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A REVIEW PAPER ON DESIGN OF PROTECTION FOR THREE PHASE AUTOMATIC CIRCUIT BREAKER

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Abstract - Circuit breakers are used in a power system to break or make current flow through power system apparatus. The action of circuit breakers changes switching topology of a power system. Reliable operation of circuit breakers is critical to the ability to reconfigure a power system and can be assured by regular inspection and maintenance. An automated circuit breaker monitoring system is proposed to monitor circuit breaker's control circuit. System is designed to enable deployment of system-wide applications that utilize the data recorded by the system. An application of system wide data analysis is demonstrated. It makes possible to track the circuit breaker switching sequences and make conclusions about their performance and final outcome. Lab and field evaluation of the designed system is performed and results are presented.

KeyWords: Inductionmotor,CircuiBreaker,LCD,PIC,Speed control.

1.INTRODUCTION

The Circuit Breakers (CBs) are part of a power system and their functioning is critical to providing continuous power supply. They are used to configure a power system as needed, to control the load flow and disconnect any faulted parts of the system. Once installed, a breaker may have a lifetime of over 40 years. Its operating state changes very infrequently unless it is located in switching stations with intense switching schedule. A breaker has no intelligence of its own. It is operated by protective relays, which detect faults on the system and identify the appropriate CBs that need to be opened in order to isolate the faults and enable the system to function. Also, a breaker may be operated through a manual command issued either remotely by power system operators or locally by maintenance personnel. Sometimes the breaker may not open or close on command, leading to an interruption in the operator switching action leading to an incomplete control action or unsuccessful fault clearing allowing the fault to exist longer than the system can sustain without damage. Mis-operation of CBs can result in undesired changes in system functioning that may cause the system to go into an abnormal state, potentially causing power outage. The CB represents a critical part of the protection system, as well as the Supervisory Control and Data Acquisition.

2. LITERATURE REVIEW:

The literature review is based on the reference book of different

Technical publication. The aim was to identify the relevant details in published literature. The literature survey is carried out from number

of technical book , research papers , various publication, web sources , product manuals, etc. The relevant information about project report is explained in various technical book, research papers which we have referred.

Drive have been classified into two types as AC & DC. Variable Frequency Drive is a AC Drive used this Pro-ject.

The detail Drive operations, control strategies are presented and the operation of induction motor in all-four quadrant i.e. forward motoring in first quadrant, forward braking in second quadrants, reverse mo-toring in third quadrant and reverse braking in fourth quadrant. Different types of control

strategies i.e.V/F control andPWM control is studied. Among

these PWM method is used for Inverter O/p control. Hence, it is being implement in our project.

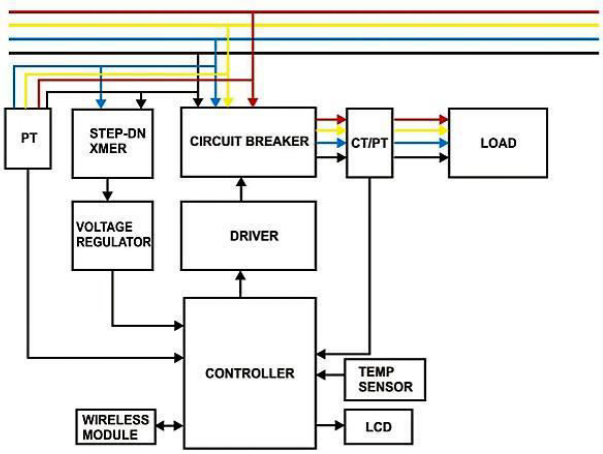
The description of various components such as 1ph Bridge rectifier, DC Bus, 3 ph Bridge Inverter presented in this report . In our project , we require pulse generation , constant voltage by frequency Ratio, and elec-trical isolation have been included briefly in this manner.

3. METHODOLOGY:

Different monitoring systems have been designed and proposed to monitor the status of CBs and predict optimal maintenance schedules based on the following

measurements: 1) the mechanism velocity 2) phase currents and voltages 3) gas pressure and temperature 4) vibration signals etc. A report by CIGRE shows that approximately 25% of the major and minor failures of circuit breakers in service are caused by control circuit failures. Some of the data acquisition systems currently available for measuring signals from the control circuit are not suitable for real time monitoring of breaker performance in a switching sequence that involves multiple breakers . As a result they do not record enough information to make accurate diagnosis of the switching performance deterioration that may occur simultaneously on multiple breakers. Most of the monitors do not have sufficient number of channels, online recording and time synchronization capabilities to enable the artificial intelligence tools to make good decisions about the status of the breaker and/or system. Data collected from circuit breakers in substations across the system may be combined to make deductions about the system switching state and performance that affect reliability. This application requires that the collected data be synchronized in time. Most of the existing monitoring systems do not have any option for time synchronization of recorded data. This limits application of data only to the usage for maintenance purposes on a single breaker. With thousands of breakers to be monitored these limitations serve as a deterrent to the adaptation of an online monitoring strategy on a large scale. While the circuit breaker monitor (CBM) data can provide information about the operation and status of individual breaker, substation and systemwide applications can help increase reliability by providing information about the sequence of events and topology of the power system. Some of this information is also obtained by SCADA. The redundant and more detailed information from circuit breaker monitors can be used to verify the consistency and increase redundancy of the measurements thereby increasing robustness of data and reducing operation errors.

