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Over Current Protection

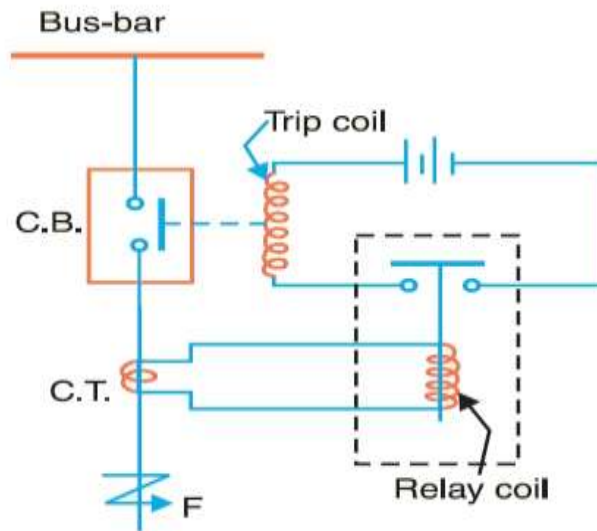
➤ Over current and its causes

- In an electric power system, over current or excess current is a situation where a larger than intended electric current exists through a conductor, leading to excessive generation of heat, and the risk of fire or damage to equipment.
- Possible causes for over current include short circuits, excessive load, incorrect design, or a ground fault.

➤ Working Principle of Over Current Relay

In an over current relay, there would be essentially a current coil. When normal current flows through this coil, the magnetic effect generated by the coil is not sufficient to move the moving element of the relay, as in this condition the restraining force is greater than deflecting force. But when the current through the coil increased, the magnetic effect increases, and after certain level of current, the deflecting force generated by the magnetic effect of the coil, crosses the restraining force, as a result, the moving element starts moving to change the contact position in the relay.

➤ Over current Protection



Over current relays are fed from Current Transformers. Whenever the current through the relay exceeds the preset value. The Relay operates and actuates the trip coil of the circuit breaker, isolating the faulty section from the electrical system.

➤ Types of over current relays

Depending upon time of operation, Over current relays are classified into 3 groups.

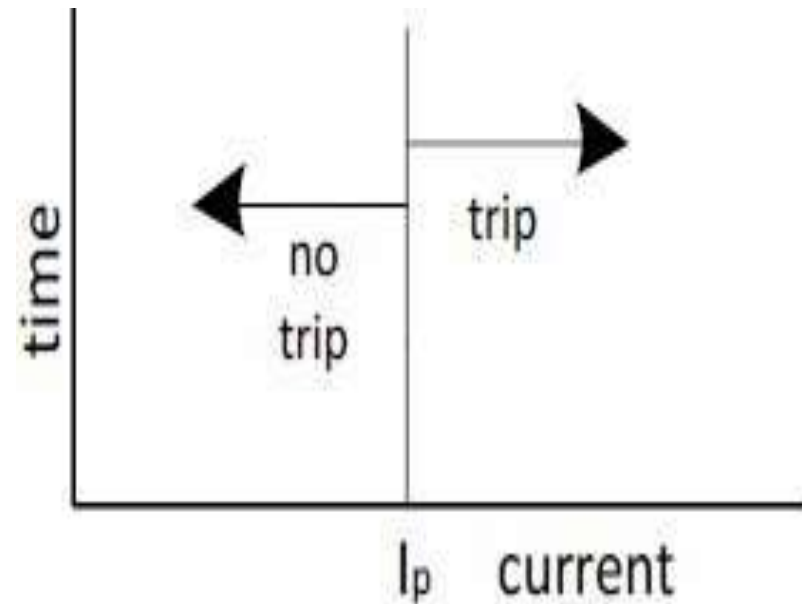
- Instantaneous over current relay.
- Definite time over current relay.
- Inverse time over current relay.

➤ Instantaneous over current relay

This relay is referred as instantaneous over current relay, the relay operates as soon as the current in the coil gets higher than pre set value (I_p).

There is no intentional time delay set. There is always an inherent time delay of the order of a few milliseconds.

Attracted armature type relays shows this characteristics.

