e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:04/April-2022 Impact Factor- 6.752 www.irjmets.com

AUTOMATIC LOAD SHARING OF TRANSFORMER USING MICROCONTROLER

Shailesh G. Thakre[*1], Pratima S. Komtolu[*2], Abhishek V. Bisen[*3], Saurabh D. Thengadi[*4], Ajit M. Lilhare[*5], H. P. Thakre[*6]

[*1,2,3,4]Student, Department Of Electrical (Electronics & Power) Engineering, PCE, Nagpur, Maharashtra, India.

[*5]Assistant Professor, Department Of Electrical (Electronics & Power) Engineering, PCE, Nagpur, Maharashtra, India.

[*6]Professor, Department Of Electrical (Electronics & Power) Engineering, PCE, Nagpur, Maharashtra, India.

ABSTRACT

The aim of the project is automatic load sharing of transformer under overload condition and protect the transformer from damage and give uninterrupted power supply. Due to overloading the exceeds current flow and windings get overheated and may get burnt hence the efficiency get drops. Thus protect the transformer by sharing loads by connecting another same rating transformer in parallel through a micro-controller. The micro controller compares the load on the first transformer with a reference value. When the load is exceeds then the reference value the second transformer will share the extra load. Therefore the two transformer work efficiently and prevented from damage. In this project three modules are used to control the load currents. The first module is a sensing unit, which is used to sense the current of the load and the second module is a control unit. The last module is micro-controller unit and it will read the analogue signal from the sensor module and perform some calculation and finally gives control signal to a relay. The advantages of the project is protection of transformer, uninterrupted power supply, short circuit protection, and for maintenance purpose.

I. INTRODUCTION

Transformers is one of the most significant equipment in the electrical power system, hence transformer required protection. Apart from this the demand for electricity is increasing due to the increasing population and their unavoidable demands, With this increased power requirement , the existing systems have become overloaded. The overloading appear at the consumer end of the transformer terminals, which can affect its efficiency and protection systems. Due to overload on the transformer the efficiency drops and the windings gets over heated and may get burnt. It takes a lot of time to repair and lot of expenditure. Transformers are occasionally loaded beyond nameplate ratings because of existing possible contingencies on the transmission lines, any failure or fault in power systems, or economic considerations. One of the reported damage or tripping of the distribution transformer is due to thermal overload. To eliminate the damaging of transformers due to overloading from consumer end, it involves the control against over current tripping of distribution transformer. Rise in operating temperature of the transformer. The project is all about protecting the transformer under overload condition. by connecting another transformer in parallel through a microcontroller and a relay which shares the excess load of the first transformer. The transformers are switched alternatively to avoid thermal overloading. Therefore, two transformers work efficiently under overload condition and damage can be prevented. If there is a further increase in load beyond the capacity of two transformers there will be a priority based load shedding of consumers which will provide un-interrupted power supply for the hospitals, industries etc.

II. OBJECTIVES

- Protect transformers from overloaded condition by sharing the load.
- To measure the current and load in watt of both the transformers.
- To monitor the loading on both the transformers.
- To calculate the percent of overload condition on transformer.

