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PERFORMANCE AND ANALYSIS OF 3 PHASE SQUIRREL CAGE INDUCTION MOTOR UNDER DIFFERENT MODE OF OPERATION USING PLC TECHNIQUE

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Abstract: The objective performance and analysis of 3 phase squirrel cage induction motor under different mode of operation using plc technique Nowadays there has been a challenge for industries that is 3 phase induction motor control and provide protection against motors failure during operation, the industries are developing rapidly also increasing records of motor failures due to limited protection but still we are not able to provide full proof motor protection and analysis of motor failure as still fallowing old method with limited protection option but this is the module which control and analysis the motor live parameter while motor in operation condition and its completely digitized system it is monitor the condition complete protection of motor also this device provide human safety and machine safety and this is very advanced motor protection system device, this device no need external ct from measure current it has inbuilt ct arrangement, it is programmable device using this option we can control motor more efficiently and this device will completely replace the old system of motor protection

Keywords: Phase sequence changing, PLC Programming and data checking.

I. INTRODUCTION

This project introduces for industrial application specially for controlling 3 phase induction motors, operate 3 phase induction motor presently we are using different starting methods which are having limited protection without any condition monitoring of motor while operation now this digital device will increase the protection system under the standard of IEC of motor. This programmable digital device has a HMI through this HMI we can set protection setting and motor parameters and live data monitoring and preconditions of operation, this device consist of digital inputs and outputs configuration based of requirements we can program, working delay is very less overall this device is the perfect for motor control. Using this device, we can perform some operation for example single direction, bi-direction operation, inching operation, jogging control, this device has communication protocol simple in communication with PLC/DCS, there are three control selection available with this local, HMI, remote. Using simple one Ethernet cable we can control the complete operation.

II. LITERATURE SURVEY

The ever-increasing use of three phase induction motors in most modern industrial applications has made this subject a matter of interest from every possible perspective. In particular, these devices present a number of advantages as compared to their single phase or even DC counterparts among which include high level versatility, minimum attention requirement, ruggedness, durability, ability to start up from rest with no extra starting motor or external initial force required and the fact that they require reasonably simple starting arrangement without need for synchronization unlike synchronous types.

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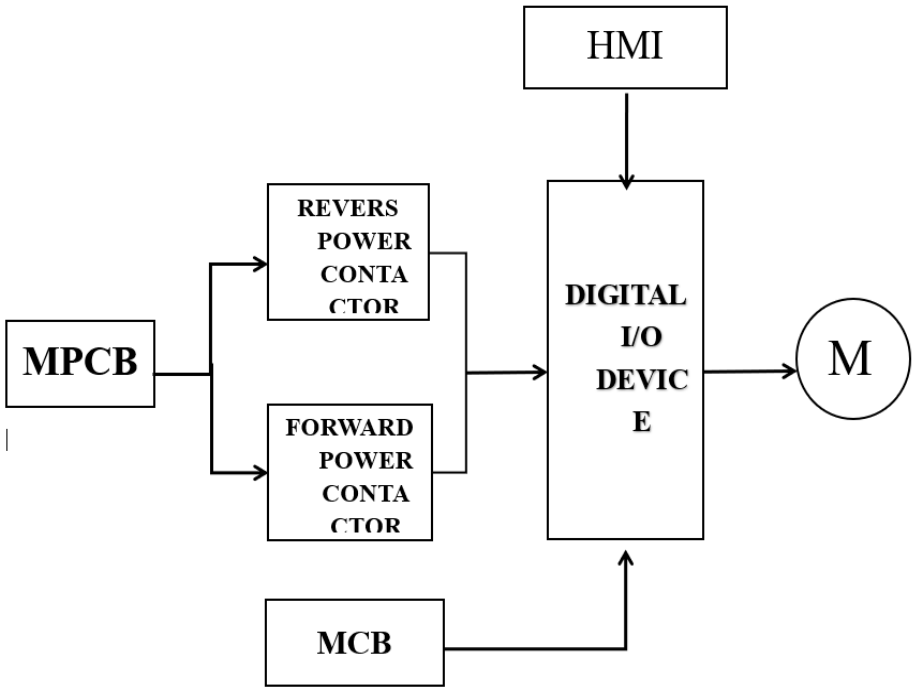
Nevertheless, they experience a couple of limitations such as speed variation at expense of efficiency, speed decrease as load increases and an inferior torque to a d.c shunt motor just to mention a few. This equipment falls under asynchronous motor type since they have synchronous speed as the upper speed limit and so can only operate near synchronous speeds at best.