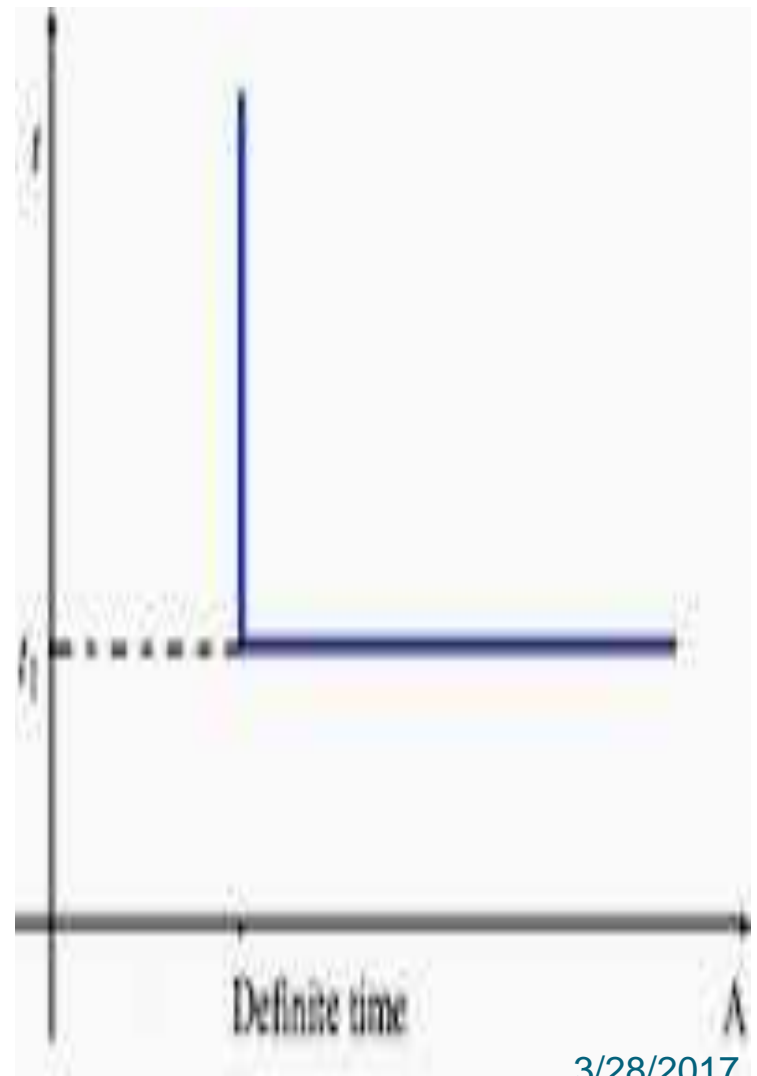


Characteristic of instantaneous overcurrent relays

➤ Definite time over current relay

This relay is created by applying intentional time delay after crossing pick up value of the current. A definite time over current relay can be adjusted to issue a trip output at definite amount of time after it picks up. Thus, it has a time setting adjustment and pick up adjustment.

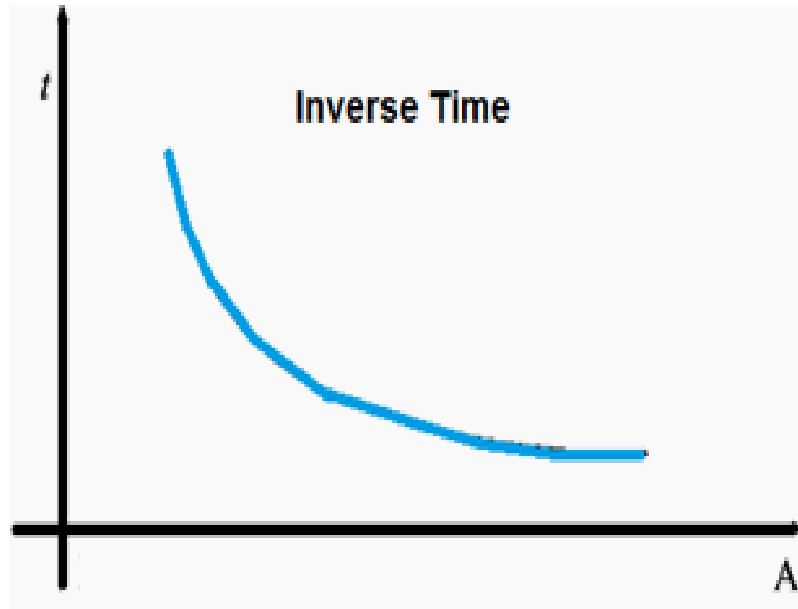
Attracted armature type relays with time element shows this characteristics.



