

CONTROLLING AND OF THREE PHASE INDUCTION MOTOR USING AUTOMATION

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Abstract – Automation is the method of coping with various parameters of technique like temperature, flow, and many others. Without presence of responsible individual. Within the improvement of automation controllers the trend has been to transport in the direction of gentle controllers with a purpose to offer better manage, extra flexibility and greater reliability with wise diagnostics of gadget faults. So industries have step by step moved from conventional relay logic control to %. Three segment induction motors are extensively used cars in industry. The implementation of tracking and manage system for the induction motor based totally on programmable good judgment controller generation is described. Also the implementation of a hardware and software program for pace manipulate and protection with the end result obtained from the take a look at on induction motor performance is provided. Variable frequency drives (vfd) can also use to govern the motor rotation course and rotation velocity of the three segment induction motor and protection of motor is completed. All the required manipulate and motor performance records may be taken to a private computer via % for in addition evaluation.

Index Terms— Computer-controlled systems, Programmable Logic Control, induction motors, Personal Computer (PC), variable frequency drives, voltage control

I. INTRODUCTION

Ac induction Motors are used as actuators in lots of business methods. Despite the fact that ims are reliable, they're subjected to some undesirable stresses, causing faults ensuing in failure. Tracking of an im is a quick rising era for the detection of preliminary faults. It avoids surprising failure of an business process. Tracking strategies can be categorized as the traditional and the virtual strategies. On account that technology for movement manipulate of electrical drives have become available, using programmable good judgment controllers with strength electronics in electric machines applications has been brought within the production automation. Ac induction motors (ims) are used as actuators in many business tactics. Although ims are dependable, they may be subjected to a few undesirable stresses, inflicting faults resulting in failure. Tracking of an im is a quick emerging generation for the detection of initial faults. It avoids unexpected failure of an business manner.. Nearly any production line, system feature or technique may be automated using a p. C. The velocity and accuracy of the operation may be greatly improved the usage of this sort of manage machine. But the biggest gain in using a p. C is the capacity to trade and mirror the operation or manner whilst collecting and communicating essential records. Considering there have been issues associated with massive electric panels with some of electric components and good sized wiring, human beings felt the want for software program good judgment controllers, in order that they gave delivery to programmable common sense controller (p. L. C) wherein the control logic is advanced in ladder diagram, a software good judgment manage, with a number of inputs taken from the surroundings and generating the outputs, depending on the common sense programmed,

to the surroundings. This helped to control any system sequence with small electrical panels, much less number of electrical additives and less wiring with greater flexibility to exchange device series.