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III. METHODOLOGY

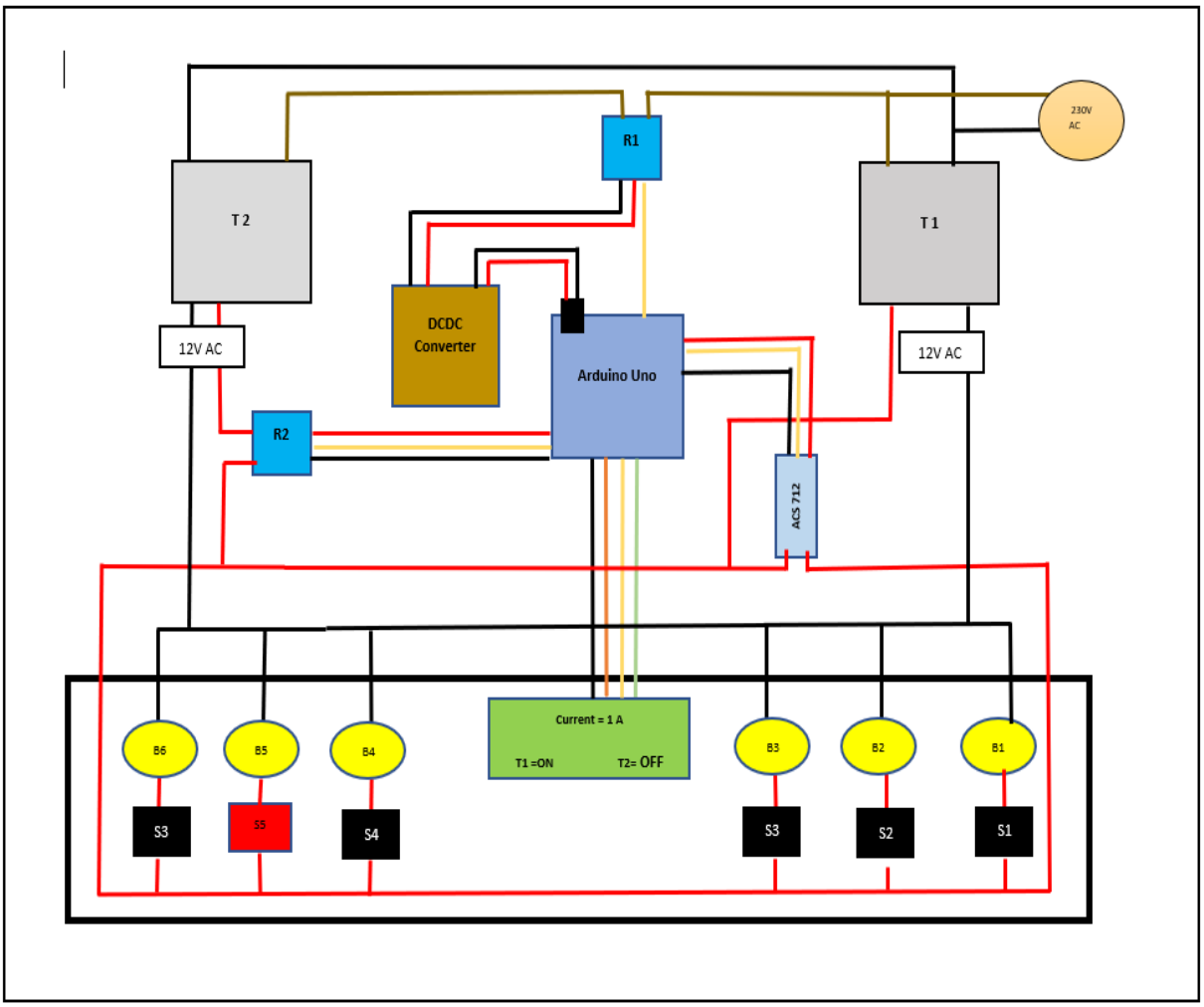

Fig 1: block digram of automatic load sharing of transformar

IV. WORKING AND OPERATION

There are three modes of working:

1) Normal working mode when Load is < 5 Amps

In the above figure three bulbs are switched on i.e., S1, S2, S3 and based upon the load of 4.5 Amps. condition Relay 1 is kept ON and Relay 2 is in OFF condition. This means Transformer 1 will be active and Transformer 2 will be OFF hence the LCD screen shows the amperage as 4.5 and T1 = ON and T2 = OFF. In this case the load up to 5 amps will be supplied using Transformer 1 (Primary Transformer).

2) Parallel working mode when load is > 5 Amps

In the above figure four bulbs are switched on i.e., S1, S2, S3, S4 and based upon the load of 7 Amps. Relay 1 and Relay 2 is kept ON condition. This means Transformer 1 and Transformer 2 will be Parallelly connected with the load and in this case as both of the transformers have same specification the load will be divided equally among both transformers. hence the LCD screen shows the amperage as 7 and T1 and T2 = ON. In this case load above 5 amps will be shared between Primary Transformer (T1) and Secondary Transformer (T2).

3) Overloading mode when Load is > 10 Amps

In the above figure when all the bulbs are switched on i.e., S1, S2, S3, S4, S5, S6 the current of 13 Amps or greater than 10 Amps is drawn through T1 and T2. In this condition Relay 1 & Relay 2 is kept in OFF condition. This means Transformer 1 and Transformer 2 will be OFF hence the complete system will be shut down and

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will continue to be in same stage till the load becomes less and LCD screen shows the amperage as 13 Amps and "OVERLOAD" is continuously displayed on the screen.

