Architecture
Manage a loop with CBs brings more availability than with switches

Innovative Premset makes loop management with CBs economically feasible!

Principle

A loop is an electrical link coming from a switching or HV/MV substation and going back to the same substation (or another one). Along this ring, around 10 to 20 MV/LV substations are connected. Generally, the loop system is open at one point (the "normally open point"). Each "half loop" is called "feeder".

This principle is mainly used in urban areas contrary to radial system which is used in rural areas. Load break switch or circuit breaker can be used for loop management.

● A switch is a switching device having load current breaking capabilities and short circuit making capabilities.
● A circuit breaker is a switching device having short circuit breaking and making capabilities.

Loop management aims at :
● restoring the power supply after fault detection and isolation
● optimising the network configuration to balance the load and the distributed generation
● facilitating network maintenance and evolution
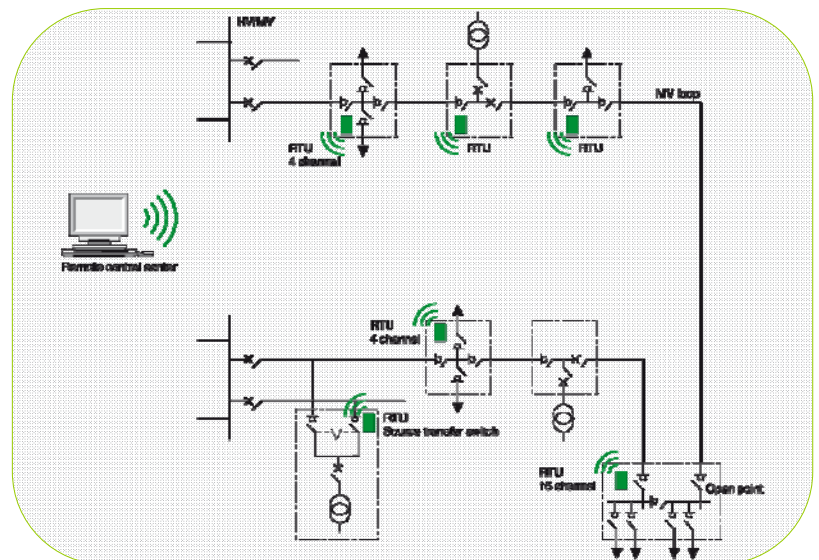
Main points to remember

• *Adding circuit breakers in distribution network loops is an efficient way to decrease the number of customers affected by an outage and reduce power restoration time.*

• *Cost-effective Premset solutions have been specifically designed*
       - integrated CBs
       - self-powered relays
       - optimised and compact low power CTs and VTs

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Advantages

● The management of a loop in case of fault is more efficient with a circuit breaker than with a switch; then brings more availability.

– With switches in the loop :
A general outage by mandatory tripping of the upstream protection in the HV/MV substation is the immediate consequence of an outage at any point of the loop.
The process to feed again can take some hours in order to localize (manually or automatically) and to isolate the faulty area.
– With circuit breakers in the loop :
Instead of tripping the complete feeder at the HV/MV substation, circuit breakers in the loop allow a tripping closer to the fault. The number of customer affected is then reduced. As a consequence, the fault is easier to locate since the healthy part of the feeder is still energized.
The process to feed again will be shorter thanks to automatic fault localization.

● Circuit breakers in the loop are safer than switches.
It could happen that phase fault occurs at the same time the switch or circuit breaker in the loop is opening during normal conditions of operation. In that case, the switch will not be able to break the fault while the circuit breaker will break it properly.

Schneider Electric offers compact fixed CBs with reduced maintenance dedicated to secondary distribution network.
Modern digital relays allow reducing time discrimination interval and thus provide the possibility to increase the number of protection layers by using CBs.

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FAQ

● **Is a switch better than a circuit breaker for frequent load break operation in the networks in conjunction with disconnection?**
- No, according to standards, a circuit breaker has higher operation endurance at rated current (up to 10 000 operations) than a switch.
- Furthermore, circuit breaker of Premset range also has disconnecting performance

● **How is selectivity done?**
- For earth fault, it is possible to do selectivity with a lot of levels.
- For phase fault, up to two levels are possible. An adequate mix of circuit breakers and switches will bring the most effective solution.
- It is also possible to use logic selectivity without limit in the number of circuit breakers. In this case, a pilot wire linking all MV/LV substations is required.

As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.

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