➤ Inverse time over current relay

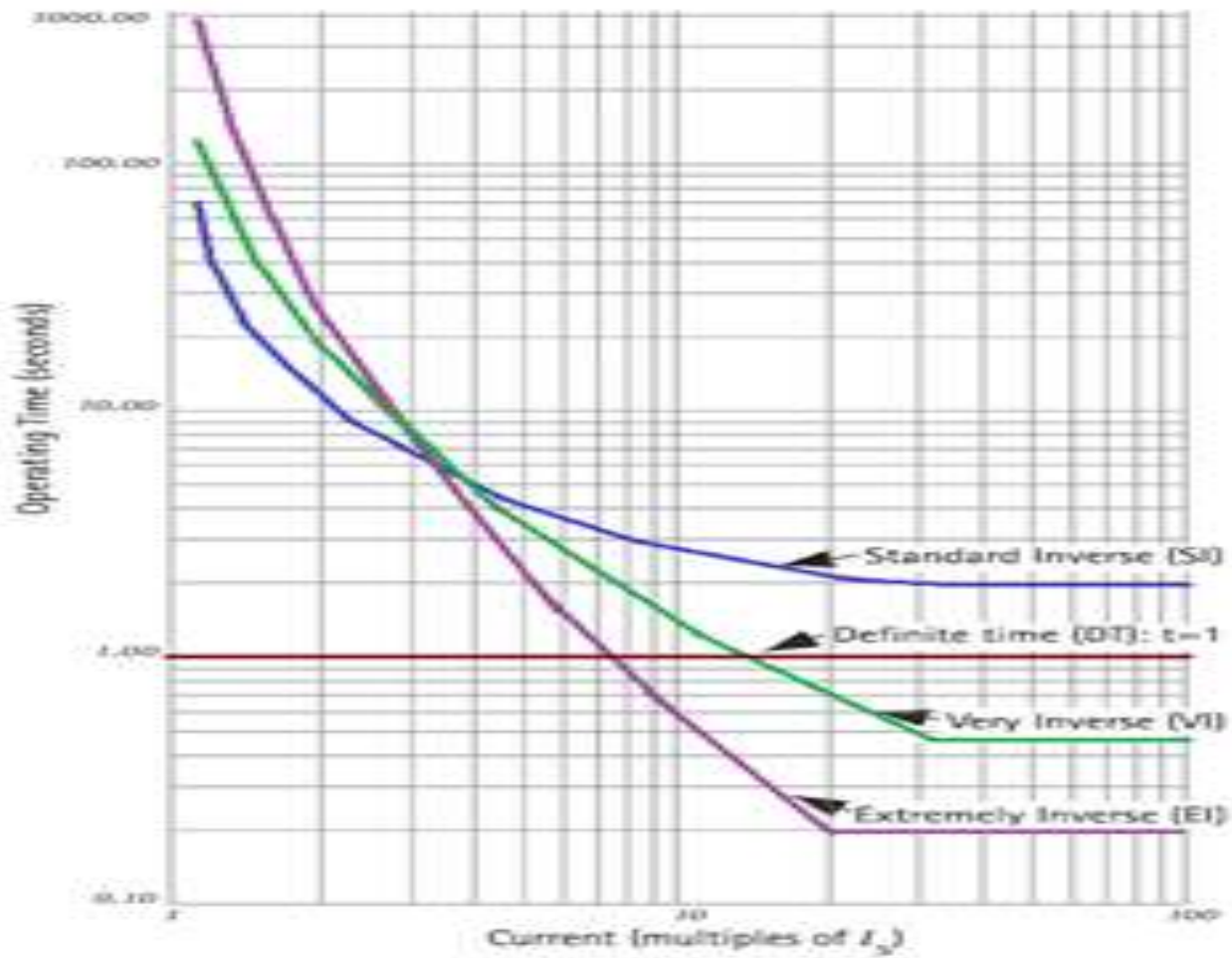
- Inverse time is a natural character of any induction type rotating device. This means that, the time of operation inversely varies with input current.
- This characteristic of electromechanical induction disc relay is very suitable for over current protection.
- In this relay, if fault is more severe, it would be cleared more faster.