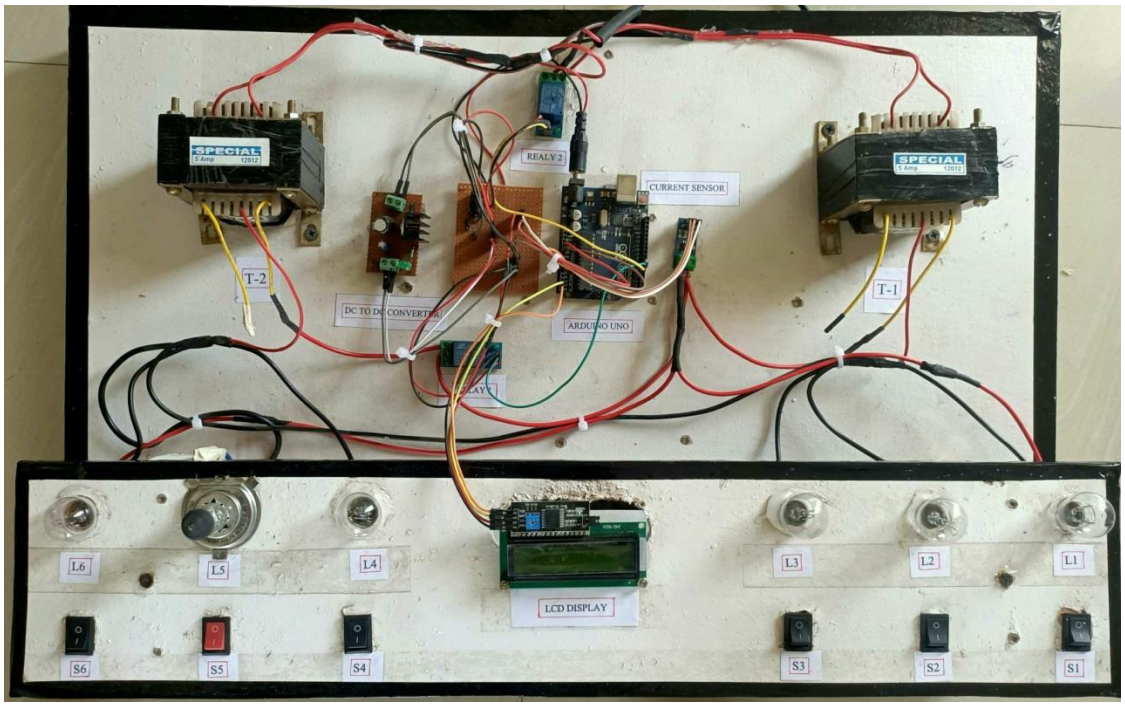

Fig 2: Automatic load sharing of transformer

V. LOOK UP TABLE

Condition	Switch (ON)	Display			Load Sharing (A)		Load in Watt		
		T-1	T-2	Total load (A)	T1 (A)	T2 (A)	T1	T2	Total Load
Normal	L1	ON	OFF	1.75	1.75	0	21	0	21
Normal	L1&L2	ON	OFF	3.5	3.5	0	42	0	42
Load sharing	L1,L2&L3	ON	ON	5.25	2.6	2.6	31.5	31.5	63
Load sharing	L1,L2,L3&L4	ON	ON	7	3.5	3.5	42	42	84
Overloading	L1,L2,L3,L4&L5	OFF	OFF	15.33	0	0	0	0	0

Where,

L1, L2, L3, L4 = Load (21W)

L5 = Load (100W)

T1 & T2 = Transformer 1 & Transformer 2 (60W each)

VI. CONCLUSION

Transformers is one of the most significant and expensive equipment in the electrical power, transmission and distribution system, hence transformer required maintenance and protection With increasing in a load demand need to increase load capacity of transformer to satisfy the consumers this can done by parallel operation of transformer In this project the parallel operation take place automatically with the help of microcontroller, which provide un-interrupted power supply and avoid load sharing.

ACKNOWLEDGEMENTS

We would like to express our deep sence of gratitude and indebtedness toward our guide Prof. H. P. Thakre, who guided me throughout this project. Electrical Engineering Department , whose zeal and enthusiasm were a

source of inspiration for us. We truly appreciate and value her esteemed guidance and encouragement from the beginning to the end of this project. We are extremely grateful to him. We also thank our Principal Dr. S. A. Dhale and Professor and Head of Electrical Engineering Department Dr. K. B. Porate who made available all the required facilities throughout the session.

Finally, we would like to acknowledge all the friends and those people who directly and indirectly helped and contributed to the successful completion of our project.

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