TRANSFORMER PROTECTION PANEL

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Abstract: A "Transformer" is a static electrical device used in electric power system to transfer power between circuits through the use of electromagnetic induction.

The purpose of this report is to present a solution for the transformer protection. This particular section describes its brief objective, scopes and aims. Being the most expensive equipment, transformer is the most crucial device in the distribution system. Our design focused on the low voltage side protection, due to the low voltages and high current, simple fuses cannot be deployed to keep the transformer in check.

We provide a solution for the protection of transformers against the over voltage, under voltage, over load, short circuit protection and over heat protection as well as protection against 1 phase failure in 3 phase system by connecting it in open delta.

Keywords:- Transformer, Panel, Relay, Mutual Induction, primary, secondary, flux linkages

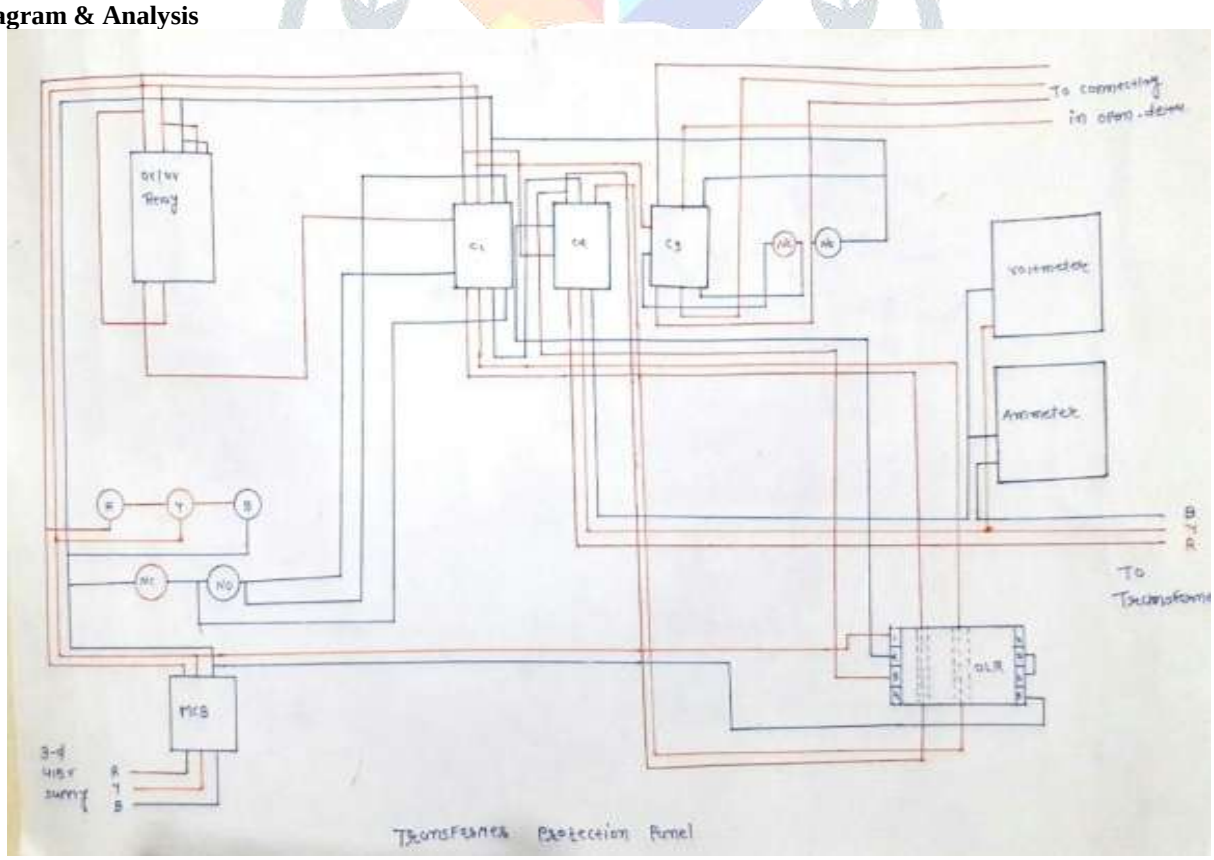
1. INTRODUCTION

An electrical transformer is a static device but due to internal stresses and abnormal conditions fault occur faults such as over current due to overloads, terminal faults, incipient faults, winding faults etc.

