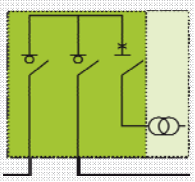
Architecture

Circuit breaker is the most flexible and cost effective solution to protect your transformer

Circuit breaker for transformer protection is smarter than fuse

RMU

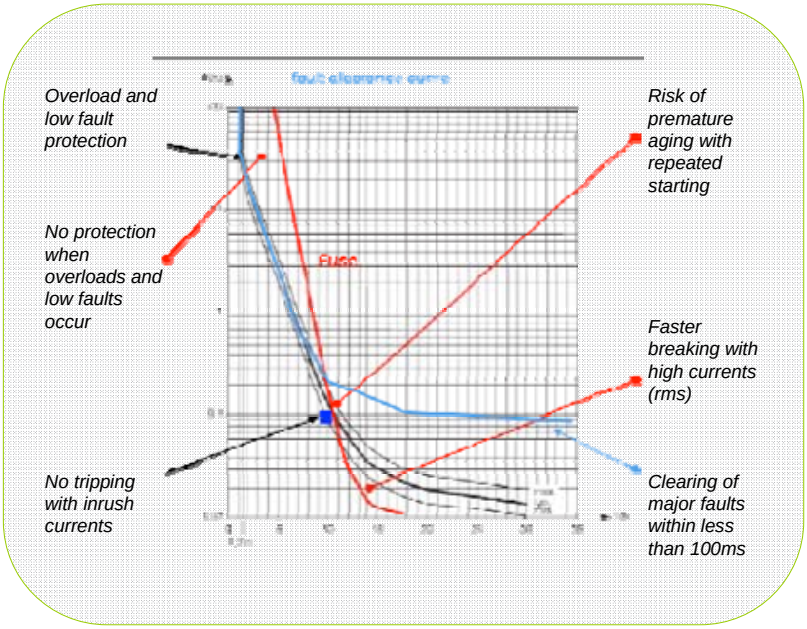


RMU – electrical scheme

Principle - **Circuit breaker RMU improves MV/LV transformer protection**

Circuit breaker associated with CT and protection relay **can break every type of fault currents** (overload and earth fault currents) following a tripping curve.

A fuse can only break high currents.
For instance, it can not break overload currents.



Main points to remember

- *Easiness to set.*
- *Better discrimination with other MV and LV protection devices.*
- *Improved protection performance for inrush current, overloads, low magnitude phase faults and earth-faults.*
- *Greater harsh climate withstand.*
- *Reduced maintenance and spare parts.*
- *More functions: measurement, diagnostic and remote monitoring.*

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Advantages - Full flexibility with only one device for all current rating

Schneider Electric recommends for many years now circuit breaker for transformer protection because of

● MV/LV transformer has usually a very low failure rate, and all faults in a transformer are starting with interturn fault or earth phase fault with low magnitude current. **Only circuit breaker can detect and clear this low current fault** avoiding the destruction of the MV/LV transformer, contrary to the fuse that is only able to break high current fault, so later.

● Compared to MV fuses, **circuit breakers** combined with electronic protection relays **bring many protection selectivity improvements**, including coordination with upstream and downstream devices. In the case of MV circuit-breaker, it is possible to choose the right curve in the electronic relay to ensure discrimination between MV and LV protection.

● Circuit breaker **require less maintenance** than MV fuse switches and reduce life time cost because:

- There is no need to keep large stock of spare fuses
- Modern protective relays are now almost maintenance free, as they include self testing features.

● Transformer energizing produces very high transient inrush current that can reach peak values, up to ten times the peak rated current The circuit breaker **allows greater flexibility to avoid tripping current** where still maintaining a good level of protection due to the electronic relay time/current characteristic.

● Recent developments of low cost circuit breakers and self powered relays allow to have circuit breaker solutions at **an equivalent life time cost** than traditional MV switch fuse solutions.

FAQ

● **Is circuit breaker as fast as fuse protection?**

"Fuse has to be very fast because it didn't do its job before during the first step of fault occurrence."

A three phase short circuit current is extremely rare in a transformer, and is always preceded by an earth fault or a low magnitude phase fault current that a fuse can not break. Generally, a circuit breaker will then break before the fuse.

Of course, when the three phase short circuit current is established, fuse is very fast, but new circuit breakers break in 60ms which is widely sufficient to protect efficiently the transformer.

● **Is life duration of electronic protection relays shorter than fuses?**

- Life duration of fuse is estimated at 5 years. If you do not change every 5 years your fuses, network availability will decrease.
- VIP relay is a simple product, without sophistication, without auxiliary power supply so it is very robust. Its life duration is estimated at 20 years.

● **How is it possible to know if the VIP relay is working properly?**

It is possible to test the whole protection chain (current transformer, VIP relay, MITOP, circuit breaker), contrary to fuses which are not possible to test.

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