

PLC Based Automatic Changeover Switch

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Abstract: The use of electric supply for industrial, commercial and residential is highly unstable. Power failure or outage is the main issue regarding continuity of supply as industries; factories with frequently power failure are not efficient. Whenever the power failure is considered, most of the factories, industries, and academic institutions use the generator for backup power supply. So, the manpower is required for manually controlled to on and off the generator. The introduction of an automatic changeover system is mainly done to reduce the problem in manual switching along with challenges in smooth switching and this concept represents the procedure of fast connection of the electrical consumers to a backup electric power source. This paper presents the design and implementation of an auto changeover switch using a programmable logic controller (PLC). In case of mains power failure, this switch turns ON the generator automatically and connects the load to the generator output, alternatively it switches OFF the generator automatically when power is restored and returns the load to the mains power with the help of the desired range of parameters which may be set by programming. This helps in reducing the time consumption required for switching operations. In this way, the continuity of supply is maintained.

Keywords: PLC.

1. Introduction

Automatic change over means simply the total load is transferred to the one source to another. It consists to of two sources one service provider is a source and another is from generator. When service provider supply is cut off then use of change over switch power can be delivered by the generator automatically. This process can be done by using PLC. PLC is a programmable logic control and relay switches. Main purpose of PLC is the automatic turn ON/OFF generator. It senses the main power signal no more available. Short delay time is given to the PLC wait for the main power to return in case of short power failure. If there is no time command given to the generator. Continuity of supply to be maintained by the all this conditions such as industries, hospital, banks, malls etc. In case of textile, industries, when service provider supply is shut down the whole machines are stop immediately. When service provider supply is come that time machines will take more time to start. Some have to reduce such difficulty by using the auto change over switch. Also in case of chemical industry, chemical reaction takes place in 2-3days.sowe required the continuity of supply. In case of hospital, if serious operation takes place at that time continuity of supply is must be required.

2. Literature review

“Experimental Study Platform of the Automatic Transfer Switch used to Power Supplies Back Up”. Cristina Gabriela Sărăcin, Marin Sărăcin, Daniel Zdrențu.

-Standard ATS;

-Manual transfer switches selection of the electric power supplies;

-ATS (Automatic Transfer Switch) with PLC.

His paper presented the form and the function of an experimental platform able to describe the automatic transfer switch process from a main power source to a Back-up power source or a safety generator. The theoretical concepts that have been presented help get to a better understanding of the driving operation of ATS.

Design of automatic changeover switch with generator control mechanism” L.S. Eczema., B. Pieter, O. O. Harris.

In this paper, we provide an automatic switching mechanism that transfers the Consumer loads to a power source from a generator in the case of power failure in the mains supply. It automatically detects when power has been restored to the Mains supply and returns the loads to this source while turning off the power from the generator set. This mechanism has been tested and was corded great result. Features of Generator to be used on Automatic Changeover Switch the automatic change-over switch can be used in any place where alternative Power is needed to complement them a in power supply. In this project, a generating Set is used as an alternative power supply. Thus, it is very important to note the Necessary peripherals to be used with the automatic change-over switch.

- The generator must have electrical ‘start and stop’ facility.
- The generator’s battery has to be in good condition always.
- The inter-connecting cables must be in good order.

It is worthy to note that this project is subject to scrutiny and further development. He can recommend that for future development an overload protection system be included.

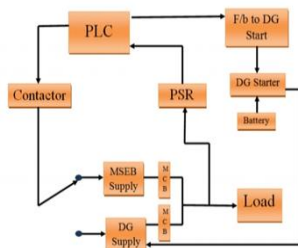


Fig. 1. Block diagram

3. Working

In case of service provider supply is ON, at this condition PSR monitors the presence and Absence of main supply and give command to the service provider. If there is yes, then contact or of service provider gets energies and continues supply will be on the service provider. If there is No, then PLC Gives feedback to the DG to start. With the help of battery DG will ON. At this condition Contact or of service provider is de-energies and DG contact or gets energies and contactor Change over to service provider to DG and wise-versa.

In case of service provider supply is come. A delay time is given, for which the PLC wait for the Main power to return in case of any short power failure, after that delay it sends Command to generator, thus turning it ON. Also when the main power returns, it waits for a given time interval, so to ensure that main power has returned properly, and if the Main power supply turns off before that time, then PLC keeps the generator ON.

A. Components Used

1) PLC

- No. Of digital input: I/O-8/5
- Contact Rating: NO type; 5A @ 28VDC (Resistive)
- 5A @ 240VAC (Resistive)
- Memory: Data memory: 16kb
- Code memory: 112Kbytes
- Temperature: Operating: 0 to 55 °C
- Storage: 20 to 70 °C
- Humidity (non-condensing): 10% to 95% RH
- Supply Voltage: 230V AC (180-270VAC)
- Power Consumption: 6VAMax.
- Dimensions: 70x90x66.4mm

2) MCB (230V, 6A)

3) Selector Switch

- AC: 415V, 4A
- DC: 230V, 0.5A

4) Emergency Switch

- AC: 415V, 4A
- DC: 230V, 0.5A

5) Push Buttons

- AC: 415V, 4A
- DC: 230V, 0.5A

6) Indicators (220V)

7. Ladder Diagram

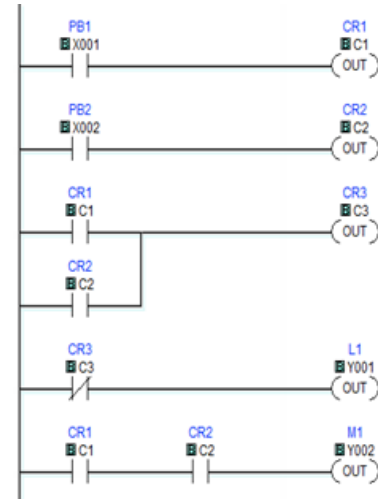


Fig. 2. Ladder diagram

4. Application

1. Used in hospitals, malls, colleges, restaurants.
2. Used in process industry.
3. Used in commercial structures and government buildings

5. Conclusion

This project is establishing steps for designing and implementation of PLC Based automatic change over switch. The overall system is to initiate simple and effective. It can be used for various educational, commercial and industrial applications. This project presents a prototype model concern to the auto changeover system which can help the increasing the stability of the system and speed of operation which can improve reliability. It can eliminate the continuous manual switching operation, because of in continues manual switching voltage spike is present in to a system.

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