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A Review on Three Phase Preventer Using Adjustable Timer

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ABSTRACT

Use of proper irrigation method is important in the field of agriculture. The farmer has to keep an eye in conventional irrigation system. This project work best where water is used in limited quantity. For the last years various methods have been developed for starting this induction motors with low current. This project implements the use of relays and electronic timer which requires low current to start current and protect it from inrush current as well [(1).] The production of crop can be increased by setting the time in auto switch for on product and the simple circuit of the project makes it so cheap that even are poor farmer can afford this. Also the other countries scanner for this low cost maintenance or project and make good crops [(2)].

Keywords: Auto switch, Inrush current, Irrigation system, Induction motor, Low current, Start current,

1. INTRODUCTION

Irrigation is the main occupation of our country irrigation is most important part of it. Many technologies have been developed over the year for making farming effortless. The rain fall is not much more so in order to obtain good crops one will have to supply proper amount of water at correct timing[(3)]. Only a system irrigation system can make it possible. When the crops need water it releases the proper amount of water and when it doesn'tneed then it collects the water at desirable amount. Three phase induction motors are used because of their low cost, low maintenance and more efficiency. Induction motor is not switched to delta mode within little time then it will draw high amount of current and can burst itself. So proper switching devices are needed to overcome such situation and protect the motor [(5).]

We should use automatically star delta starter with relay and electronic timer. Buy this week and switch the mode of operation of the motor from drawing low current to drawing full loaf current. This method also has single phase protection. Starting current higher value of current to reduce the high current[(4)].

1.1 Main components of 3 phase preventer using adjustable timer are as follows[(3)]

- Transformer (230 – 12 V Ac)
- Relays
- In4007 (Diode)
- Rectifier
- Bc547
- Resistors
- Filter
- Led
- Capacitors

1.1.1 D O L Starter

The D O L starter is a direct on-line motor starter. Itis also known as across the line starter. To start the induction motor we can use the D O L starter. The induction motor is directly connected to the three supply of D O L starter and full line voltage is fed to the induction motor terminals.

During the direct connection, no any damage to the motor. In the D O L starter, the protective devices is connected for protection of the motor.

1.1.2 Rectifier

It is an electrical device which converts the alternating current (AC) supply into direct current (DC) supply. The process called rectification when the current flows in only one direction. For the power supplied and as detectors of radio signals the rectifiers are majorly used.

The solid state diodes, vacuum tubes diodes, mercury arc valves and other components are used to construct the rectifier.

1.1.3 Transformer

Transformer is a static device which step up and step down the voltage level. It contain the two windings which is primary winding and secondary winding. We also called it the input winding is primary winding and the output winding is secondary winding. In the transformer, there is no any electrical connection between the two windings.

1.1.4 Relay

The simple definition of relay is, it switch that electromechanically open and close the circuit. The main operation if relay are in phases were only low power signal and it can be used to control the circuit. For switching the call and telephone exchange and also used in long distance telegraphy, the relay plays an important role.

The working principle of relay is that it work on the principle of electromagnetic attraction, when relay sense the fault current energised electromagnetic field and this field produce the temporary magnetic field, this field move relay armature for spacing and closing the connection. The important usage of relay, it is particularly valuable because they can control this high voltage and current with only small voltage and current. The industry, digital computer, automatic system, telephone exchange for these the relays are majorly used.

1.2 Method

Usingrelays and microcontroller as timer devices is a self-governing system in the automatic star delta starter. This system is able to switch the motor from star to delta mode operation to keeping the system functioning properly [(2)].

By using three 230/12 V single phase step down transformer, we receive the three single phase AC supply. By using three set of bridge rectifier, this is converted into 12 V DC supply. For the working of microcontroller, one of these output is provided to 7805 voltage regulator which gives 5 volt DC input. The two sets of 12 volt dc output are helped to drive the two relays [(3)].

The lamps which contribute to the three phases of windings of the motor are directly connected to the 230 volt power supply through the two relays one in star configuration and other in delta configuration[(2)].

1.3 Equation of star delta connection

1.3.1 Star connection

Phase Voltage Vs = 3 Phase Voltage = V1 x 1/√3
Phase Current IS1 = Phase Voltage Vs / Z = √3 x V1 / 3Z
Line Current = Phase Current IS1 = √3 x V1 / 3Z [(2)]

1.3.2 Delta connection

Per Phase Voltage Vs = 3 Phase Voltage V1
Phase Current IS2 = Phase Voltage Vs / z = V1/ Z
Line Current = √3 x Phase Current IS2 = √3 x V1 / 3Z[(2)]

2. BLOCKDIAGRAM

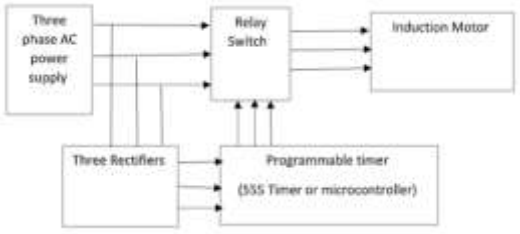

Fig-1. The automatic induction motor starter with programmable timer.