From the foregoing, theoretical analysis and mathematical treatment of the subject have shown that three phase induction motors have an inherent self-starting propensity, thanks to the internally developed initial torque developed from rotating fields upon energizing the windings of the motor by a three phase power supply. However, in practice to avoid endangering the windings due to the initial high inrush currents that would cause overheating hence literally burn out the windings of the motor and also to provide overload and no-voltage protection, various modalities have been proposed and used to aid in safe three phase induction motor starting; these include Direct On-Line (DOL) Starter, Star-Delta starters, power electronics starter circuits, rotor impedance starters, autotransformer starters and primary (stator) resistance stators. Each starter arrangement has associated with it a number of advantages and disadvantages and most importantly the complexity (a figure of interest) of each circuit varies from one method to the other.

This material intends to briefly examine some of the starter circuits mentioned above save the last two that it will give an in-depth treatment. The material then ventures into a comprehensive assessment detailing various preferred major components of the proposed three phase induction motor starter model and criteria used for component selection.

III. METHODOLOGY



The configured I/O device will check the all inputs and circuit status before operation based on application and inputs bit configuration with reference of input bits device gives the on command to selected contactors and start monitoring of the motor live parameters if any abnormalities found as per the protection settings the device stop the power contactors and indicates trip and in HMI fault will be indicated and based on fault action to be ta ken. the device will protect the motor from over current, ground fault, phase imbalance, over voltage, under voltage, thermal over load, rotor jam, long start fault

Using this device we can perform some operation for example single direction, bi-direction operation, Inching operation, Jogging control, This device has communication protocol simple in communication with PLC/DCS, There are three control selection available with this local, HMI, remote. Using simple one Ethernet cable we can control the complete operation.

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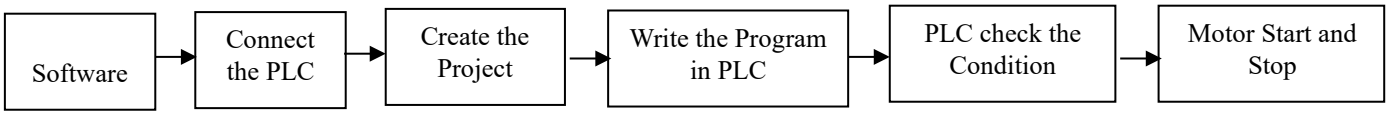
Software and Programming
Programming Soft ware

Connected Components Workbench software is a set of collaborative tools supporting Micro800 controllers. It is based on Rockwell Automation and Microsoft® Visual Studio® technology and offers controller programming, device configuration and integration with HMI editor.

Use this software to program your controllers, configure your devices and design your operator interface applications. Connected Components Workbench software provides a choice of IEC 611313 programming languages (ladder diagram, function block diagram, structured text) with user-defined function block (UDFB) support that optimizes machine control.



Block Diagram

Open the

Use Connected Components Workbench Software

To help you program your controller through the Connected Components Workbench software, you can see the Connected Components Workbench Online Help that comes with the software. Controller Changes in Run Mode Micro820 controllers allow you to make certain changes while in Run mode by using the following features:

- Run Mode Change (RMC) Allows logic modifications to a running project without going to Remote Program mode. Run Mode Change (RMC) is a productivity enhancement feature introduced in software version 8 for Micro820 controllers. The feature saves the user time by allowing logic modifications to a running project without going to remote program mode and without disconnecting from the controller. You must use the Connected Components Workbench Developer Edition software version 8 software, or later, to use this feature.

- RMC is useful during project development, when you add small changes incrementally to the logic and want to see the effects of the changes on the machine immediately. With RMC, since the controller stays in Remote Run mode, the controller logic and machine actuators do not have to reinitialize constantly, which can occur if the controller is switched to Remote Program mode (for example, the first scan bit is checked in the program logic to clear outputs).

When you edit, build, and download a project without using RMC, a full build of the entire controller project is performed and a full download of the project is performed. During RMC an incremental build is performed and only incremental changes are downloaded to the controller.

