

SANCTIONED LOAD MONITORING & CONTROLLING BY USING PLC

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Abstract - Transmission lines are the important factor of in modern age, automation has been placed on power reliability and economy. A power transformer is a very valuable and important link in a power transmission system. Transformers of substation are one of most important equipment in power system network. Because of, the large number of transformers and various components over a wide area in power system, the data acquisition, condition monitoring, automatic controlling are the important issues. By making use of a smart transformer we can monitor and control an entire substation. In this paper automation is done using PLC using wireless system technologies system. PLC (Programmable Logical Controller) plays crucial role in automation field where many process are automated. On the other hand SCADA (Supervisory Control and Data Acquisition) act as human interfacing medium with machine where voltage, current and temperature fluctuation are monitored and corrected if necessary.

Keywords: Load, Relay, PLC, Current Sensor, SMPS, Buzzer, Switches.

1 INTRODUCTION

Sanctioned load means that we are allowed to use that much load which is sanctioned. Load in electrical circuit's means the Power consumed in that circuit. Every appliance that is connected to electrical supply of your home, consumes some power for its operation, this power consumption by the appliances is known as 'Load' in common terms. we are charged 'fixed charges'/meter rent according to sanctioned load. If we exceed the sanctioned load then your service provider may impose some penalty on us. Suppose our sanctioned load is 2 KW then we pay Rs. 100 (50 for each KW/ month of sanctioned load). If you use 3 KW which exceeds your sanctioned load by one KW then our service provider will impose a penalty in your next bill. Our service provider will also ask us to get our sanctioned load enhanced to 3-4 KW and would certainly ask for load enhancement charges which are calculated per KW. Our service provider is actually justified in asking

for load enhancement charges. He is making arrangements for supplying to you the desired load, such as the infrastructure like power generating system (power plants) and power distribution equipment like

transformers and electricity lines. So, it all boils down to the maximum connected load. If we need more power (by connecting electrical equipment which consume a large amount of electricity) then he needs more power generating systems for which we need money. Again if we need more power, we will need bigger transformers and heavy wires for which he will need money. So, we will first penalize us for using more than sanctioned load because by doing that you are putting extra burden on his whole system of power generation and distribution. After that, we may automatically enhance our sanctioned load to our maximum connected load or even a little bit more and add the load enhancement charges in our next bill.

1.1 Objective

- A society needs correct design for internal electrical distribution system. It also needs appropriate contractual load from the electric utility company.
- An inaccurate design may result in lower system reliability and lower contractual load may result in the penalties.
- There are a lot of terms and a lot of technical sections. The understanding of the same can be left to the experts in general. But there is no harm in getting to know the basic concepts as the experts are not always available.
- The main objective of our project is to monitor and control sanctioned load.
- To reduce time much more than the other remaining techniques.
- To avoid scenario of load shedding.

1.2 Problem Definition

In now a days there are no arrangement for the detection of running load in domestic level so that the service provider can calculate the load automatically. So here we are trying to make the system in which a sensor will be added to the house of user and if consumer exceed the limit than he will be automatically warned 3 times and if he keeps exceeding the limit than the power will be automatically cut off and he will have to pay the penalty to the service provider and a control switch located in service provider control room will on the supply.

2 LITERATURE SERVEY

The adoption of PLC and SCADA has been rapidly spreading and existing systems are being replaced with new systems based on these new technologies. At changing environment of the power system industry, in 1999 Toshiba announced a concept of new middleware for power system network control systems including energy management systems (EMS), supervisory control and data acquisition systems (SCADA), and distribution management systems (DMS). Supervision Control and Data Acquisition (SCADA) system is a communication and control system used for monitoring, operation and maintenance of household and industrial load. Compared with traditional applications, a PLC system has more accuracy in the operation and lead better result.

