



Pole rebalancing reactor

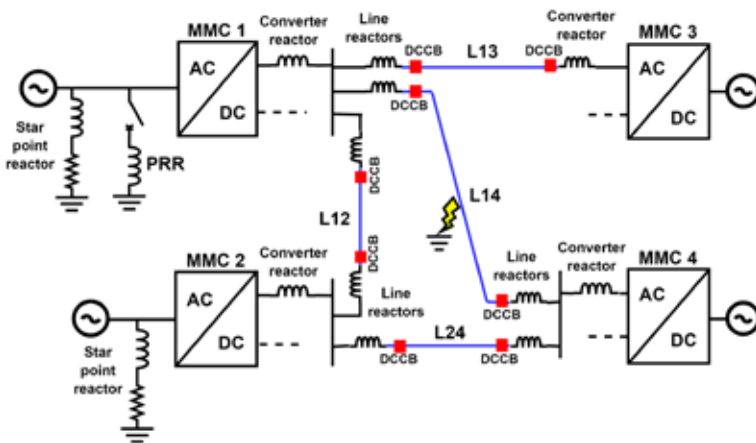
Symmetric monopole HVDC fault management

CONTEXT

Symmetrical monopolar is nowadays the most common architecture employed in HVDC system utilizing Modular Multilevel Converter (MMC) technology. In such configuration, only pole-to-pole faults give rise to high steady-state overcurrents. The most probable type of fault, the pole-to-ground fault, won't lead to high steady state fault overcurrents but to large overvoltages at both the AC and DC sides of the converter, especially on the nonfaulty pole. The resulting overvoltage is potentially dangerous and could damage the insulation of the equipment. Therefore, a protection strategy for symmetrical monopolar configuration has to consider both aspects of fault clearing and overvoltage management.

TECHNOLOGY DESCRIPTION

The pole rebalancing reactors (PRR) are installed at the AC converter side through an AC switch and are intended to be used to rebalance the healthy pole voltage after a pole to ground fault within less than 100ms. When a pole-to-ground fault takes place, and once the faulty line has been selectively isolated by means for example of line DCCB, the PRR are switched on. By this action, the high impedance grounding device (e.g. the star-point reactor) is by-passed, creating a low-impedance path that allows the flow of current between the AC and the DC grids. This current will flow through the stray capacitance of the cables and will discharge the healthy pole while charging the faulty pole. The PRR may be realized as an air core single-phase reactor and may have a value of few Henry. The use of series resistors can be considered in order to limit the discharge current.



APPLICATION DOMAIN

Protection of MTDC grid
Symmetrical Monopolar configuration

ADVANTAGES

What are the alternatives:

- natural rebalancing (sustained overvoltage)
- full discharge (need for DC discharging resistor)
- Dynamic Braking System (very costly)

This solution is:

- Faster
- Simpler (AC technology)

TRL SCALE



EMT simulation work.

DELIVERABLES

Patent appl. FR1850771