Characteristics of inverse – time over current relay



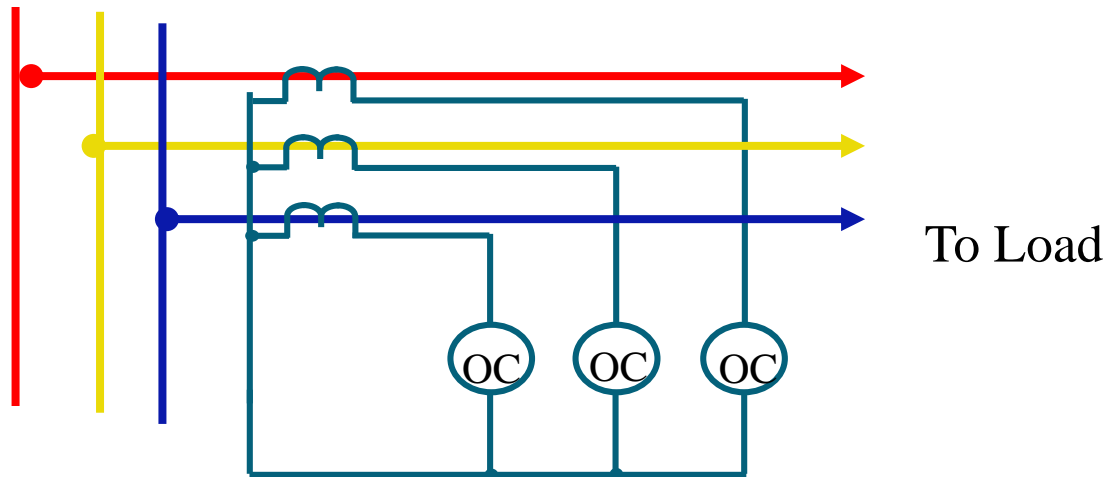
➤ Classification of Inverse time relays

- Inverse definite minimum time over current relay (IDMT) is again subdivided as
 1. Normal (standard) inverse
 2. Very inverse time
 3. Extremely inverse time relay



➤ Over current Protection Schemes

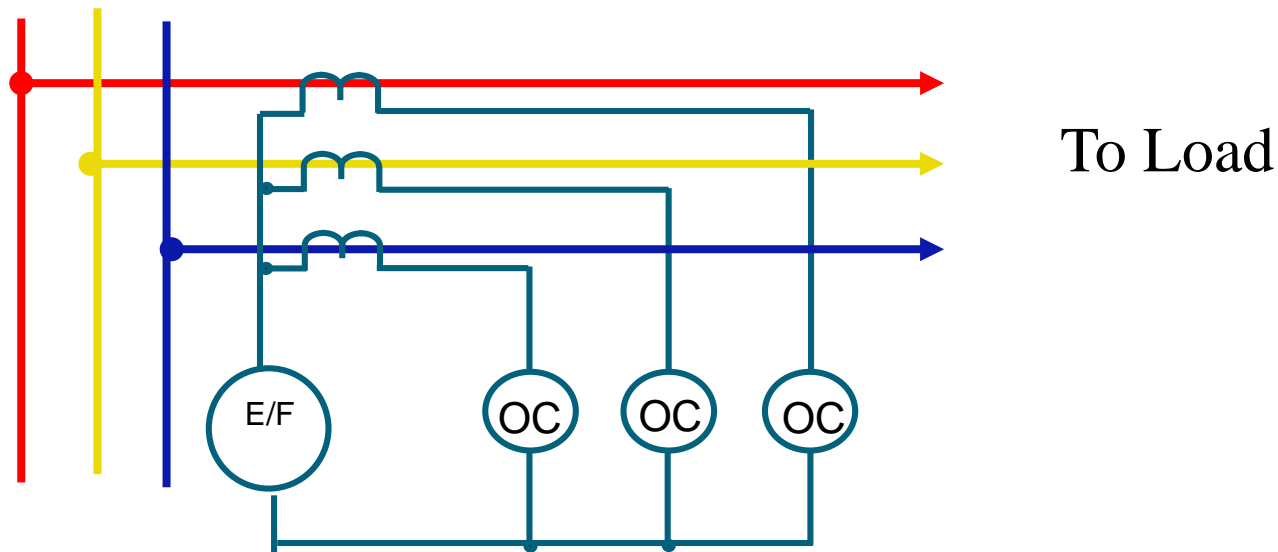
1. 3 Nos. of Over Current relays for Over current and Earth fault Protection.
 - For phase to phase faults the relays in only the affected phases operate. For single line to ground faults only the relay in the faulty phase gets the fault current and operates.



