

PLC BASED LOAD SHARING SYSTEM

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Abstract - Whenever we are talking about electrical power distribution transformer plays very important role. Because it works 24/7 of the day and feeds the load to the different applications. But in some condition the load on transformer increases suddenly due to overloading that effect transformer may be damaged. Due to this situation the transformer will be overheated and overloaded and due to overheating transformer may get damage or burn the insulation of transformer resulting in interruption of supply. To avoid this situation connect other transformer parallel with main transformer. In the suggested approach second transformer will share the load when the load on the first transformer will rise above its rated capacity. The main aim of the work is to provide an UN-interrupted power supply to the energy consumers. By applying this scheme we try to avoid problems occurred in transformer like overloading and overheated that increase the life of transformer.

KeyWords: Capacity, Interruption, Load, System, Transformer

1. INTRODUCTION

Transformer is the very impotent equipment in the electric power transmission and distribution system because without transformer transmission cannot possible. The main problems in transformer are voltage variation and overheating. For the repairing time of transformer is very large and lot of money is required. The main task is protect the transformer from overload condition. Because of overloading the secondary winding gets overheated due to that it burn So , for the safety of transformer we decrease extra load. This can be overcome by connecting other transformer or slave transformer parallel with main transformer through relay. PLC compare the reference value of main transformer and connect to second transformer through relay according to reference voltage. When the load increases above the reference value, the slave transformer will automatically be connected in parallel with first transformer and passes the extra load.

That affects both transformer work efficiently. For the home appliances and other purpose we required step down voltage for this purpose we need step down transformers this plays very important role. This may happen in several phases. Whenever electricity distribute through the substation fist it step down and then transmitted through the step down transformer. In that main

transformer send pass step down voltage to secondary transformers. In this work, a second transformer passes the load of first transformer in the case of overloading and overheating. A PLC is designed to check overloading of first transformer and if this condition occurs be then, immediately the second transformer will be connected in the parallel to the main transformer and the load is shared. Initially when we main switched ON the load that time load will be shared through the first transformer but when the load on first transformer suddenly increase above its reference value then immediately second transformer connected parallel with first transformer automatically through Plc by using relay circuit. For this project we required regulated 12V, 1mA power supply. The function of full wave rectifier is used to rectify output which is in the AC form secondary of step down transformer. This work of load sharing can be done using various processes like using processor, by using GSM module and by using relays. In this sachem we are used a relay and PLC for automatic load sharing between three transformers. According to our applications the number of transformer operated parallel with main transformer increases. For operating number of transformer parallel then some condition may follows like same voltage ratio, same polarity etc. i.e. we have to operate identical transformers in parallel.

1.1 BLOCK DIAGRAM1

Figure shows the block diagram of automatic load sharing of transformers using micro controller. The various components in the system are described below.

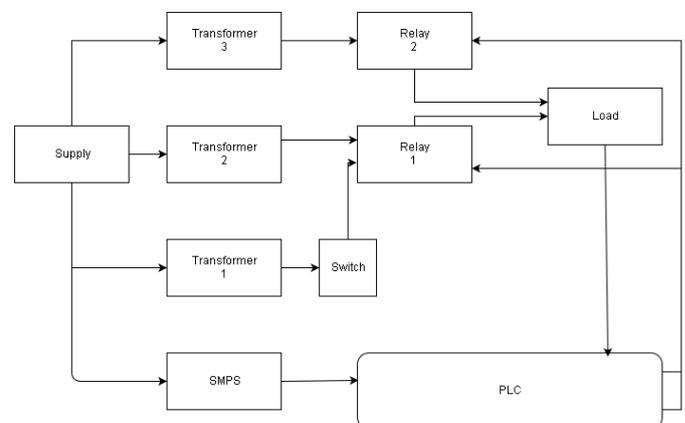


Fig -1: Block Diagram of PLC Based Load Sharing System

1.2 TRANSFORMERS: 2

In the block diagram we use three transformers which are static device and used to convert energy at one voltage level to another voltage level by the principle of mutual induction. Transformers convert AC voltage from one level to another level with a little loss of power.

