are three states of Star-Delta starters, a). Star Connected State, b). Open State, and c). Delta Connected State. During starting time Main and Star Contactors remain closed and complete Circuit. In Star Connected State, voltage applied is reduced to  $1/\sqrt{3}$  of the Line Voltage across each winding. As and when motor attains good rotational speed, say about 90% of full r.p.m. after the timer count downs the star connections get disconnected and it get shifted to delta connections Between these two, Star connected and Delta connected states, circuit becomes open and motor neither remains in Star nor in Delta State. This is called open transition switching. In Delta connected state voltage applied to windings is equal to Line Voltage. Items Required to Make Star Delta Starter Three Contactors, Over Load Relay



Timer, Fuse Switch Unit 2 Pole MCB, Fuse, Start Push Button stop Push Button

### III. PROPOSED SYSTEM DEVELOPEMENT

#### 555 TIMER:-

- The 555 timer IC is an integrated circuit implementing a variety of timer and multi vibrator applications. Depending on the manufacture, the standard 555 package includes over 20 transistor, two diodes, and 15 resistor on a silicon chip installed in an 8 pin mini dual in line package

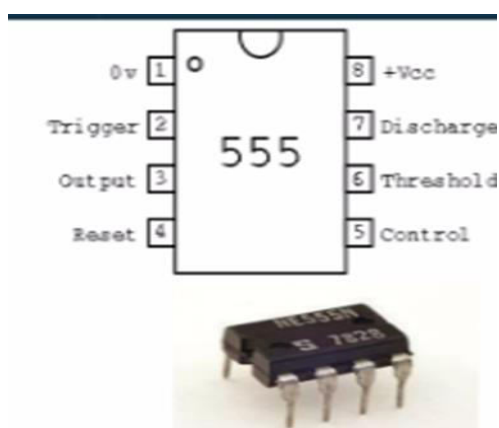


Fig.1 pin diagram of 555timer

#### STATOR:-

- The stator winding consist of three different windings which Overlap one another and are offset by an electrical angle of 120°.

#### ROTOR:-

- Rotor in induction machine with squirrel cage rotor consist of a slotted cylindrical rotor core sheet package with aluminum bars which are joined at the front by rings to form a closed cage.

#### BC547:-

- The BC547 transistor is an NPN semiconductor made silicon transistor. The BC547 transistor is a transistor used in small plastic packages. Whenever the base is high, the current starts flowing through base and emitter and after that only current will pass from collector to emitter.

#### RELAY:-

- It is an electromagnetic switch. Used to control the electrical devices. Copper core magnetic flux plays a important role.

#### Working of the system:

Due to the maximum variety characteristics of the induction motor, it plays the important role in the industrial sector. Some of those are self starting, strong construction, high efficiency, good power factor and ease of control, etc. Squirrel cage type of induction motors are mostly used and most preferable than the other types.

The secondary side of the motor just look like short circuited transformer when the motor is at idle, because all the rotor bars are connected together to form a closed path. a inrush current will flow through the rotor bars. So when the motor is started, stator draws the inrush current which is 8-12 times that of the motor rated current. Before starting the motor, it require the voltage to the motor.

The project is designed to give low voltage start to induction motors. This is done with the help of star to delta conversion. Star/Delta starters are probably the most commonly used as reduced voltage starters in the 50Hz industrial motor world. Star delta is used to reduce the start current applied to the motor in star connections then after sometime



full load current is given to the motor in delta connections. Since in star connection current is same in different phases when line voltage is the root three times the applied voltage. So the voltage is reduced if motor is started as star mode. And also in delta connection the voltage is same as that of line voltage so full voltage is applied if we run the motor in delta connection. The Star/Delta starter is generally obtained from three contactors; electromechanical timer and a thermal overload for operating a 3 phase motor at 440 volt at ac mains supply 50 Hz. The interlocking arrangement of all the 3contactor coils is in 440 volt AC.

The project is designed to start a 3 phase motor at 440 volt AC mains supply 50 Hz with a set of 12 volt DC relays in star mode get shifted to delta mode by an electronic adjustable timer. A set of relays are used to switch the motor connections from star to delta with a time delay. The project is supplied with six lamps; it will operate on 3 phase induction motor. For lamps, three lamps representing each phase winding of the motor.