- the desired sensitivity with earth fault relays cannot be obtained in as much as the high current setting will have to be necessarily adopted for the over current relay to avoid operation under maximum load condition.

➤ Over current Protection Schemes

- (2). 3 Nos. of Over Current relays + 1 No. E/F relay for Over current and Earth fault Protection.
- For phase to phase faults the relays in only the affected phases operate.



- Under normal operating conditions and three phase fault conditions the current in the 3-phase are equal and symmetrically displaced by 120 degree, Hence the sum of these three currents is zero. No current flow through the earth fault relay. Only earth faults cause currents to flow through E/L relay

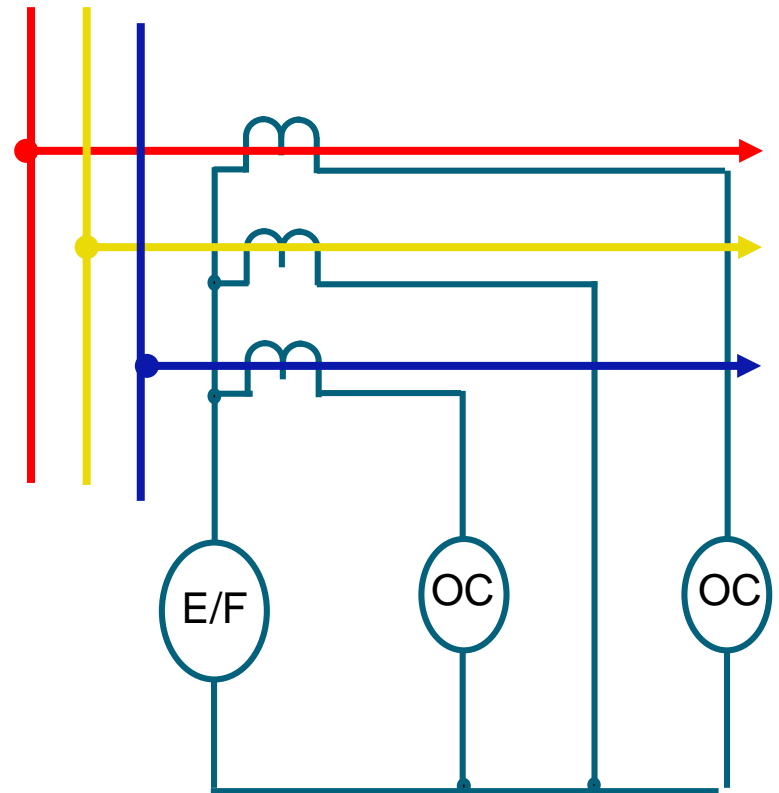
(3). 2 No O/C Relay + 1 No E/F Relay for Over Current and Earth Fault Protection

The two over current relays in R&B phases will respond to phase faults. At least one relay will operate for fault involving two phase.

For fault involving ground reliance is placed on earth fault relay.

This is an economical version of 3-O/C and 1-E/F type of protection as one over current

relay is saved.



➤ Application of Over current Protection

Overcurrent Protection is used in almost all electrical equipments such as.

- HT lines
- Transformers
- Generators
- Reactors
- Capacitor Banks
- Motors
- Neutral displacement relays in capacitor banks
- Breaker failure Protection

Thank You

Any query ??????