These different faults demand different schemes of transformer protection. For which the panels are designed. The function of the panel is to provide appropriate protection of transformer in faulty condition. It also gives indication about the faults, the fans and pumps used cooling purpose are also controlled through panel. Panels have different types which include RTCC, MBox, TJB, Common MBox, VFD, PLC, etc. The panels which are made for the controlling and protection of transformer undergo different or steps in which they are designed.

The company process of manufacturing a panel mainly depends on the demand of the consumer. According to the consumer needs it include general arrangement, special instruction, bill of material, change over circuit/power circuit, control circuit, alarm circuit, trip, firefighting, indication circuit etc. Fabrication and wiring in done after the above process is complete then the final checklist is made and the panel is tested for the desired purpose after a the procedures are being done the panel is dispatched to the consumer

2. Circuit Diagram & Analysis



Electronic overload relay based on IC technology. It protects motor against overloading, single phasing and reverses phasing. It gives single phasing protection up to motor terminal. As it is with current sensing single phasing preventer, it is very slim and compact. CT's are inbuilt. It is available in various ranges. Thermal overload relays can be replaced by this electronics overload relay. No separate single phasing preventer is needed. It weighs 510gms approx. And measures 110mm x 65mm x 85mm approx.

There are two arrangement of operation of miniature circuit breaker. One due to thermal effect of over current and other due to electromagnetic effect of over current. The thermal operation of miniature circuit breaker achieve with a bimetallic strip when ever continues over current flow through MCB, bimetallic strip is heated end deflect by bending. This deflection bimetallic strip release mechanical latch. As this mechanical is attached with operating mechanism is cause to open the miniature circuit breaker contacts. But during short circuit condition sudden rising of current, cause electromechanical displacement of plunger associated with tripping coil or solenoid MCB. The plunger strikes the trip level cogging immediate release of letch mechanism consequently open the circuit breaker contacts. This was simple explanation miniature circuit breaker working principle.

Contactors are an electrically controlled switch use for switching a power circuit, similar to relay accepts with higher current rating. A contactors is controlled by circuit with has much lower power level then the switched circuit.

Contactors come in many forms with varying capacities and features. Unlike circuit breaker, contactor is not intended to interrupt a short circuit current. Contactors range from those having a breaking current several amperes to thousand of amperes and 24 V DC to many kilovolts. The physical size of contactor range from a device small enough to pick up with one hand, to large device approximately a meter (yard) on a side.

Thermal switch is used for overheat protection.A thermal switch is a device which normally opens at a high temperature (often with a "plink"Sound) and re-closes when the temperature drops.

Voltage relays are used for device and plant protection, supplying emergency light devices and the detection of N-conductor breaks and short-time voltage interruptions.

3. Implementation of Hardware

An electrical transformer is a static device but due to internal stresses and abnormal conditions fault occur faults such as over current due to overloads, terminal faults, incipient faults, winding faults etc.

These different faults demand different schemes of transformer protection. For which the panels are designed. The function of the panel is to provide appropriate protection of transformer in faulty condition.

4. Advantages

- It protect transformer against overvoltage.
- It protect transformer against under-voltage
- It protect transformer against over-current.
- It protect transformer against over-heating.
- It protect transformer against under current.
- If fault occurs in any one phase winding of transformer, we get continues 3 phase supply by open delta connection.

5. Conclusion

We should have protection panel to protect the transformer against sudden fault. In this project the transformer from over-voltage, under-voltage, over-current, over-heating, over load, continuous power by V-V connection.

Also with this project have invented new idea of continuing power in distribution line is established with the transformer. By open delta V-V connection of transformer. We can continue power in distribution line even when any fault is occurred in any one phase of generating station and transmission line.

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References

[1] L. C.D. Hayward,-Harmonic-current Restrained Relays for Transformer Diffential Protection, AIEE trans, vlo.60, pp 276, 2009.

[2] M.S. Sachdev, T.S. Sidhu, H.C. Wood, -A Digital Relaying Algorithm For Detecting Transformer Winding Faults, IEEE Transactions on power Deliver, vol. 4, No.3. July 2011.

[3] H.S. Broneado, P.B. Brogan, and R. Yacamini, "Harmonics analysis of transient currents during sympathetic interaction" IEEE Trans. Power Syst., vol. 11, no. 4, pp. 2051-2056, Nov. 2010.

[4] M. Tripathy, R.P. Maheshwari, and H.K. Verma, "Advances in transformer protection:a review," Electric Power Components and Systems, vol. 33, no. 11,pp. 1203-1209,2005.

[5] H.K. Verma and G.C. Kakoti, "Algorithm for harmonic restraint differential relaying based on the discrete Hartley transform," Electric Power Systems Research, vol. 18, no.2, pp. 125-129,1990.