

Gsm Based Transformer Health Care Monitoring With Overload Alert and Protection

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Abstract— The power transformer is most important electrical equipment. It is used in power Transmission system; they perform the function of transforming the voltage levels. So maintenance of power transformer is required; they are located at different types of geographical areas periodical checking is not possible all the time due to insufficient amount of man power. So that due to this types of reason transformer failure may occur power shutdown. So to overbear this shutdown due to transformer failure we proposed a system for observing the transformer .The objectives of our project is to monitor as well as protect oil level, oil quality then temperature and voltage level of transformer without involving men's power. If any abnormal condition occurs the message will be send to the control panel .This monitoring system consist of PIC 18F4520 micro controller as well as LM35 temperature sensor, level sensor, GSM and LCD. So that result obtained in the proposed system with suitable changes can be applied to the real time system.

Key words: The power transformer, oil level, oil quality as well as temperature and voltage level

I. INTRODUCTION

The demand of electric power for domestic as well as commercial and industrial purpose increases day by day. The present methods of management of power system are complicated. They are interconnected with huge operating machine units and working together. If any machine in this interconnected system faces failure then whole power system is affected .Hence careful observing and protection of these machines are necessary. The interconnected transformer is a static machine. It is used for step up or step down voltage levels in power systems depends upon the electromagnetic induction principle. In the present system checking of transformer is done using wired network including with temporary test unit and involving man into action, so here continuous monitoring is not possible all the time which may lead to failure of power transformer. Our proposed system provides effective observing and protection of power transformer. It measure oil level, oil quality, temperature and operating voltage without involving human interference.

II. BLOCK DIAGRAM

It consist of transformer, oil sensor, voltage sensor, current sensor, temperature sensor, PIC microcontroller, power supply, LCD display, GSM modem, RS232 and relay. Normally transformer fails due to voltage, current variations as well as overheating and change in oil level etc.

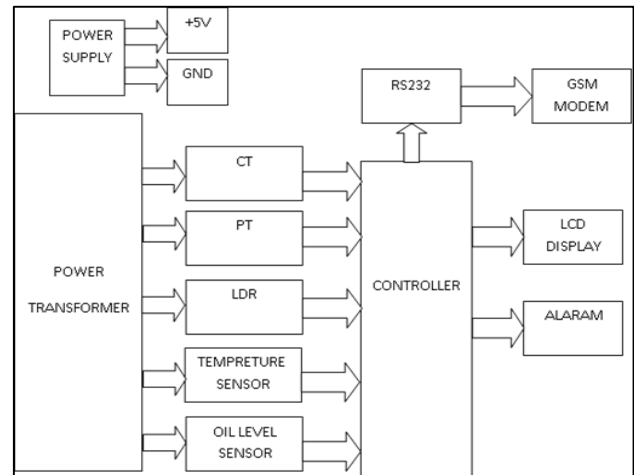


Fig. 1: Block for Transformer Monitoring

A. Potential Transformer

Instrument transformer is used for measure voltage in electrical power systems as well as power system protection and control. When voltage is too large to be snugly used by an instrument. It can be step down to a standard low value. Instrument transformers insulate measurement, protection and control circuit from the more voltages present on the circuits being measured or controlled. Voltage Transformers (VT) is also known as “potential transformers”(PT). Voltage transformers are designed to have characteristics on overloads. If the value of voltages increases than the rating of the transformer then SMS is send to the control room and relay trips and gets signals to the control room.

B. Oil Level Measurement

1) Float Sensor

Float sensor is mounted in the transformer tank. It is immersed into the oil. If level of oil inside the tank is decreases below 70% then SMS is send to the control room through GSM. If the level of oil is decreases below standard level alarm start functioning in the control room.

2) Oil Quality Measurement (Light Dependent Resistor)

Light Dependent Resistor is mounted in the transformer tank. It monitors or observes quality of the transformer oil as in the LDR intensity of light passing through oil. LDRs resistance is vary when change quality of the oil. The output of LDR is sending to PIC as well as it is continuously monitored or observed if its value increases beyond certain limit then SMS is sent to control room through GSM module.

C. Temperature Sensor

The LM35 is temperature sensors. The output voltage of LM35 sensors is proportional to the Celsius (Centigrade) temperature. The operator is not required to subtract a large constant voltage from its output to determine convenient

Centigrade scaling. This sensor is immersed into the oil of the transformer tank. The temperature sensor resistance varies as the temperature of oil also varies then the temperature values increases beyond 90°C SMS is sent to the control room through GSM model. If the temperature of the oil reaches the certain level then alarm operates at control room. It consists of two temperature sensors. One Temperature sensor is to check the room temperature and the other temperature sensor is to monitor or check the oil temperature. LM 35 temperature sensor is connected to the analog ports of the PIC Microcontroller (i.e. pins AN6, AN7).

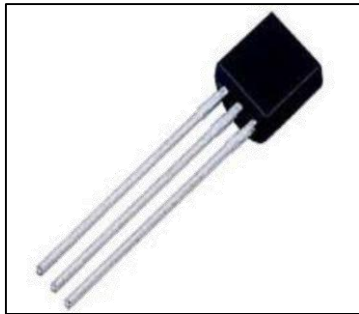


Fig. 2: LM35 Temperature Sensor

D. GSM Modem

GSM means Global System for Mobile Communication. GSM modem is the most famous standard for mobile phones in the whole world. A GSM modem is a specialized type of modem. It accepts a SIM card, as well as operates over a subscription to a mobile operator, and just like as a mobile phone. This is a powerful GSM/GPRS Terminal with compact and self included unit. This has standard connector interfaces. It has an integral SIM card reader. This modem consists of DB9 connector. Which a speaker and microphone manage allowing audio calls being installed, but this feature is not used. So in this project as only data transfer is needed.

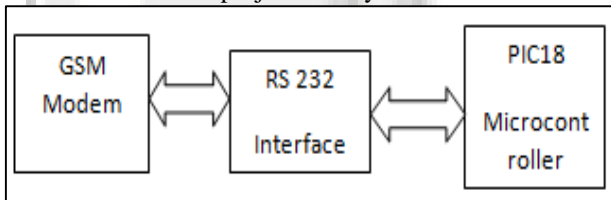


Fig. 3: GSM Module

E. PIC18F4520 microcontroller

The microcontroller is required to serve information of the main transformer such as temperature as well as voltage and current through the LCD display, then personal computer and triggering the relay when any fault is occurred. Modern power networks need faster as well as more accurate and reliable protective system. The microcontroller based protective schemes is capable of fulfilling these necessities. They are better to electromagnetic and static relays. These layouts have more flexibility because of their programmable approach. When it compared with the static relays which have hardwired circuitry. Therefore the PIC18F4520 microcontroller is choose because of its suitability for this project such as speed, power consumption as well as universal synchronous asynchronous receiver transmitter (USART), in built ADC, and amount of RAM and ROM on the chip etc.

III. CONCLUSION

The GSM based observing or monitoring of distribution transformer is useful as compared to manual monitoring. It is reliable as it is not possible to check always the oil level, oil temperature rise, as well as ambient temperature rise and load current manually. After receiving of SMS of any faulty condition we can take action immediately to overcome any failures of distribution transformers. In a distribution network there are many distribution transformers and cohering each transformer with such system, we can easily find out that which transformer is undergoing fault from the SMS sent to mobile. We need not have to monitor all transformers and corresponding phase currents as well as voltages and thus we can recover or repair the system in less time. The time for receiving SMS may vary because of the public GSM network traffic. It is effective than manual observing or monitoring.

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