Logic Programming

Digital Inputs:

- MPCB Trip
- MPCB ON
- Contactor On / Run Feed back
- Motor OFF
- Motor ON
- Motor Trip
- Emergency Stop
- Start Push Button Local Selection
- Remote Selection *Digital Output:*
- Contactor On
- MPCB Trip

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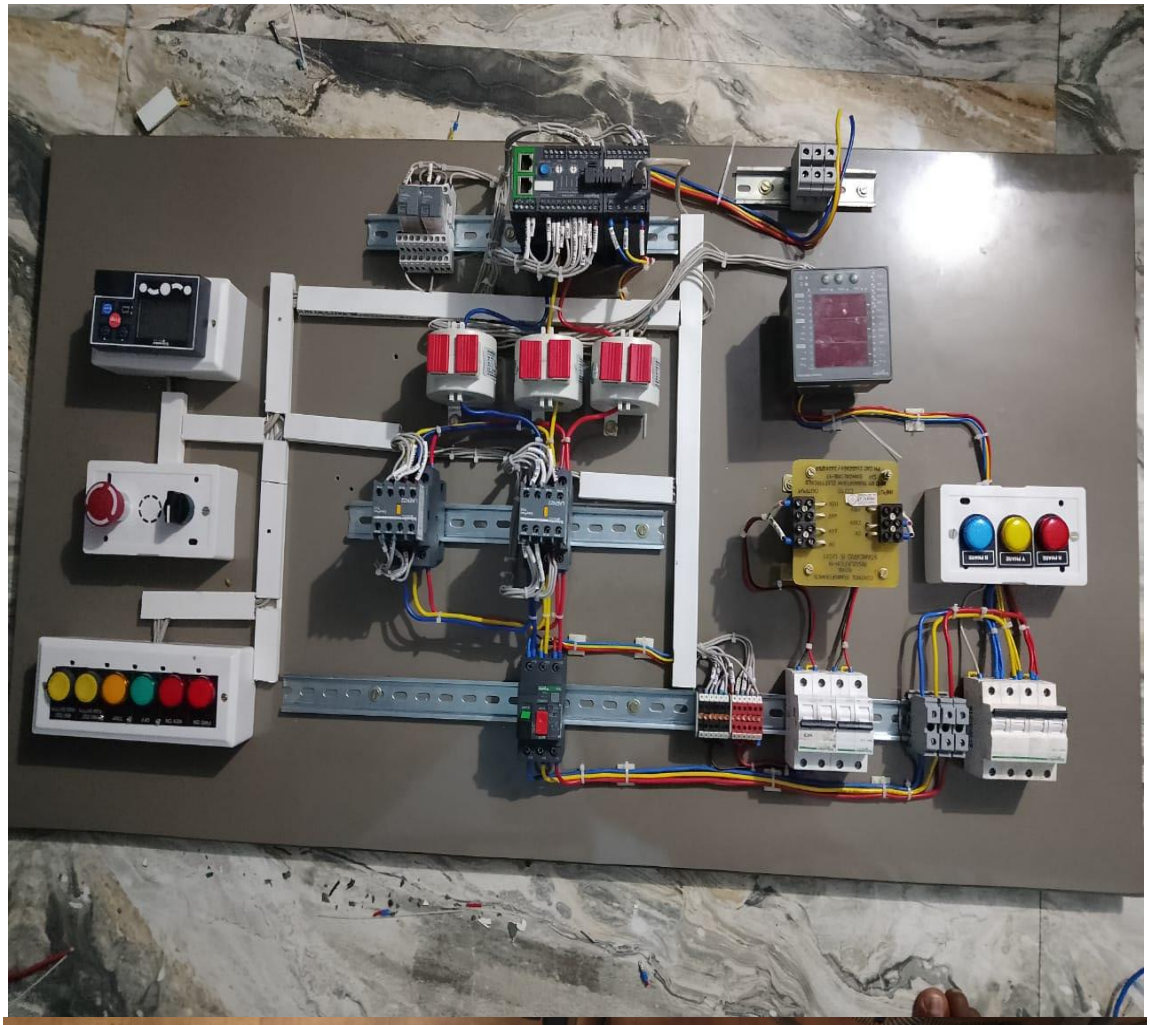
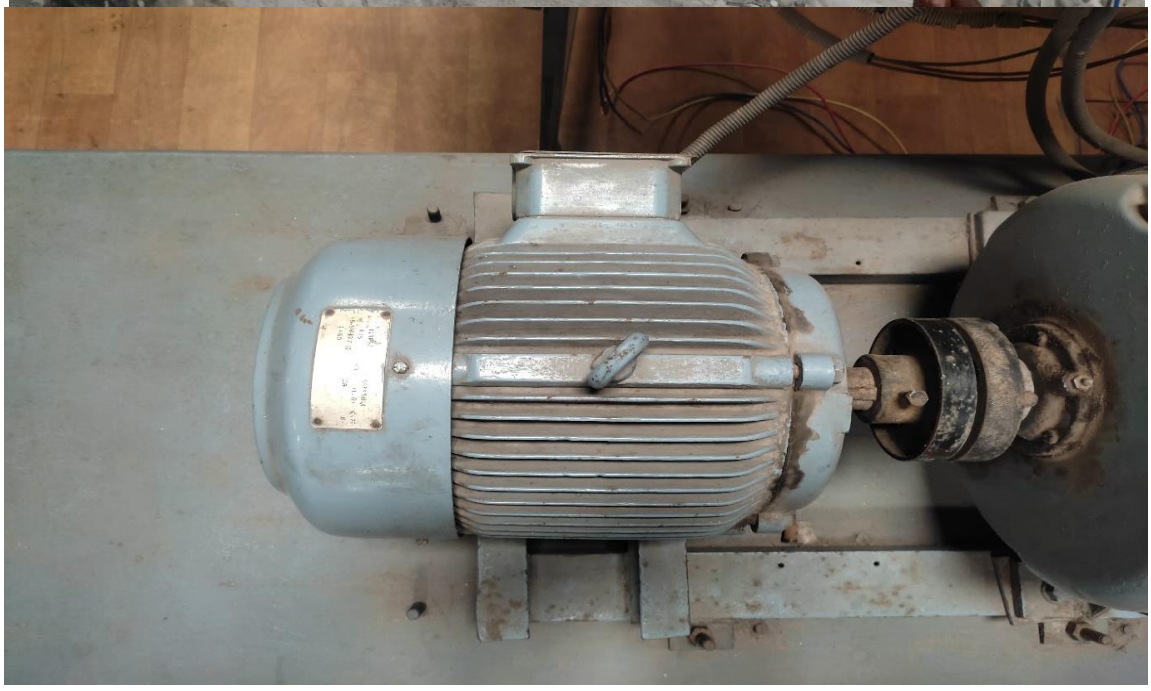
IV. RESULT AND DISCUSSION