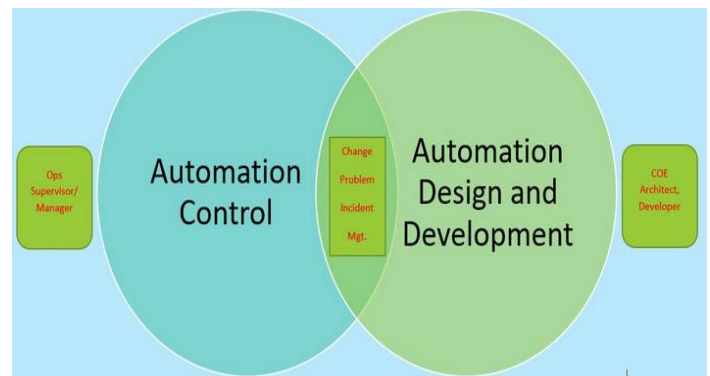
The present day Supervisory Control and Data Acquisition (SCADA) systems consisting of SCADA hosts, Remote Terminal Units (RTUs) and field devices monitor and control process equipment and systems from multiple locations and exchange data from various distributed control systems along the local and wide area networks. Main concept of our project is "to control and to monitor the load that has been sanctioned." We are going to read the electrical data by the use of PLC and SCADA. According to the readings controlling actions will be taken by the operator. Our project will help the supplier to calculate the required energy in coming time and to control on the sanctioned load for customer. This will help to decrease the load shedding and can send the energy wherever it needs.

There could be very detailed and involved calculations for the demand factor, diversity factor etc. to calculate the connected load. There are however certain thumb rules to make us feel comfortable. A society is built up of the individual loads such as residential loads, office loads, lifts, water pumps, lighting, sewage treatment plant, club, shops etc. All of them have a connected load.

A thumb rule is that the society should have approximately 50 % of the sum of the total individual loads as per the plan as the sanctioned load. The society however may not have all the units ready or developed. A society may go for a lesser load as connected load based on the operating /built units in a society. It must be said that there are always variations of 50 % factor. Typically, the builder/developer needs to plan the infrastructure as per the sanctioned load while build the infrastructure as per connected load. The complications arise if the connected loads for the individual loads are increased or get violated which is very often the case as the societies get old (or if there are real design issues). Thus a society needs to keep on monitoring the maximum demand and average demand for each of the months.

3 PROPOSED SYSTEM

Sanctioned load is nothing but the amount of energy that has been allowed to use to the Sanctioned Load Monitoring & controlling by using PLC This sanctioned load is been calculated by audit while taking the new connection from the supplier. When this sanctioned load is crossed or exceed by consumer the system will give warning to the consumer by buzzer or indicator. When the current has been increased the PLC will give signal to the buzzer and buzzer will be buzzed. Same will happened again for twice time and system will give alarm to the consumer. And same at third time, if the current will increase than the sanctioned load current sensor will give signal to the PLC. PLC will give signal again to the relay and relay will trip the supply. The signal will be given to the provider office and they will get to know about the tripping of the supplier. Supply provider will be penalizing to consumer for some amount of cash rupees to the consumer. Consumer have to pay that penalty amount in office. Then the supplier will insert the hardware key in the system and system will be reset and again supply will restart to the consumer.



To avoid all this scenario and penalty for costumer it is necessary to have control and monitor on load sanctioned by Supplier Company in this project we have tried to controlled and monitoring of the sanctioned load.