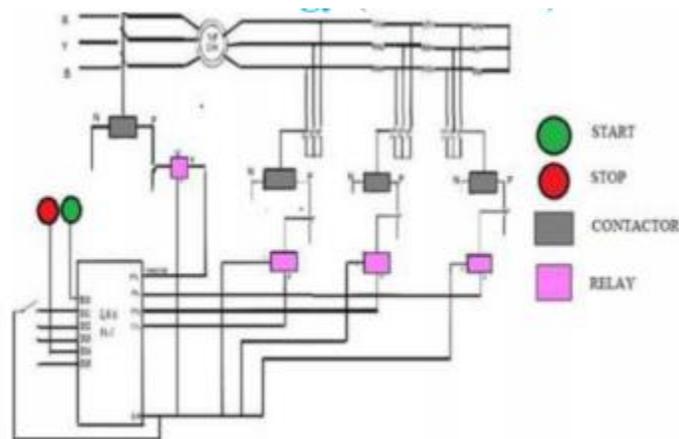


Fig.1 Block diagram

II. PROGRAMMABLE LOGIC CONTROLLER

Considering the fact that it's far a pc, it has all the simple thing parts contained in any other pc, a valuable processing unit, memory, enter interfacing, and output interfacing. % is a microprocessor-based manipulate device, designed for automation techniques in commercial environments. It makes use of a programmable memory for the internal garage of person-oriented instructions for imposing unique capabilities such as mathematics, counting, common sense, sequencing, and timing. A p. C can be programmed to feel, activate, and manage industrial gadget and, therefore, consists of some of i/o factors, which permit electric indicators to be interfaced. Input gadgets and output gadgets of the procedure are related to the % and the manage software is entered into the % reminiscence. In our software, it controls via analog and digital inputs and outputs the varying load-constant pace operation of an induction motor. Additionally, the percent continuously monitors the inputs and activates the outputs in line with the manage program. Programmable good judgment controller (percent) is a manipulate machine the use of electronic operations. Its smooth storing procedures, accessible extending concepts, capabilities of sequential/role manage, timed counting and enter/output manage are widely carried out to the field of commercial automation manage. A p. C is an instance of a hard real-time machine considering that output results need to be produced in reaction to enter conditions within a constrained time, in any other case accidental operation will result. Earlier than the percent, control, sequencing, and protection interlock good judgment for production motors became specifically composed of relays, cam timers, drum sequencers, and devoted closed-loop controllers. When you consider that these ought to number in the masses or even thousands, the procedure for updating such facilities for the every year version change-over changed into very time consuming and steeply-priced, as electricians needed to in my opinion rewire the relays to alternate their operational traits a programmable common sense controller, p. C, or programmable controller is a digital pc used for automation of usually commercial electromechanical processes, together with control of machinery on factory assembly strains light furniture. Percent are used in lots of machines, in lots of industries

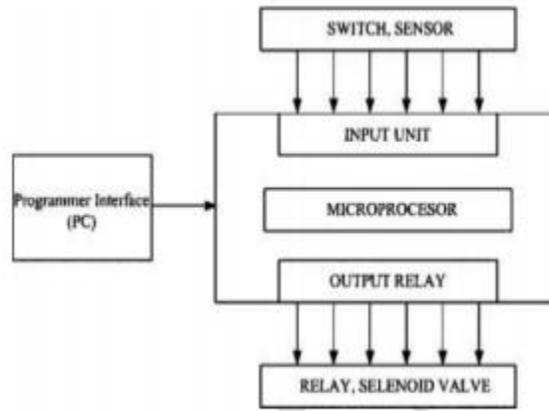


Fig.2. PLC

A. Advantages Of PLC

Very speedy, clean to trade logic i. E. Flexibility, reliable because of absence of moving elements, low energy consumption easy preservation because of modular meeting, facilities in fault locating and diagnostic ,able to coping with of very complex common sense operations, right documentation centers, easy to couple with the system computers, analog sign managing and close loop manipulate programming, counter, timer and comparator may be programmed ,ease operator interface because of colourographic and advisory system introduction.

B. Delta PLC

We're the use of delta percent among three %'s due to following cause: delta's dvp collection programmable common sense controllers provide excessive-pace, strong and extraordinarily reliable applications in all kinds of business automation machines. Further to speedy common sense operation, bountiful commands and a couple of characteristic cards, the cost-powerful dvpplc also helps various verbal exchange protocols, connecting delta's ac motor pressure, servo, human machine interface and temperature controller via the industrial community in to a complete "delta solution

III. CONTROL OF THREE PHASE INDUCTION MOTOR

Diverse automation approaches within the enterprise want manage of ac induction vehicles the use of ac drives. Supplied here's a sturdy system for switching on/off, varying the rate and course of rotation of an commercial 3-phase induction motor using vfd and percent. We use right here delta ac motor pressure for its operation. An electrical motor is an electromechanical device that converts electric electricity into mechanical energy. In case of three-section ac operation, the most-broadly-used motor is the three-section induction motor as this form of motor does no longer require any starting tool, being a self-starting motor. Frequently inside the industry, need arises for controlling the velocity of a 3-section induction motor. Delta's ac motor drives are able to efficiently control motor velocity, enhance device automation and keep electricity. Each drive in its variable frequency drive (vfd) series is designed to fulfill precise utility needs. Ac drives appropriately control torque, smoothly handle accelerated load and provide severa custom control and configuration operating modes. A vfd can be used to vary velocity, course and different parameters of a three-phase motor. We use the 2-wire method

for controlling the rate and path of the motor. Delta vfd-1 is a sensor-much less vector micro ac drive. Its compact layout is ideal for small- and medium horsepower programs. L pressure is designed to provide an ultra-low-noise operation and includes numerous revolutionary technology that lessen interference.