3. RESULT AND DISCUSSION

First the project starts in star configuration in which the supplied voltage to the lamp is V/√3. When the supply is on, the lamp goes dim. Since, we are using automatic timer system because the automatic timer configuration is automatically converted to delta, when the rated voltage is supplied to the lamp, which result in the full voltage is supply to lamp. So in the delta configuration the lamp glows brighter than the star configuration[(2.5, 6)].

When the 230 volt AC supply is supplied to the step down transformer, then the step down transformer converts the 230 volt AC supply into 12 volt DC supply. Then this 12 volt DC supply is supplied to the filters and bridge rectifier which gives the regulated 12 volt DC supply. After this, the 12 volt DC supply is forward to microcontroller and relays which switches star configuration into delta configuration.

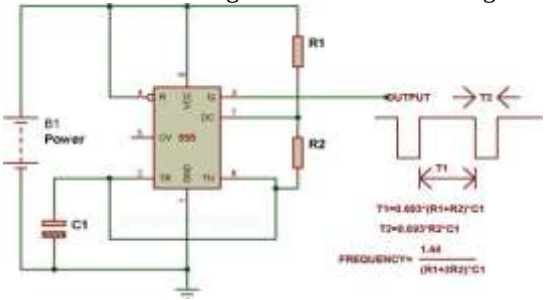

Fig-2. 3 second Timer circuit

3.1 Procedure

STEP 1- In this circuit, the MCB is provided when the 415 V, 3 phase, 50 H_z supply is given to the circuit and MCB and then the circuit is switched on.
STEP 2- In the star mode operation, the lamps glow dim due to less starting current.
STEP 3- After 3 second, instruction gives to the relay by the timer to change the mode of operation from star to delta.
STEP 4- Due to the rated current flowing in the circuit, the lamps glow brighter in the delta mode as compare to the star mode.
STEP 5- During the star and delta mode of operation of the circuit, the voltage and current is measured by Digital multi meter.
STEP 6- The miniature circuit breaker is turned off, after taking all the readings and then the main supply is also cut off[5].

3.2 Three operating modes of 555

3.2.1 **Monostable mode:** Applications include frequency divider, capacitance measurement, pulse-width modulation (PWM), timers, missing pulse detection, bounce free switches, touch switches, etc. In this mode, the 555 functions as a "one-shot".

3.2.2 **Astable - free running mode:** The 555 is also operate as in the oscillator. Uses include pulse generation, logic clocks, tone generation, security alarms, pulse position modulation, LED and lamp flashers, etc.

3.2.3 Bistable mode or Schmitt trigger: The 555 can operate as a flip-flop, if the DIS pin is not connected and no capacitor is used. Uses include bouncefree latched switches, etc[6].

4. LITERATURE SURVEY

The three phase inventors are used for high power application such as AC motor, drives and induction heating. A DC source or rectified AC voltage can be changed into DC input voltage by a three phase inverter. By combining three single phase half bridge inventor, a three phase bridge inverter can be constructed. The invertors has many advantages. In many industrial applications such as variable frequency and velocity modulation the inverters are used. Another system which is based on multi-level induction motor drive in which output content is reduced by multi-level inverter. The voltage and power increases with increase in number of levels of inverter in symmetrical circuit. To reduce the harmonic distortion one should select the switching angle properly. IGBT is used as a power element which is based on the symmetrical regular sampling with single carrier and multiple modulating signals[2].

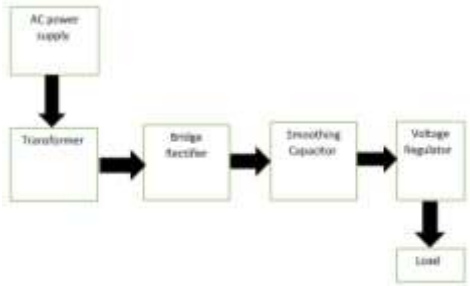

Fig-3. Block diagram of 3 phase auto switch

5. CONCLUSION

The system has significant excellences such as continuous supply and low expanses. The different inverters are used to avoid load scheduling. The system doesn't work at all when any one of the phase has been lost. The aim of the system is to generate inverter single phase using microcontroller using the assembly languages of microcontrollers. Thus the developed system shows water distribution in field. In normal condition it provides automatic restarting. The way of connecting the relays give prevention of the motor from single phasing[7].

The three phase inventors are used for high power application such as AC motor, drives and induction heating. A DC source or rectified AC voltage can be changed into DC input voltage by a three phase inverter. Hence we conclude that single phasing process is directly avoided in this project. The failure of phase can be easily traced and can be converted in two phases so as to resume the supply[8].

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