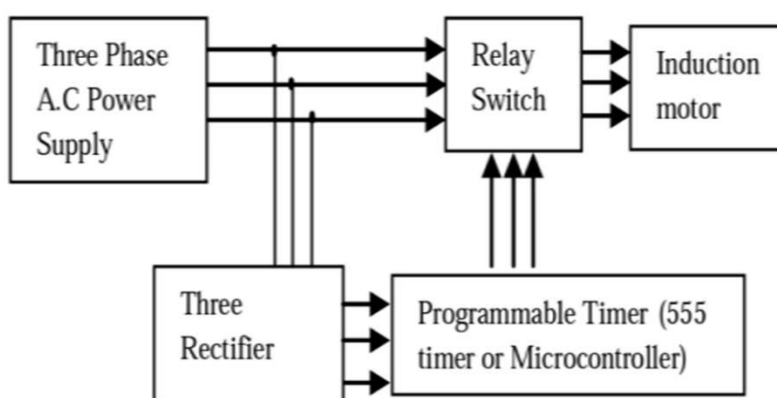


Fig.2. Block diagram of proposed system

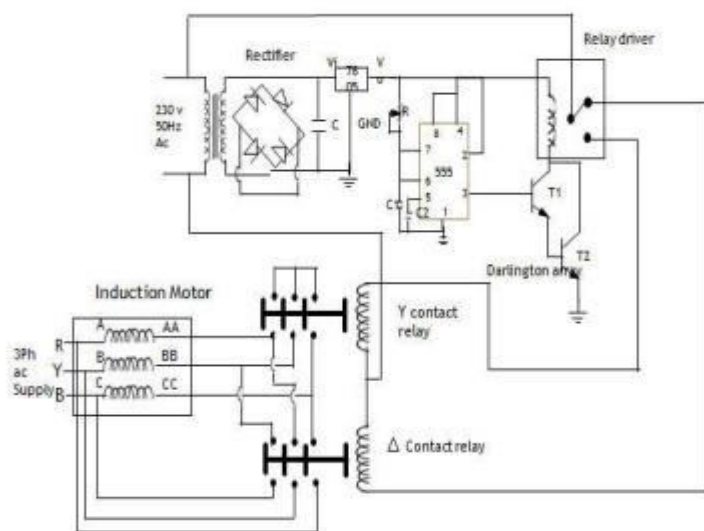


Fig.3.circuit diagram of automatic star delta starter

#### IV. CONCLUSION

An automatic voltage fluctuation protector system has been implemented for protection of induction motor. It has very compact and portable assembly unit .The cost of constructing this project is relatively low as compared to its function. It can therefore be easily commercialized For star delta starter, the basic function is to enable the motor to

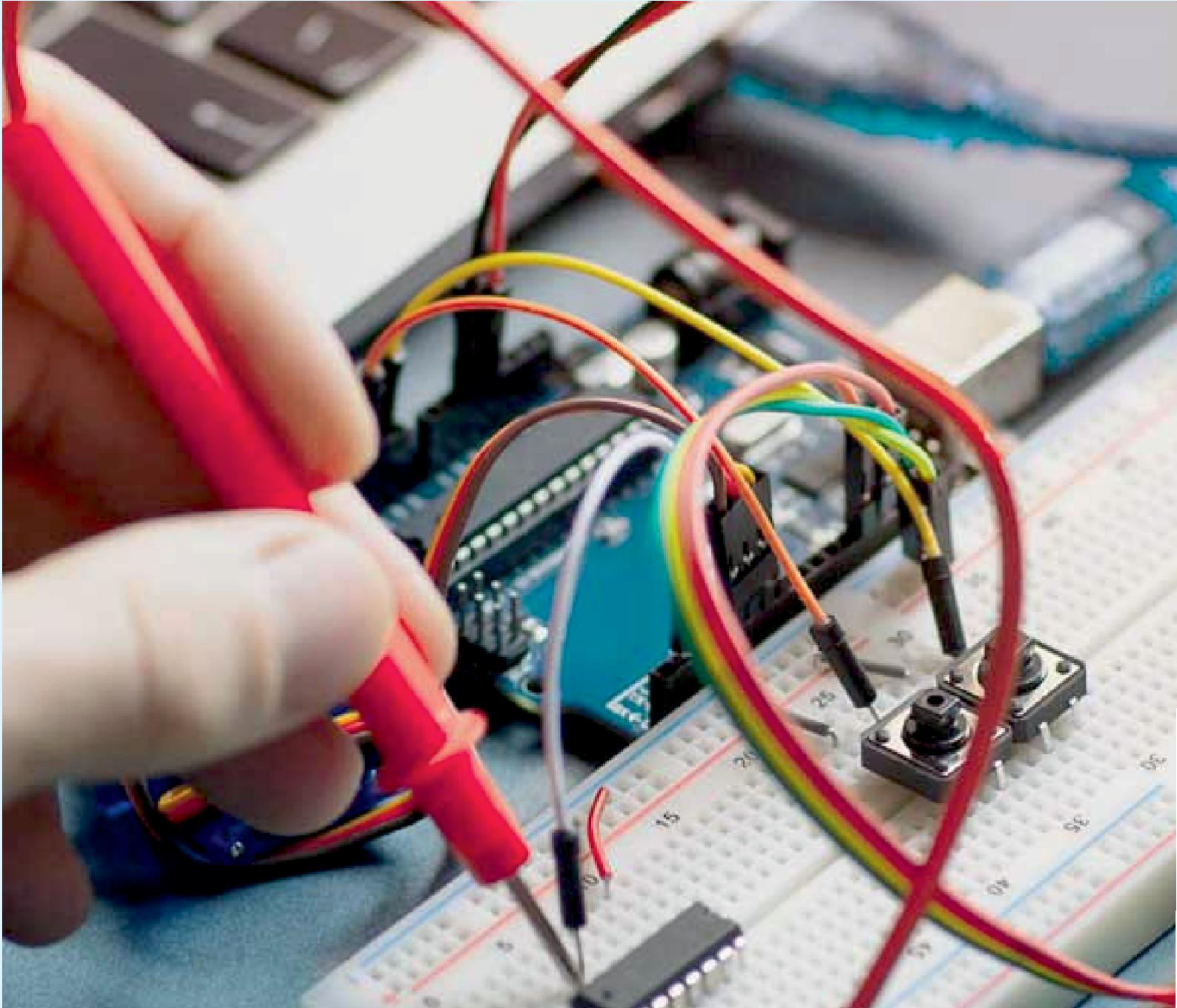




start and the motor windings are configured in a star formation to the supply voltage. The voltage applied for star delta starter to the single motor winding is reduced by a factor of  $1/\sqrt{3} = 0.58$  this connection amounts to approximately 30% of the delta values.

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