Relay:

Relays are components which allow low power circuit to Operate high current application circuits .It shares the excess load of working transformer. In that project main function of relay is switch load from main transformer to second transformer automatically using PLC .

PLC:

Programmable logic controller is an controller used to monitor and control the load through relay to transformer .This project is all about protecting transformer under overload conditions with the help of PLC.

2. FLOWCHART

Flowchart Description:

1. Supply is provided to a single transformer under normal condition and remaining transformers are connected to each other in a parallel manner.
2. A current transformer measures the load current continuously and feeds it to the relay by converting it to a corresponding D.C value in order to compare with the reference value set by the user.
3. Whenever the load current increases above its rated value given to the PLC then PLC send high signal to relay The relay coil thus passes a tripping signal to the load which is connected of the slave transformer.
4. That effect load on both transformer is identical. The current transformer still measures the load current and compares it with the reference value.
5. When the load current decrees bellow the reference value given to PLC then one transformer get shut down and avoid overloading.

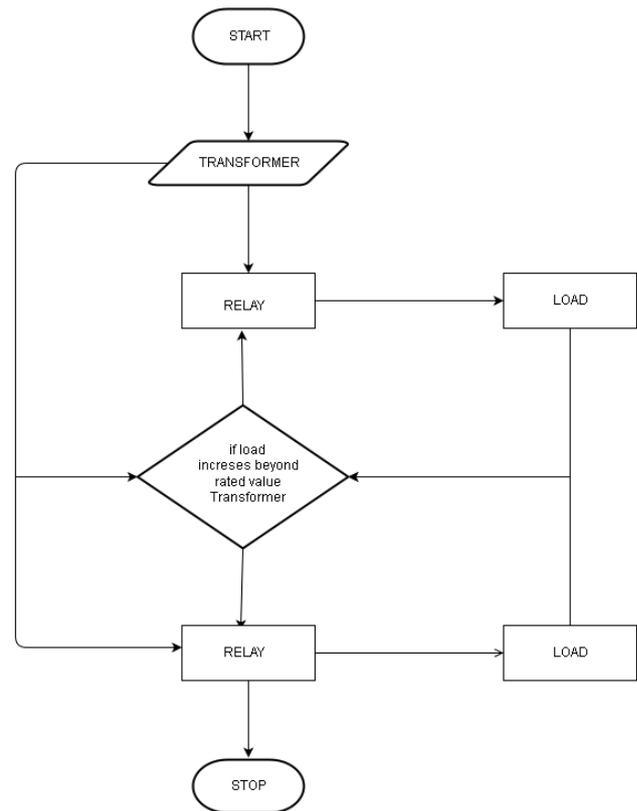


Fig -2: Flowchart Diagram

6. If the load value increases further beyond the capacity of two transformers, load will be cut-off from the main supply based on the priority level set by the user. This is done to provide UN-interrupted power supply to higher priority loads.

2.1 NEED OF THE WORK

1. Designing an efficient and cost effective solution for replacing or changing the transformer i.e. Problem related to transformer when it was fail then it can be handle and control by PLC.
2. To efficiently control the on/off of transformer via load.
3. Minimize power and time wastage.
4. Make a system very efficient to load sharing of transformer.
5. Overcome the problems arrive in industries and hospitals of uninterrupted power supply.

3. CONCLUSIONS

The work on “Automatic load sharing of transformers using PLC” is successfully designed, tested and a demo unit is fabricated for operating three transformers in parallel to share the load automatically with the help of change over relay and PLC circuit. It protect main transformers from overloading and overheating thus providing un-interrupted power supply to the customers.

4.ACKNOWLEDGEMENT

We Are Thankful to Prof. A.N.Shukla who has been constant source of Guidance and inspiration in preparing this work. We are also thankful to those who have directly or indirectly helped for completion of this work.

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