A. Over Voltage Protection:

The overall result of an overvoltage condition is a decrease in load current and poor power factor. Although old motors had robust design, new motors are designed close to saturation point for better utilization of core materials and increasing the V/Hz ratio cause saturation of air gap flux leading to motor heating. The overvoltage element should be set to 110% of the motors nameplate unless

B. Hardware implementation

Hardware implementation for controlling and protection of three phase induction motor requires a 0.37KW/1410r/min Three phase Induction Motor, Delta PLC a dc voltage sensor with rating of 25v, a diode rectifier of rating 24v which converts ac voltage to dc voltage.



Fig.3.Hardware

C. Developed Software

In order to achieve the protection of the IM easily, a PLC program was developed in WPLSOFT 2.41 Version using LAD programming method. The PLC system provides a design environment in the form of software tools running on a host computer terminal that allows LADs to be developed, verified, tested, and diagnosed. First, the high-level program is written in LADs. The LAD is then converted to binary instruction codes, so that they can be stored in RAM or erasable programmable read-only memory (EPROM). Each successive instruction is decoded and executed by the CPU. The function of the CPU is to control the operation of memory and I/O components and to process data according to the program. Each input and output connection point on a PLC has an address used to identify the I/O bit. WPL Soft is a program-editing software made for the Delta DVP-PLC series used under WINDOWS .Except for general program planning and other general functions (e.g. cut, paste, copy, multi-windows, etc.) of WINDOWS, WPL Soft ,in addition, has provided various English commentary-editing and other special functions (e.g. survey and edit the listed register, the setup, the data read out, the file saving, and monitor and set up diagrams of various contacts, etc.). In order to control induction motor we are using VFD and PLC ladder logic. To control the direction of three phase induction motor using VFD & PLC ladder logic



Fig 5: Ladder Logic for direction control.

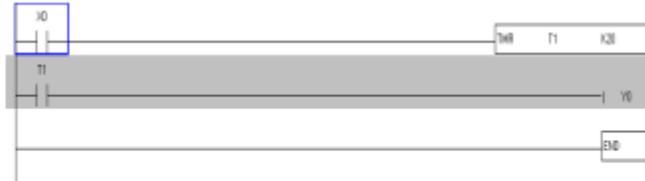


Fig 6: Ladder Logic for ON/OFF Control.



Fig 7: motor control.



Fig8: overvoltage control

IV. RESULTS

A hit experimental results are acquired by means of hardware implementation for controlling and safety of three section induction motor. On/off manage and path manage is acquired by using `without or with timer functions. Pace is managed in two exclusive speeds the usage of percent and vfd. For over voltage safety at one

TABLE I

INPUT VOLTAGE	OUTPUT VOLTAGE(DC)
230V	3.66V
230V	3.43V

unique voltage motor will turn off

V. CONCLUSION

In this paper, a success experimental results were obtained from the formerly described scheme indicating that the p. C may be used in automatic systems with an induction motor. With the aid of automation we will improve the productivity inside the industry. We continuously monitor the state of enter devices and make the choice based totally upon a custom program to control the nation devices related as output. The tracking control gadget of the induction motor pushed with the aid of vfd and controlled by way of p. C proves its high accuracy in pace law at constant-pace-variable-load operation. The percent proved to be a versatile and

green manipulate tool in business electric powered drives programs. The effectiveness of the p. C-primarily based manipulate software program is quality up to ninety four% of the synchronous speed.

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