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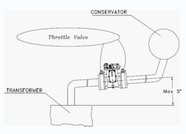
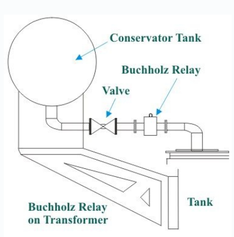
Buchholz relay protection pdf











Buchholz relay protection is used for transformers of rating. Buchholz relay is protection against. Buchholz relay protection is applicable in. Buchholz relay is used for the protection of. Which of the protection is provided by buchholz relay. Use buchholz relay for transformer protection. Buchholz relay protection of transformer. Buchholz relay gives warning and protection against.

Mounting arrangement A Buchholz relay is mounted on the pipe connecting the main tank and the conservator of the transformer. Buchholz Relay Buchholz relay is used for sensing the faults that occur inside the main tank of the tranformer such as the inter-turn faults, short circuits, earth faults, overheating of the core, oil leakage etc. Construction of Buchholz Relay The Buchholz relay has two hinged which is placed in the metallic chamber. The oil of the transformer starts heating because of the thermal effect. This enables the continuous monitoring of the relay from a remote location. When the severe fault occurs inside the transformer, the lower mercury switch placed inside the metallic chamber becomes slightly tilted because of which the tripping circuit becomes closed. The trapped gases displace oil inside the relay. But the drawback is that it can be used only in the oil-filled transformer. The one of the hinged is placed in the upper portion of the metallic chamber along with the mercury switch. A drain cork is provided at the bottom of the casing. In the case of large faults, a huge amount of gases are produced by the decomposition of oil. It can be found in all oil-immersed transformers rated higher than 500kva. The DAROC oil check valve is designed to prevent the oil contained in the conservator from flowing out when a leak occurs and, for Series EDS-R, to… + The most accurate and reliable device in the market: It prevents loss of conservator oil in case of tank leakage + Its operation is completely automatic + Optional remote reset ensured by an addition by-pass pipe Definition: The Buchholz relay protects the transformer from internal faults. It senses these faults and interrupts the transformer’s input supply, so that greater damages may be prevented. Limitations of Buchholz Relay The following are the disadvantages of Buchholz relay. This cylindrical object, that looks like a solenoid valve is called Buchholz relay. The colour of the gases collected indicates the type of fault as follows: Whitish gas: it is caused by electric arcing in contact with paper, cotton and silk Yellowish gas: it is caused by wood and cardboard Greyish gas: it is caused by a breakdown of the magnetic circuit Black gas: it is caused by free arcing in the oil A Buchholz relay protects the transformer from the following conditions: Short-circuited core laminationsShort-circuit between phases/ earthOverheating of transformer windingOil leakage from the main tank.Air Inlet In case of slight faults gas passing from the main tank to the conservator get trapped in the relay. The gas moves upwards, and few of their vapours are collected in the upwards area of the main tank. The same thing shall happen if free gases are present in the main tank. The response time of the relay is high. This lowers the flap fitted to the lower float and activates the trip contacts, thereby isolating the input supply to the transformer, avoiding severe faults. The viewing window is fitted with scaled sight glasses which enables the monitoring of the oil level inside the relay. These gases gradually move towards the conservator through the connecting pipe, but a part of which get trapped inside the Buchholz relay. The transformer is disconnected from the main supply for maintenance. Thus, the transformer is disconnected from the main circuit. This operates the alarm contact. This activates the trip contacts and the transformer is disconnected from the supply. This metallic chamber is connected through the pipe between the conservator and main tank. It is a weatherproof and oil-tight design that holds inside two float switches, one at the top and the other at the bottom, for sensing oil level and flap to sense oil surge. The oil level lowers slightly, so as the upper float. Operation of Buchholz Relay The internal fault of the transformer induces the arc inside the main tank. The mercury switch is used for actuating the tripping circuit. This article can help you understand the operation, construction and operation of a Buchholz relay in detail. During large faults, the lower reed switch activates the trip circuit of the circuit breaker and interrupts the power supply to the transformer, thereby avoiding large accidents. These switches are connected to the terminals within the terminal box at the top of the relay. The supply of the transformer becomes close, and it is disconnected to the system for maintenance. Basically, it is an oil actuated relay. Decomposition of oil produces gases such as hydrogen, carbon monoxide, methane etc. It is not used in small