4. BLOCK DIAGRAM:



4.1. BLOCK DIAGRAM DISCRIPTION

4.1.1 CIRCUIT BREAKER:- Circuit Breaker Monitor (CBM) hardware consist of IEDs located at the circuit breaker cabinets in the switchyard, concentrator PC and GPS clock receiver located in a control house, and wireless/wired point to multipoint network connecting IEDs located in the switchyard with the microcontroller located in control house. This configuration works as the master-slave architecture; the slave CBM units are set up at each breaker in the switchyard and are hardwired to acquire the signals from CB's control circuit. The master unit (microcontroller) is set up at the control house to gather the data collected by all slave units in the substation, store and process it. The system is designed to allow configuration with multiple slave IEDs depending on the number of circuit breakers in a substation. Fig. shows the hardware architecture of the CBM system in a substation.

4.1.2.TEMPERATURE SENSOR:- The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ˚ Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1/4˚C at room temperature and ±3/4˚C over a full −55 to +150˚C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy.

4.1.3.VOLTAGE REGULATR:Such a circuit is also named an emitter follower voltage regulator. It is called so because the transistor used is connected in an emitter follower

configuration. The circuit consists of an N-P-N transistor and a ze-ner diode. As shown in the figure above, the collector and emitter terminals of the transistor are in series with the load. Thus this regulator has the name series in it. The transistor used is a series pass transistor.

The output of the rectifier that is filtered is then given to the input terminals and regulated output voltage V-load is obtained across the load resistor R-load. The reference voltage is provided by the zener diode and the transistor acts as a variable resistor, whose resistance varies with the operating conditions of base cur-rent, I-base. The main principle behind the working of such a regulator is that a large proportion of the change in supply or input voltage appears across the transistor and thus the output voltage tends to remain constant.

The output voltage can thus be written as Vout = Vzener – Vbe

The transistor base voltage V-base and the zener diode voltage V-zener are equal and thus the value of Vbase remains almost constant

4.1.4. CURRENT TRANSFORMER: The ac current in the line is of a large value to be handled directly by protection circuit and microcontroller .thus for the operation of the sensitive devices we need a same signal but with a lesser amplitude. So for the same a current transformer is used in the circuit.A current transformer (CT) is a type of transformer that is used to reduce or multiply an alternating current (AC). It produces a current in its secondary which is propor-tional to the current in its primary.

4.1.5. POTENTIAL TRANSFORMER: Potential transformer(PT) are a parallel connected type of instrument They are designed to present negligible load to the supply being measured and have an accurate voltage ratio and phase relationship to enable accurate secondary connected metering..

4.1.6. DRIVER : It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof. To bring the 2nd transformer in action and connect it in parallel with the removal from circuit relay is used here. It's driver circuit is used to get the signal from microcontroller and make it in level to be understood by relays.A microcontroller is not able to supply current required for the working of a relay. The maximum current that a Microcontroller can source or sink is 25mA while a relay needs about 50 – 100mA current, hence a driver will increase the current to a desired level required to operate the relayRelays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal. Relays were first used in long-distance telegraph circuits as signal repeaters.

4.1.7. PIC CONTROLLER: PIC microcontrollers (Programmable Interface Controllers), are electronic circuits that can be programmed

to carry out a vast range of tasks. They can be programmed to be timers or to control a production line and

much more. They are found in most electronic devices such as alarm systems, computer control systems,

phones, in fact almost any electronic device. Many types of PIC microcontrollers exist, although the

best are lprobably found in the GENIE range of programmable microcontrollers. These are programmed and simulate. software.

4.1.8 .LCD(LIQUID CRRYSTAL DISPLAY): A 16*2 LCD means it can display 16 character pr line and there are 2 such lines.In this LCD each character is displayed in 5*7 pisxel matrix . This LCD has two register namely , Command and Data.

Command register stores the command instruction given tothe LCD and Data register stores the t be displayed on the LCD.

5. CONCLUSIONS

In this project ,we concluded that VFD's provide best and easy way to control speed of induction motor for many industries and field realated to the agricultural. This project plays a very important role where 3 phase connection is not available &its also gives benefit of most energy efficient economical in cost easy for connection & control . This allow continuous control the speed of induction motor.

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