3.1 Block Diagram

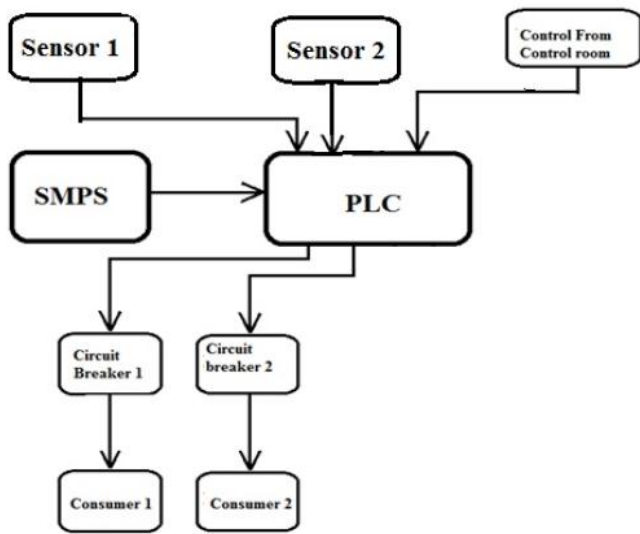


Fig No 1 Block Diagram of System

4 Circuit Diagram

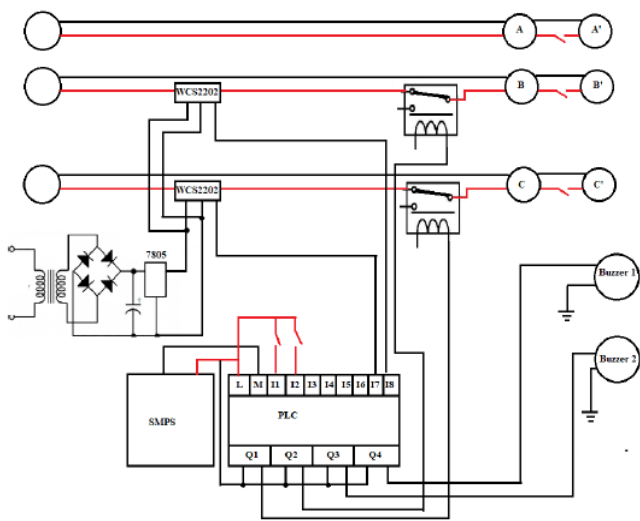


Fig No 2 Circuit Diagram of System

4.3 Working

Main supply is given to the transformer which is of the step down transformer. This step down transformer will step down supply from 230V to the 12 v. Then the rectifier is connected in series with the transformer which will rectify the supply from AC to DC. Then this DC supply will go to the voltage regulator 7805. 7805 IC will regulate the supply to the 5V and then this 5V supply given to current sensor which is connected in series with load (consumer). Two separate current sensor are used for

separate consumer for the purpose of the current sensing. Then this output of the current sensor WCS2202 is given to the input side of PLC. Switch mode power supply is connected input side to PLC to regulate supply 24 DC. This 24 DC supply is given to PLC to operate it. I1& I2 pin is connected input side of the PLC is to reset the operation. The M pin is of PLC is used to ground. Then supply from L is given to the output of PLC that is Q1 Sanctioned Load Monitoring & controlling by using PLC, Q2, Q3, Q4. One wire is remove from Q1 Q2 is connected to the relay1 and relay2 respectively. This relay is connected in series with the load and 2 wire are removed out from Q4, Q3 are connected to buzzer 1 and 2 respectively.

4.4 Implementation / Ladder Diagram

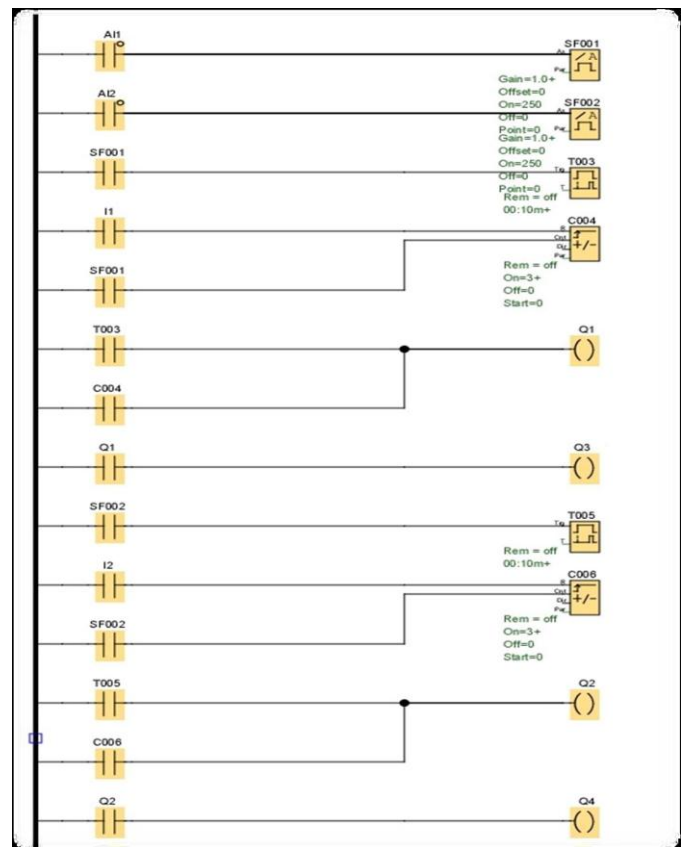


Fig No 3 Ladder Diagram

5 ADVANTAGES

- Great and easy way to load monitoring.
- Used PLC so more accuracy.
- Used PLC n SCADA, so opens many options to work together.
- Supplier can make arrangements for supplying to you the desired load.

- better n effective way on load shedding as supplier will already arranged load as per you have sanctioned.

6 CONCLUSIONS

The aim of this paper was to develop a system the PLC and SCADA system for monitoring and controlling the sanctioned load By using this PLC we can easily control and monitor any load in our system and can improve the result, system reliability, etc. Also it is strong way to work on load shedding problem and get more n more flexible system. Alternatively, SCADA and PLC communication system make it possible to integrate protection control and monitoring electrical parameter together for maximum benefits.

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