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V. DISCUSSION

When PLCs approach solving problems of practice through the use of continuous improvement (CI) processes (see graphic below), they first collaborate to identify problems and their possible root causes using a wide range of data collected from within the system. PLCs study multiple sources of relevant data to fret out problems. Once the PLC identifies the problems, the next step focuses the PLC on understanding the root causes of those problems. The causes might be directly discernible in the data, but it could just as well take additional digging to get to the causes. Once a PLC focused on instruction understands problems and root causes, teachers have the authority to dig into the literature and research to develop a theory of change. PLCs who are working with an instructional focus using continuous improvement methods might just as well be called mini-research groups since they take up understanding problems, their causes, and testing solutions using the disciplined methods of improvement science. In fact, the literature on improvement science often compares the work of these PLCs to action researchers who use their classrooms and those of colleagues as spaces in which they continuously test changes; study their results with simple, practical measures; and make adjustments until they are satisfied that they have change packages that can be pushed out with confidence to others. By using PLC, we can run the motor Locally and Automatically. Motor can have monitored remotely and Condition of the motor will be handle by the PLC.

VI. CONCLUSION

System for protection of System for protection of induction motor from abnormal conditions using PLC is built and tested. PLC can be used even in unclean circumstances and environments of high temperatures, humidity and chemicals and thus suitable in an industry than any other logic devices. They have direct interoperability to other industrial devices such as relays, valves, actuators, transmitters, motor starters etc. Simplicity in programming of PLC makes the system more popular. The project can be modified by implementing supervisory control and data acquisition (SCADA), which provides real time monitoring of various parameters of the motor on a computer screen. Further, the protection can be implemented industries.

VII. FUTURE SCOPE

Thus, we would like to conclude our system mainly focuses on 3 phase induction motor operation and protection.this is reduce the motors failure rapidly, it refuse the maintenance cost by providing proper analysis protection,it is very user friendly device, it not only provide motor safety also it provide human safety by its quick response.this will be the future leading protection system., PLC will continuously evolve because of adapting technology increases in communications, hardware, and software

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