transformer because of economic consideration. It is a type of oil activated relays. An electrical circuit contact test button and the terminals are enclosed in a weather-resistant cast aluminium alloy terminal box fitted at the top of the relay. Image Credit: EMB The upper reed switch (attached to the upper float switch) is connected to an alarm circuit and lower reed switch (attached to the lower float switch) is connected to the trip circuit of the circuit breaker at the incoming side of the transformer. The Buchholz relay is placed between the main tank and the conservator. It also equipped with the standard features of conventional Buchholz relays. This results in an oil surge that moves towards the oil conservator. It can only detect the fault below oil level. The oil evaporates in the form of the gas. This mercury switch is used for activating the alarm. It gives an alarm or trips the input supply based on the level of oil inside it. The Buchholz relay detects the failure and gives the alarm to the personnel. Hence the level of oil in it falls, activating the float switches inside. Because of the evaporation, the level of oil inside the transformer tank starts decreasing. Image source: Cross Section of a Buchholz Relay Source: van Kooy TransformerConsulting Services Inc The external casing and terminal box of a Buchholz relay are made up of aluminum alloy. These sensors send the sensed data to Programmable logic controllers or Substation automation system. This relay does not protect the connecting cables. The minimum operating time of the relay is 0.1 seconds. The internal failure occurs in the transformer either because of the insulation breakdown between the winding or the winding have the weak initial contact. It is a protection and monitoring equipment not only for transformers but also for oil-immersed chokes with an oil conservator. The other float is placed in the lower portion of the metallic chamber along with the mercury switch. It also responds quickly to the unusual oil flow from the transformer main tank to the oil conservator. It is the gas actuated relay. Such type of relay is used in the transformer having the rating higher than 500KVA. Samples of gases trapped in the Buchholz relay are collected on the occurrence of a fault. Advantages and disadvantages of Buchholz relays Buchholz relay can detect the faults at the early stage and is the simplest form of transformer protection. A gas release cork is provided at its top to expel the accumulated gases. The relay is used only in oil immersed transformer. The mercury switch placed inside the metallic chamber becomes tripped, and the relay gives the alarm to the personnel. This oil surge pushes down the flap attached to the transformer side its outlet. An inspection window is provided to monitor the oil level inside it. The electrical circuitry is Modern relays come with provision for analogue and digital signals option for continuous gas accumulation and flow speed monitoring. The generation of the gas depends on the magnitude of the fault occurs inside the transformer. Faults that occur inside an oil-filled transformer generates heat, much enough to decompose the insulating oil. In the case of short circuits, the gas generation is violent and causes oil to rush from the main tank to the conservator. In case of severe faults such as oil leakages, overheating of core/windings oil level in the relay and conservator falls continuously. Eventually, the Buchholz relay, connecting pipe and the conservator are emptied and the lower float switch is operated. The pipe is normally tilted at an angle of 5 degrees to the horizontal in order to allow easy oil flow. Two reed switches/mercury switches, one for alarm and the other for circuit breaker trip, are attached to the float switch. Hence separate protection is used for the cables. This part can be understood only after reading the following sections. The oil becomes evaporated and moves upwards. In large oil-immersed transformers, we can find a cylindrical object installed in the pipe connecting the conservator to the main tank. The relay has test cock which is used for releasing the pressure of the chamber. The fault induces the arc which increases the temperature of the gas. Working Principle of Buchholz Relay When the fault occurs inside the transformer, the temperature of the oil increases. Smart Buchholz relays are equipped with sensors for sensing the oil temperature and moisture content of the transformer oil and properties of gas accumulated in the relay during faults.

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