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Development of a 20kV/400A Resistive Type DC Superconducting Fault Current Limiting Module

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Resistive type superconducting fault current limiter (SFCL) is one of the most promising SFCLs for HVDC systems. The resistance of SFCL is almost zero with the negligible influence on the system in normal operation. The increased impedance makes the current decreasing to levels below the breaker limit during a fault situation, which can effectively reduce the fault current in the DC system. Within a collaboration of Beijing Jiaotong University and Samri, one resistive type SFCL for the $\pm 20\text{kV}$ Nano-Substation has been designed and manufactured. The active part of the SFCL module consists of 8 solenoids made of 14mm wide steel-stabilized YBCO conductor supplied by Samri, and is housed in a cryostat operated at normal state liquid nitrogen. The 8 solenoids are parallel assembled, and the windings of the neighbouring solenoids are series connected. The rated operation current is 400A, and the prospected limiting resistance is $9\ \Omega$. By using of the SFCL, the maximum fault current could be reduced to about 2.1 kA.

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