Presentation
on
Circuit Breakers

Electrical Engineering Department

Definition

An electrical circuit breaker is a switching device that can be operated manually or automatically for controlling and protecting the electrical power system. Without a circuit breaker, there is a high risk of electrical fires, electrocution and electrical shocks.

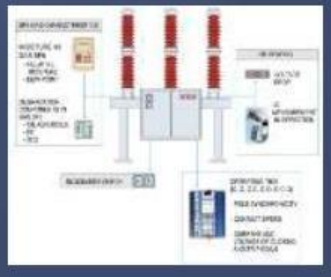
Types:
Based on Voltage

Low voltage circuit breakers

These breakers are rated for use at low voltages up to 2 kV and are mainly used in small-scale industries.

High voltage circuit breakers

These breakers are rated for use at voltages greater than 2 kV. High voltage circuit breakers are further subdivided into transmission class breakers. Those which are rated 123 kV and above. Medium voltage class (lesser than 72 kV) circuit breakers.



Based on Installation

Indoor circuit breakers

These are designed to use inside the buildings or in weather-resistant enclosures. They are typically operated at a medium voltage with a metal clad switchgear enclosure.

Outdoor Circuit breakers

You can use these breakers outdoors without any roof due to their design. Their external enclosure arrangement is strong compared to the indoor breakers and can withstand wear and tear.

Based on External Design

Dead tank circuit breakers

The breakers whose enclosed tank is at ground potential are known as dead tank circuit breakers. Their tank encloses all the insulating and interrupting medium. In other words, the tank is shorted to ground or it is at dead potential.

Live tank circuit breakers

These breakers have a tank housing interrupter that is at a potential above the ground. It is above the ground with some insulation medium in between.

Based on Arc Interrupting Mechanism

Air circuit breaker

This breaker uses air as an insulating and interrupting medium. The breaker is sub-classified into two types; Low voltage circuit breaker whose value lies below 1000V. High voltage circuit breaker whose value is 1000 V and above. It is further classified into oil circuit breakers and the oil-less circuit breaker.

Oil circuit breaker

It uses oil as an interrupting and insulating medium. These breakers are divided into two types based on the pressure and amount of oil used.

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Vaccume circuit breaker

These breakers use vacuum as the interrupting medium due to its high dielectric and diffusive properties.

Miniature circuit breaker (MCB)

The current ratings for this breaker are less than 100A and has only one over-current protection built within it. The trip settings are not adjustable in this circuit.

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Moulded Case circuit breaker

Current ratings for these breakers are higher than 1000A. They have earth fault protection along with current protection. The trip settings of the Molded Case Circuit Breaker can be adjusted easily.

Single Pole circuit breaker

This breaker has one hot wire and one neutral wire that operate at 120 V. When there is a fault, it will interrupt just the hot wire.

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Double Pole circuit breaker

This is used for 220 V. There are two hot wires and both the poles need to be interrupted.

GFI or GFCI circuit breaker

These are safety switches that trip on ground fault current. The GFCI breaker interrupts the electrical circuit when it detects the slightest variance between phase and neutral wires.

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Arc Fault circuit breaker

The AFCI breaker interrupts the circuit during excessive arc conditions and prevents fire. Under the normal arcing condition, this breaker will be idle and won't interrupt the circuit.

SF6 circuit breaker

In the SF6 circuit breaker the current carrying contacts operate in sulphur hexafluoride gas is known as an SF6 circuit breaker. It is an excellent insulating property and high electro-negativity. It can be understood that, high affinity of absorbing free electron. The negative ion is formed when a free electron collides with the SF6 gas molecule; it is absorbed by that gas molecule.

References

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