USE OF SWITCHING CURRENT LIMITERS

Pirotti O. Ye., Guzin M. Yu.
National Technical University
«Kharkiv Polytechnic Institute»,
Kharkiv

Switch current limiters are current limiting devices for systems with rated voltages of 2.8 kV to 38 kV and rated currents up to 5000 A. Usually, current limiting reactors are used to limit short-circuit currents in power supply systems with such currents. However, there are cases where the level of short-circuit currents increases, so that the utility has to change its switchgear equipment to meet the new operating conditions. There are huge disadvantages to this: while upgrading the switchgear leads to high investment costs, the use of reactors leads to voltage losses and all the negative consequences that result from this.

Also for voltages of 3-35 kV and rated currents up to 315 A, fuses are widely used. However, they also have a number of serious drawbacks. It is well known that the fuse link determines the reliability and selectivity of the fuse. Imperfect fuse design leads to variations in the time-current characteristics of the fuse and so creates the possibility of damaging the fuse by various overcurrents. In addition, circuit tripping by fuses is usually associated with overvoltage, sometimes single-phase tripping is possible. In normal operation, current flows on the copper busbar. If a short-circuit occurs, electronic logic circuits are triggered which activate a disconnector that tears the busbar into several sections. Thus, multiple gaps are created and the current is transferred to the parallel connected fuse element. The fuse begins to melt, providing current limitation within the first half-cycle of the short-circuit current and up to the first peak. The main principles of the design and application of switch current limiters are, on the one hand, to use the advantages of fuses and, on the other hand, to eliminate the negative effects of reactors and savings due to not having to upgrade the switchgear. Current limiters can be installed in parallel to current-limiting reactors, in series with circuit-breakers or separately.

In modern western industry, current limiters are used in the power supply circuits of plants in a wide variety of industries: iron and steel, non-ferrous metals, petrochemicals and even nuclear power plants. These electrical devices have long proven their worth in industrial giants such as SHELL, Ford Motor Company, IBM and many others. The CLiP (for currents up to 5000 A) and PAF (for currents up to 600 A) are examples of current limiters widely used abroad.